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KNOWLEDGE SOCIETY IN MACEDONIA – POLICY PERSPECTIVES AND CHALLENGES

Abstract

This paper addresses the main policy perspectives and challenges towards building a knowledge society in Macedonia. Knowledge society encompasses variety of aspects determining the wealth generation and sustainable development, but it is primarily shaped by three core policy areas – education and training, ICT and research and development. Those three policies are elaborated from the perspective of the undertaken reforms, mutual coherence and crucial challenges with respect to the knowledge society. The need for developing better key policies and create a comprehensive policy framework encompassing all relevant policy aspects is stressed out as necessary to achieve progress towards the knowledge society. In that respect, proactive policy approach is distinguished as vital to ensure an optimal balance between the knowledge and utilization of the available resources in a sustainable way.

Keywords: Knowledge society, Information and Communication Technologies (ICT), Education and Training, Research and Development (R&D).

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Introduction

In the 21st century, a new society is emerging where knowledge has become the most important factor determining the wealth generation and sustainable development (SD). The core element of the knowledge society is information economy, based

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on advanced information and communication technologies (ICT). Technological change imposes reconfiguration of the economic, social, cultural, political and organizational structures, as well as adaptation of supporting legal and regulatory frameworks. Maximisation of the possibilities to benefit from the technological changes highly depends from the pro-activity towards the changes. Only proactive policy approach could ensure an optimal balance between the knowledge and utilization of the available resources in a sustainable way, resulting in a comprehensive wealth for the country, combined with social cohesion and a healthy environment.

The strategic goal for 2010 set for the European Union at the Lisbon European Council (March 2000) was “to become the most competitive and dynamic knowledge-based economy in the world, capable of sustainable economic growth with more and better jobs and greater social cohesion”.¹⁾ However, the EU realised that it has been intrinsically difficult to come close to the Lisbon objectives. At the European Commission’s request, in November 2004, a group of independent experts assessed the results of the first cycle of the Lisbon Strategy and the causes of the muted progress, and proposed a way forward in order to achieve the Lisbon objectives. The Lisbon Agenda was narrowed to ten priority areas focusing on three primary objectives: Europe as a more attractive place to invest and work; knowledge and innovation for growth; and more and better jobs.²⁾ Significant efforts were put in these areas, but the outcomes were not as expected. The financial crises from 2008 which put the EU into recession contributed to the underperformance of the Lisbon goals. Therefore, building of a knowledge based economy proved to be a difficult task, even for developed countries. At the same time, the EU reaffirmed that despite difficulties, the knowledge based economy should remain the primary navigation course in the 21st century.

Macedonia, as a candidate country for the EU membership needs to start its transformation towards the knowledge society without delay. Building of a knowledge society in Macedonia is not just relevant for faster integration into the EU, but it is primarily essential for better utilisation of the available resources of the country. The paper strives to provide profound discussion about the importance of perceiving knowledge society as target for the future by the national policy-makers, and the necessary steps that need to be undertaken in that direction. The paper analyses were largely based on the extensive theoretical and empirical analysis related to the subject.

1) http://www.europarl.europa.eu/ftu/pdf/en/FTU_4.1.pdf

2) <http://eu2009.cz/en/eu-policies/competitiveness/competitiveness/competitiveness-684/index.html>

1. KNOWLEDGE ECONOMY INDICATORS

Given the importance of the knowledge economy, the World Bank has developed methodology for its measurement. Four key variables serve as proxies for Knowledge Economy Index (KEI):³⁾

- 1) Economic Incentive and Institutional Regime
- 2) Education
- 3) Innovation and
- 4) Information & Communications Technology (ICT),

In addition to this, there is Knowledge Index (KI) – a simple average of the country scores on the key variables in the three mentioned pillars – education, innovation and ICT. Table 1 provides an insight into both indexes for top 20 countries and Macedonia in 2012. The performance has been measured on a scale from 0 (lowest) to 10 (highest) score. Also, the rank from previous available measurement in 2000 and 1995 has been included in the Table.

