



ERAWATCH COUNTRY REPORT 2010: Cyprus

ERAWATCH Network – University of Athens

Lena Tsipouri and Dariya Rublova

Acknowledgements and further information:

This analytical country report is one of a series of annual ERAWATCH reports which are produced for EU Member and Countries Associated to the EU Seventh Research Framework Programme (FP7). [ERAWATCH](#) is a joint initiative of the European Commission's [Directorate General for Research and Innovation](#) and [Joint Research Centre](#).

The analytical framework and the structure of the reports have been developed by the [Institute for Prospective Technological Studies of the Joint Research Centre \(JRC-IPTS\)](#) with contributions from Directorate General for Research and Innovation and the [ERAWATCH Network](#). The report has been produced by the [ERAWATCH Network](#) in the framework of the specific contract on ERAWATCH Research Inventory and Analytical Country Reports 2010 and 2011, commissioned by JRC-IPTS.

In particular, the authors acknowledge the critical, but constructive, comments and suggestions made by the reviewer for this report, Vivarelli Marco. The contribution and comments of Elisabetta Marinelli from JRC-IPTS and DG-RTD are also gratefully acknowledged.

The report is only published in electronic format and available on the [ERAWATCH website](#). Comments on this report are welcome and should be addressed to jrc-ipts-erawatch-helpdesk@ec.europa.eu.

The opinions expressed are those of the authors only and should not be considered as representative of the European Commission's official position.

Executive Summary

Cyprus is the third largest Mediterranean island and one of the smallest countries in the European Union with a population of about 797 thousand (0.16% of the EU27). GDP per head is close to the European average, annual growth is higher and the impact of the crisis is less significant than in the other member states. The service sector is the most dynamic, with tourism being the leading economic activity followed by financial services and real estate. Private R&D investments are low because of the structure of the economy, its size and the late start of a national innovation system.

The research system is not fully developed. GERD to GDP was 0.46% in 2008¹ and is predominantly financed by the public sector. Universities are the most important research performers, while BERD is 23% of GERD only.² This structure derives both from a very late start of the RTDI system, which was practically developed in the last two decades, and the sectoral composition of the economy, which leads to low demand for R&D. In addition, the business sector has not developed an innovation culture and is only very slowly adapting to knowledge-based competition.

The deficiencies should however not overshadow the significant progress that has been achieved in a very limited period of time. Within two decades, through increasing political determination, universities were created and a system of RTDI incentives was developed with ever increasing budgets (with the exception of the last year, where the crisis and internal reorganisation led to a provisional budget reduction). Despite the very low level of R&D intensity in the country, a positive trend is observed over the past years, attributed mainly to a considerable expansion of research activities in the public sector. R&D expenditure in 2004 was only 0.37% of GDP, while in 2008 this figure reached 0.46% (compared to the 1.9% EU average). The highest share of GERD is performed by the Higher Education sector, increasing from 35% in 2004 to about 46% in 2008. More than 67% of publicly supported R&D takes place there. The government sector performed 22% of the total GERD in 2008, decreasing from 2004 by 1%. The share of the business sector performance increased from about 22% in 2004 to 23% in 2008.

RTDI governance is weak but improving with the set up of modern structures. The objectives set respond to the needs of the country and the policy mix envisaged is appropriate, and improving with very slow pace.

Knowledge triangle

The knowledge triangle is not operating effectively yet, although progress is visible in the last decade. The education and research parts are significantly better developed and achieve more progress than innovation. However, since GDP grows and the country benefits from a relative prosperity, the business community is not pressing for structural change.

Hence, in parallel to the increasing budgets and efforts of research and education, more emphasis is needed to create bridges and reinforce the triangle. Knowledge demand remains the weak factor, despite significant and generous incentives. Policy is emphasising this priority yet without any visible changes in terms of outcomes and

¹ Eurostat

² Own calculations based on the data from Eurostat, provisional data for 2008 for Cyprus

impacts. Partly because of the structure of the productive sector (small companies in traditional sectors and hardly any R&D-intensive FDI) and partly because the business culture has not changed, companies do not apply for grants and under-exploit the incentives offered. The role of the business community remains marginal as the strategy it follows is limited to buying knowledge incorporated in new vintages of machinery. A vicious circle of low demand for and limited supply of knowledge needs to be broken. Positive elements are the increase of human capital (despite persisting brain drain), significantly increasing incentives (mostly in terms of grants), visible improvements in the universities and the decision to establish new intermediaries (TTOs). But the limited absorptive capacity of the business sector remains a major drawback that will take time to be eliminated.