Table 1

KNOWLEDGE ECONOMY INDEX AND KNOWLEDGE INDEX IN TOP 20 COUNTRIES AND MACEDONIA IN 2012

Rank 2012	Rank 2000	Rank 1995	Country	KEI	KI	Economic Incentive Regime	Innovation	Education	ICT
1	1	4	Sweden	9.43	9.38	9.58	9.74	8.92	9.49
2	8	7	Finland	9.33	9.22	9.65	9.66	8.77	9.22
3	3	2	Denmark	9.16	9.00	9.63	9.49	8.63	8.88
4	2	5	Netherlands	9.11	9.22	8.79	9.46	8.75	9.45
5	7	3	Norway	9.11	8.99	9.47	9.01	9.43	8.53
6	9	6	New Zealand	8.97	8.93	9.09	8.66	9.81	8.30
7	10	10	Canada	8.92	8.72	9.52	9.32	8.61	8.23
8	15	14	Germany	8.9	8.83	9.10	9.11	8.20	9.17
9	6	9	Australia	8.88	8.98	8.56	8.92	9.71	8.32
10	5	8	Switzerland	8.87	8.65	9.54	9.86	6.90	9.20
11	11	12	Ireland	8.86	8.73	9.26	9.11	8.87	8.21
12	4	1	United States	8.77	8.89	8.41	9.46	8.70	8.51
13	16	22	Taiwan, China	8.77	9.10	7.77	9.38	8.87	9.06
14	12	11	United Kingdom	8.76	8.61	9.20	9.12	7.27	9.45
15	14	13	Belgium	8.71	8.68	8.79	9.06	8.57	8.42
16	19	24	Iceland	8.62	8.54	8.86	8.00	8.91	8.72
17	13	15	Austria	8.61	8.39	9.26	8.87	7.33	8.97
18	25	19	Hong Kong, China	8.52	8.17	9.57	9.10	6.38	9.04
19	26	27	Estonia	8.4	8.26	8.81	7.75	8.60	8.44
20	22	20	Luxembourg	8.37	8.01	9.45	8.94	5.61	9.47
57	73	68	Macedonia	5.65	5.63	5.73	4.99	5.15	6.74

Source: World Bank database (http://info.worldbank.org/etools/kam2/KAM_page5.asp)

As evident from the Table 1, the Scandinavian countries –Sweden, Finland and Denmark were leaders in the knowledge economy in 2012, with KEI scores of 9.43; 9.33 and 9.16, respectively. Sweden and Denmark had the same ranking in 2000 (Table 1/Column 2), while the ranking in 1995 included both countries in the top four (Table 1/Column 3). That indicates the continuity of the investment into Education, Innovation and ICT in these countries in a longer period of time. Furthermore, the KEI indicators positioned 11 EU countries (out of 27) in the top 20 in 2012, indicating the EU commitment to achieve good performances in the measured areas.

The biggest drop in the rankings was registered by USA, which dropped from the 1st position in 1995 to the 4th position in 2000 and down to the 12th position in 2012. This was largely attributable to the deterioration of the education score from 9.44 in 1995 down to 8.70 in 2012, while innovation score also decreased - from 9.84 (1995) to 8.51 (2012).⁴⁾ Only ICT score remained relatively stable.

Macedonia has been ranked on the 57th position (out of 146 countries) in 2012 or 16 positions up compared to the 73rd ranking in 2000. Macedonian KEI score was 5.65 in 2012 (out of 10) against 4.76 in 2000 (Table 2). In terms of specific variables, the best performance in 2012 was registered in the ICT with score of 6.74, while education score was 5.15. All indicators, apart of education, experienced positive change compared to 2000, while education score dropped to 5.15 in 2012 against 5.54 in 2000. In the group of lower middle income class countries, Macedonia took the 2nd position in 2012 (out of 42 countries), which could hardly be assessed as success, as previously the country has been included in the group of upper middle class country, where most of the neighbouring countries still belong, apart of Bosnia and Herzegovina (included also in the group of the lower middle income class countries).

Table 2

**KNOWLEDGE ECONOMY INDEX AND KNOWLEDGE INDEX IN
MACEDONIA IN SELECTED YEARS**

Year/ indicator	KEI	KI	Economic Incentive Regime	Innovation	Education	ICT
2012	5.65	5.63	5.73	4.99	5.15	6.74
2000	4.76	5.15	3.62	4.35	5.54	5.55
1995	5.14	5.41	4.32	4.43	4.81	7.00

Source: World Bank database (http://info.worldbank.org/etools/kam2/KAM_page5.asp)

The KEI ranking for Macedonia in the period 2000-2012 (Table 2) provide some ground for optimism related to building of a knowledge development platform in Macedonia, although the current economic situation in the country is not really en-

³⁾ http://info.worldbank.org/etools/kam2/kam_page5.asp

⁴⁾ Ibidem

couraging. In the course of 2011, the unemployment rate was over 31%, the trade deficit reached over US\$2.3bn and the FDI were rather low – around US\$400m.⁵⁾ Those indicators, along with the changing economic environment on the global level, should be taken as a warning that holding the status quo is not an option. Macedonia needs to move forward and embrace the conditions necessary to underpin higher value added economic activities, better and more productive jobs, new social prosperity and sustainable use of the resources within the environmental limits. In that respect, governance's vision and quality of the policies determine the country's success in transition towards knowledge society.

2. POLICIES CONTRIBUTING TO KNOWLEDGE SOCIETY IN MACEDONIA

The knowledge society encompasses variety of aspects of the modern society – primarily education, technology, research and development (R&D), employment, infrastructure, industry, services and agriculture. The governance focused on building knowledge society needs to provide an optimal balance among the relevant policies. Policies related to science and technology, industry and education will need to emphasize the role and importance of the innovation systems, as well as necessary infrastructure and incentives to boost investments in research and development. Therefore, knowledge as an essential asset of the new society should be managed through governance system based on an integral policy-making to ensure interrelation of all policies regulating or contributing to some aspects of the knowledge society.

The main challenges to build knowledge society in Macedonia will be addressed from the perspective of the three core policy areas – education and training, ICT, research and development. Those policies tackle the KI variables mentioned previously.

2.1. Education and training policy

In the context of the knowledge society, the policy on education and training in Macedonia should aim towards creating values and knowledge that correspond to the demands of the domestic economy, as well as changing global society in all sectors. Moreover, educational policy should have a broader role of developing ethics, moral and social behaviour aiming at reducing inequalities and exclusion. Accomplishment of these tasks imposes the responsibility of the policy-makers to:

- Develop a comprehensive policy and regulatory framework for education and training to support the information economy and knowledge society;

⁵⁾ National Bank of the Republic of Macedonia/ main economic indicators/ <http://www.nbrm.mk/?ItemID=750FC531FC3D1B49B16440313562D400>

- Establish a system for professional development of teachers, trainers, researchers and all workers in the education and training sector and
- Enhance cooperation between industry and education.

Regarding the development of a comprehensive policy and regulatory framework for education, Macedonia experienced intense reforms in the education system in the past decade. The reforms were mostly tailored to strengthen the management, administration and teachers' competences in primary and secondary schools. The 2003-2010, the Education Modernization Project, financed with an IBRD loan, has helped Macedonia to respond to the challenges of creating a decentralized education system by:⁶⁾

- Establishing a school self-evaluation process; an evaluation performed by the State Education Inspectorate; and a nationally administrated assessment of student achievement, which provides data about the quality of the education system;
- Introducing medium and long-term planning at both central administration and school levels;
- Providing School Improvement Grants – of up to \$30,000 each – to all 427 primary and secondary schools to improve infrastructure, strengthen student security and hygiene, and provide teacher training and teaching aids.

According to the project assessment, the results have shown that between 2004 and 2008, the enrolment into secondary schools increased to 95 percent from 85 percent, and dropout rates decreased to 1.9 percent from 2.1 percent. A market for teachers' training has been established, along with criteria for accreditation and monitoring of teacher training services. In addition, from 2004 to 2007, 48.8 percent of school managers and teachers reported improvements in students' achievements, 60.7 percent saw improvement in planning and assessment processes, and 28.5 percent confirmed that attendance and participation of students improved.⁷⁾

In addition, there were reform activities in the higher education that included "liberalisation" of the education by enabling opening of private universities (2003), as well as compulsory implementation of the Bologna Declaration as of academic year 2009/2010.⁸⁾ That resulted into serious increase of the number of graduated from the higher education institutions (Table 3), in particular from post-graduated studies, while the absorption capacity of the economy has not increased, which caused changes on the labour market with regards to the structure of the unemployed.

⁶⁾ <http://web.worldbank.org/WBSITE/EXTERNAL/NEWS/0,,contentMDK:22489080~pagePK:64257043~piPK:437376~theSitePK:4607,00.html>

⁷⁾ Ibidem

⁸⁾ Law on Higher Education (Official Gazette of the Republic of Macedonia 35/08)

Table 3

UNIVERSITY AND POST-GRADUATE DEGREES IN MACEDONIA (2005-2011)

Category/Year	2005	2006	2007	2008	2009	2010
1. Graduated university students (total)	5132	5771	7835	10027	9570	9030
2. Master of science	198	203	277	272	425	691
3. Ph.D	92	85	82	87	119	157

State Statistical Office of the Republic of Macedonia/Statistical Review No. 2.4.11.12/695

Furthermore, the need for life-long learning was recognized and put into legal framework with the Law on Adult Education enacted in 2008.⁹⁾ These reforms aim to produce educated persons in accordance with the labour market needs and towards improvement of the competitiveness of the country’s economy, but the outcome is determined by many factors. Unfortunately, no detailed and comprehensive assessment of the introduced reforms in the tertiary and long-life education has been conducted so far.

Vital part of the efforts for promotion of the education’s outcomes is the professional development of the educational and training personnel. The education and training sector’s ability to adjust quickly to the demands of the information economy significantly determines the pace of adjustment of the workforce and community as a whole. So far, the professional development in the educational system in Macedonia has been supported with different projects funded by donors such as World Bank, USAID and EU that have provided part of the personnel in this sector with modern methodological and didactical skills. Furthermore, the Government project on modernisation of education¹⁰⁾ started in 2006 and the component “Computer for every child” has already provided sufficient IT equipment in the education system, enabling introduction of interactive and interesting teaching methods. These activities imply extensive changes in the education, but the process is a gradual one, given the complexity and size of the system.

Despite reforms, the KEI score indicated downward movements in the field of education in Macedonia, given the decrease of the score to 5.15 in 2012 against 5.54 in 2000. Furthermore, the education had lower performances compared to other variables, apart of innovation (Table 1). In addition, the current labour market situation in Macedonia indicates serious problems with regards to the engagement of the available human resources. Although decreasing in the past few years, the rate of unemployment is still rather high – over 31% in the period 2005-2011 (Table 4). The labour

⁹⁾ European Commission Progress report on the Republic of Macedonia 2008, Chapter 26/ <http://www.sep.gov.mk/Default.aspx?ContentID=36&ControlID=IzvestaiEU.aspx>

¹⁰⁾ Project on modernisation of education, *Ministry for information society* www.mon.gov.mk/PMO/files/mk/vazni-dokumenti/Progress-Report-MK-5.pdf

market is facing a situation of a continuous increase of the unemployment of the youth and highly educated persons, which raises a question about the matchmaking between the education reforms and labour market demands.

Table 4

PARTICIPATION OF THE UNEMPLOYED PERSONS WITH HIGHER EDUCATION* ON THE LABOUR MARKET IN MACEDONIA(2005-2011)

Category	2005	2006	2007	2008	2009	2010
1. Rate of unemployment	37.3	36.0	34.9	33.8	32.2	32.0
2. Unemployed persons (in absolute number)	323934	321274	316905	310409	298873	300439
3. Unemployed persons with higher education (in absolute number)	19892	21910	23550	24077	29376	32973
4. Share of the unemployed with higher education in total unemployed persons (in %)	6.1	6.8	7.4	7.8	9.8	11.0

* Data refer to the persons with graduate education, masters and Ph.D

Source: State Statistical Office of the Republic of Macedonia/Labour Force Survey, Statistical Review No 2.4.11.09/692; No 2.4.10.04/651; No 2.4.9.12/632; No 2.4.8.06/593 and No 2.4.6.07/531.

The current situation of large share of the unemployed persons with university degree in the total unemployed, imposes a great challenge to these persons to increase their flexibility to the economy's demands. In this context, there were/are some programmes and projects related to increase of the skills of the labour force, in particular the EU funded V.E.T (Vocational Education and Training) project providing technical and financial assistance to the reforms in the Macedonian education since 1999.¹¹⁾ There were four V.E.T. projects so far, while the latest one (since 2006) aims to enhance secondary education and to modernise VET schools in order to meet the needs of the labour market. The previous projects aimed to introduce new equipment and to implement new curricula related to modern IT equipment and specific branch equipment in workshops and laboratories.¹²⁾ Another project focusing on the link between the labour market and education is the USAID project "YOUTH EMPLOYABILITY SKILLS (YES) NETWORK ACTIVITY" (2010-2015) that should provide the youth will relevant skills that will enable them to participate in the modern economy. The programme targets students in their final year in the Macedonia's Vocational Education and Training (VET) Schools, unemployed registrants with the Employment Service Agency (ESA) and other out-of-school youth, aged 15-24.¹³⁾ There are two components of the project: 1) Build public-private dialogue to better match the skills

11) EFT country plan 2009 for Macedonia/European Training Foundation [http://www.etf.europa.eu/pubmgmt.nsf/\(getAttachment\)/D11CDB3695FA111CC12575390036E66D/\\$File/NOTE7N5DQR.pdf](http://www.etf.europa.eu/pubmgmt.nsf/(getAttachment)/D11CDB3695FA111CC12575390036E66D/$File/NOTE7N5DQR.pdf)

12) <http://www.bfi-wien.at/eu-projekte/vet-macedonia/>

13) <http://macedonia.usaid.gov/en/sectors/education/YES.html>

required in the labour market with those developed in schools and 2) Improve the “supply” of future workers by creating Youth Employability Skills networks.¹⁴⁾ Given the start of the project in September 2010, no assessment of the results is yet available.

The mentioned projects mostly refer to acquiring skills in the secondary schools or vocational training, while the cooperation between industry and higher education in Macedonia appear mostly ad hoc, i.e. there is no systematic integration between those two sectors. The higher education policy has not been really related to the industrial policy, as evident from the growing number of the unemployed highly educated persons (Table 4), who, implicitly, have specialization in non-propulsive industrial branches. In addition, there is a strong trend of increase of the number of the persons with higher and postgraduate education in the period 2009-2011 (Table 3), while the industrial policy has not designated specific areas of development which should serve as a guide in curricula formulation by the Universities. Further lack of systematic link between both fields (university education and industrial policy) would likely to continue producing educated workforce that would face problems to find adequate jobs. This situation, along with the decreasing score of the education component in the KEI index (Table 2) indicates huge challenges in the area of the education policy towards building of a knowledge society in the country.

The education policy should be further developed to contribute genuinely to a knowledge society platform. The university education must be closely linked to the labour market demands and the lifelong learning must really become a key policy focus, highlighting the mutually reinforcing importance of the economic and social strands to the knowledge society development. Moreover, the policy framework should ensure sufficient public investment in education, but also needs to encourage effective partnerships with the private sector that can provide access to a wider pool of expertise and technology, open up new market opportunities and create more favourable climate for innovation of efficient and effective methods of education and training.

2.2. ICT policy

Creation of a knowledge society is not possible without advanced ICT infrastructure in the country, available to all citizens under favourable terms. The ICT policy in Macedonia should aim to enable access to advanced information technology and telecommunication infrastructure at an affordable price for all citizens and especially to education, training and research institutions. Better access to the current ICT

¹⁴⁾ Ibidem

infrastructure has been foreseen in the National Strategy for Development of Information Society in Macedonia elaborated in 2005.¹⁵⁾ So far, a noticeable progress has been registered in this area, as the number of the companies (with 10 or more employees) using internet increased from 70.3% in 2006¹⁶⁾ to 88.6% in 2011.¹⁷⁾ In addition, internet access was significantly improved in the households from 14% in 2006¹⁸⁾ to 55% in 2011.¹⁹⁾

The KEI index confirmed that the country stands well in the area of ICT (Table 2). The score ranged from 7.00 in 1995, down to 5.55 in 2000 and up to 6.74 in 2012. Given that the ICT index refer to the “information and communication technology to facilitate the effective creation, dissemination, and processing of information”,²⁰⁾ the increasing use of the internet in the country is encouraging, along with the rising availability of the e-services. Within the framework of the USAID project e-government (2004-2011), the following e-services were developed:²¹⁾

- Electronic public procurement;
- Single portal for export/import licences (EXIM);
- Online registration of employment;
- Automated system for management of international cargo transport licences;
- E-tax services;
- Online application for civil servant positions and
- E-budgeting.

However, the electronic trade is still barely used in the country, while use of e-learning systems in Macedonia is rather limited, due to the insufficient infrastructure in the education and training institutions, as well as limited equipment that end-users possess for access and use of the online services. The project on modernisation of the

¹⁵⁾ National Strategy for Development of Information Society in the Republic of Macedonia, *Ministry for information society* http://www.mio.gov.mk/files/pdf/dokumenti/Strategija_i_Akcionen_Plan.pdf

¹⁶⁾ Information society news release 8.1.7.05, *State Statistical Office of the Republic of Macedonia*

¹⁷⁾ Information society news release 8.1.11.22, *State Statistical Office of the Republic of Macedonia*

¹⁸⁾ Information society news release 8.1.6.14, *State Statistical Office of the Republic of Macedonia*

¹⁹⁾ Information society news release 8.1.11.25, *State Statistical Office of the Republic of Macedonia*

²⁰⁾ <http://web.worldbank.org/WBSITE/EXTERNAL/WBI/WBIPROGRAMS/KFDLP/EXTUNIKAM/0,,contentMDK:20584268~menuPK:1433162~pagePK:64168445~piPK:64168309~theSitePK:1414721,00.html>

²¹⁾ <http://macedonia.usaid.gov/en/sectors/economic/egov.html>

education, in particular, the component “Computer for every child” has provided some infrastructure in the primary and secondary schools, but the foreseen outcomes of the projects should be expected in a longer period of time.

As the modern trends in the education and training encourage wider use of e-learning as key mode of education, the ICT policy should promote establishment of reliable, sustainable, affordable and mutually compatible infrastructure support systems and high capacity networking within and among education, training and research institutions. Furthermore, rapid technological changes in the world impose a need for prompt adaptation of the national economy that should be based on carefully selected industries for development, with highest potential for technological advancement and innovation. Therefore, although performing better compared to the other KEI components, ICT policy should continue to follow developments in this area, in purpose of providing platform for other knowledge economy components.

2.3. Research and development policy

Another core policy area contributing to the knowledge society is research and development (R&D). The importance of R&D has been recognized as a priority in the EU Lisbon Strategy aiming at boosting employment and growth in Europe. The rapid pace of technological change on the global level imposes need for immediate actions for research and development on the local level, especially in the countries that are economically and technologically lagging, such as Macedonia. The KEI indexes confirm that the country needs to undertake serious reforms in the area of R&D, given the lowest score in the area of innovation, compared to other KEI components (Table 2). The score ranged from 4.43 in 1995, down to 4.35 in 2000 and up to 4.99 in 2012.

The current situation in the country reflects lack of genuine support to this sector, represented through low technological level in the industry, very low funds for research and innovations, negligible investment in talents and narrow embedding of research in practice. Central budget allocation for research and development stands on a low level, although it registered an increase from €12.9m in 2007 up to €20.4m in 2008, but decreased again to €15.4m in 2009 (Table 5). Most of these finances were allocated for the salaries of the personnel employed in these institutions, leaving very scarce budget for the equipment and other necessities for the research activities.

As evident from the Table 5, the number of employed in the research institutions decreased by 17% year on year in 2009, or down to 5085 persons against 6114 in 2008. Given that only around 60% of the total employees in these institutions are researchers, this fact additionally stresses out the unfavourable situation with regards to research and development sector in Macedonia. The number of employed in R&D in the business sector is not sufficient, as well, confirmed by the low number of domestic patents in the analysed period, in particular 2008-2009.

Table 5

EMPLOYEES AND SUPPORT IN THE R&D INSTITUTIONS (2007-2009)

Category	2007	2008	2009
1. Number of research institutions	53	53	51
2. Total number of full-time employees in the R&D institutions	6245	6114	5085
2a) Business sector	1865	1407	1465
2b) Government sector*	710	712	647
2c) Higher education sector	3670	3995	2973
3. Employees on contract in the R&D institutions	515	495	316
4. Share of the researchers in the total number of employees in R&D (in %)	62.1	61.8	61.2
5. Ministry of education and science allocation on R&D (in millions \square), including salaries in the sector	12.9	20.4	15.4
6. Number of domestic patents	150	34	39

* The government sector includes the institutions financed by the Government, which primarily deal with R&D, such as research institutes.

Source: State Statistical Office of the Republic of Macedonia/Statistical Review on Research and Development No.2.4.0.01/611; No.2.4.11.08/691; No.2.4.11.18/703; Annual Report of the State Office of Industrial Property 2010.

The insufficient R&D activity in the country has been affecting the country's competitiveness. According to the World Economic Forum Global Competitiveness Index (GCI) 2011-2012, Macedonia was ranked 79 (out of 142) with score of 4.05 (out of 7), according to the overall index of competitiveness. In terms of sub-indices, Macedonia had lowest score in "innovation and sophistication factors" - only 3.14 (rank 104).²²⁾

The low competitiveness index reflects the lack of the industrial policy in a longer period of time. Macedonia has formulated the industrial policy relatively late, in 2009. Nevertheless, the recently formulated policy framework does not clearly stress out the industrial areas that should be prioritized. Certain prioritization was done within USAID project on "Macedonian competitiveness activity" in 2003,²³⁾ which selected five clusters with highest potential for competitiveness increase – lamb meat and cheese, tourism, information technology, wine and textile apparel. In addition, Macedonian government has distinguished the sectors with highest investment and export potential in 2007. These are: automotive components industry, information communications technology, healthcare products (pharmaceuticals and medical devices) and agro-business and food processing industry.²⁴⁾ However, no specific development measures are undertaken following the mentioned prioritization.

²²⁾ http://www3.weforum.org/docs/WEF_GCR_Report_2011-12.pdf

²³⁾ USAID Macedonia Competitiveness Project, http://macedonia.usaid.gov/English/EG/MCA_eng.htm

²⁴⁾ Invest in Macedonia, <http://www.investinmacedonia.com/page.aspx?language=EN&page=UM729bN5xqDvjEyW5Mhx0Q>

Those priorities should serve as guidelines for the reforms in the R&D policy, as well as education system, but need to be supported by both - the private and public sector. The focus of the research policy should not be only on the individual research institutions and researchers, but on the interaction between research and various business and social actors crucial for applying knowledge and delivery of better jobs and higher standard of living. According to the Global Competitiveness Index 2011-2012, the third ranked factor as problematic for doing business in Macedonia was “inadequately educated workforce”.²⁵⁾ The intense reforms in the education and increased number of unemployed highly educated persons (Table 3) raises question about the quality of the undertaken reforms in education in line with the demands of the global economy. In this respect, establishment of the educational clusters of excellence in the selected areas for development could be a good approach towards enhancement of the cooperation between industry and education.

R&D determine competitiveness in the knowledge society at great extent, as information economy is based on knowledge-based industries. Therefore, further efforts should be focused on formulation and implementation of coherent R&D and industrial policy, focused on technological advancement, higher growth and prosperity for a country. Both these policies needs to ensure higher technological base that will underpin higher value added economic activities, optimal utilisation of human and other resources, increased employment, growth in productivity and higher international competitiveness. Accomplishment of these tasks requires not only a strong R&D and technology base, but also strong capacities in industry to convert fundamental and applied research into new products, services or processes, as well as to bring these innovations quickly to the market. That is certainly a serious challenge for the policy-makers, but the pace of the technological development is not leaving an alternative.

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Considering the variety of specific challenges for development of a knowledge-based society in Macedonia, ***the policy-makers need to develop proactive approach aiming at better key policies and to build coherent framework that will encompass all policy aspects relevant for the knowledge society.*** Sustainable future of the country could be ensured if citizens are embodied with the key competencies and functional literacy for the knowledge economy. As Charles Darwin said: “It is not the strongest of the species that survive, nor the most intelligent, but the ones most responsive to change”.²⁶⁾ In the knowledge society’s terminology, only nations acquiring and effectively using knowledge could be winners in the modern world.

²⁵⁾ http://www3.weforum.org/docs/WEF_GCR_Report_2011-12.pdf, p.242

²⁶⁾ Charles Darwin Quotes, *Brainy Quote*, http://www.brainyquote.com/quotes/authors/c/charles_darwin.html

CONCLUSION

Knowledge society has become a target of many societies at the start of 21st century, as it provides preconditions for comprehensive wealth, social cohesion and a healthy environment. Knowledge society encompasses variety of aspects determining the wealth generation and sustainable development, but it is primarily shaped by three core policy areas – education and training, ICT, research and development. In each of these policies, the knowledge is an essential asset that should be managed through effective and efficient policy approach on both levels – individual and integral policy making. The latter one is distinguished as vital to ensure an optimal balance between the knowledge and utilization of the available resources in a sustainable way. The current situation in Macedonia indicates determination towards building of a knowledge society in the country, but substantial efforts needs to be focused on development of integral policy approach.

In terms of specific policies, Macedonia has experienced significant reforms in the area of education and training in the past decade. Management, administration and teachers' competences in education were strengthened and life-long learning was brought into the policy-makers' focus. The main challenges with regards to further reforms in the area of education and training are related to introduction and application of new technologies and methods in the education and training that should enable delivery of proper skills for knowledge society, maintaining the lifelong learning as key policy focus, ensuring sufficient public investment in education and promotion of partnerships with the private sector. Also, the policy on education and training should ensure continuous professional development of the personnel in this sector, as well to provide advanced ICT infrastructure in the country that will have a strong role in performing and boosting economic activities. Additional challenge for the policy-makers is to enhance cooperation between industry and education through establishment of educational clusters of excellence in the selected areas for development, according to the country's resources. This also requires for improved link between education and labour market in Macedonia.

Another core policy area contributing to the knowledge society is research and development. The current situation in the country reflects lack of real support in this sector, especially visible through decreasing number of personnel in this area, as well as insufficient funds for research and innovations. Therefore, a better R&D policy in Macedonia should ensure strong support to research institutions and boost cooperation between industry and R&D, essential to accelerate the achievement of the knowledge society goals. In this respect, lack of specific industrial policy in the country represents a serious obstacle that should be promptly addressed by formulation and implementation on coherent industrial policy focused on technological advancement, higher growth and prosperity for a country. The R&D policy needs to ensure higher technological base that will underpin higher value added economic activities leading

toward better economic performances of Macedonia, but it should also contain a dimension that will ensure sustainable use of the available resources. Implicitly, this requires a development of a proactive and coherent integral policy framework for knowledge society that would encompass the policy aspects relevant for maximisation of the benefits from the technological changes in a sustainable way.

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