Effectiveness of knowledge triangle policies

	Recent policy changes	Assessment of strengths and weaknesses
Research policy	<ul style="list-style-type: none"> • Establishment and operation of the two new governance bodies, the NCRI³ and the CSC⁴; • The elaboration of the first long-term National RTDI Strategy started; • Reduction by about 35% the budget of DESMI⁵ due to the economic crisis and internal organisational delays. 	<ul style="list-style-type: none"> • (+) The new governance system allowing (if properly operating) for better coordination and more focused approach; • (+) Intensive use of European funding as an investment instrument towards mobilisation of national research; • (-) R&D budget negatively affected by the crisis; • (-) Lack of clear strategic research priorities; • (-) Inadequate science-industry dialog; • (-) Low willingness and absorptive capacity of the business sector.
Innovation policy	<ul style="list-style-type: none"> • The new strategic approach consolidates research and innovation under the single policy framework; • Many of the innovation-related measures included in the 2009-2010 plan were not launched due to budget cuts of the RPF⁶. 	<ul style="list-style-type: none"> • (+) Increased focus by policy makers on the business sector R&D and innovation; • (+) Increased efforts towards the creation of adequate strategic and integrated framework for policy-making; • (-) Limited response of the business sector to the numerous measures; • (-) Linkages between enterprises and the research and academia are almost absent; • (-) Slow and not very effective implementation of the infrastructure; • (-) The lack of emphasis on RTDI policy by the MCIT⁷; • (-) Little attention to non-technological or organisational) innovation.

³ National Council for Research and Innovation

⁴ Cypriot Scientific Council

⁵ Research Promotion Foundation’s Framework Programme for Research, Technological Development and Innovation

⁶ Research Promotion Foundation

⁷ Ministry of Commerce, Industry and Tourism

	Recent policy changes	Assessment of strengths and weaknesses
Education policy	<ul style="list-style-type: none"> • Expansion of the post-graduate courses in the universities; • Further expansion is planned for the near future; • New initiatives targeting awareness raising of science and research culture in primary and secondary education. 	<ul style="list-style-type: none"> • (+) Very high youth education levels and further efforts to maintain them in terms of expansion of universities programmes; • (+) Strong political commitment to develop cooperation with the leading foreign HEIs; • (+) Increased focus on the cultivation of research culture; • (+) A range of measures foreseen aiming to promote research as a potential career among students; • (-) Low levels of S&E graduates, especially post-graduates; • (-) Insufficient financial resources limit research and educational potential of both, private and public HEIs; • (-) Brain drain.
Other policies	<ul style="list-style-type: none"> • The e-Procurement System • The contract for the preparation of an e-Inclusion National Strategy was signed in summer 2009 and is expected to be completed by mid 2010; • Co-financed by the EU Structural Funds projects targeting the promotion of the renewable energy sources (RES) launched their implementation within 2009; • Application of the JEREMIE Initiative. 	<ul style="list-style-type: none"> • (+) ICT is a highly developed area in the country; it has a potential to become one of the first priorities for demand-driven research; • (+) The comparative advantage of Cyprus in the area of RES (especially solar); • (+) Promotion of new (non-traditional) financial instruments; • (+) IPR support schemes in HEIs.

European Research Area

The government of Cyprus has adopted the ERA as a major opportunity to integrate the small Cypriot research system into a broader and more ambitious community. The country is one of the pioneers in opening up research and academic positions as well as national research programmes. Its efforts to internationalise within and beyond the EU are evident.

However, significant challenges remain, not only related to the need of an overall activation of GERD and BERD but also in relation to the ERA, since the country is still lagging behind in terms of gender quality and Research Infrastructures, the latter both in terms of national establishments and international cooperation.

Despite the apparent and increasing emphasis given to business R&D, one of the major challenges in relation to ERA remains to increase the business sector involvement in research through more responsive policies focusing R&D and innovation. Moreover, more focused strategic approach and better prioritisation are needed in order to narrow down research priorities and enhance national research capacity.

Assessment of the national policies/measures supporting the strategic ERA objectives (derived from ERA 2020 Vision)

	ERA objectives	Main national policy changes	Assessment of strengths and weaknesses
1	Ensure an adequate supply of human resources for research and an open, attractive and competitive single European labour market for male and female researchers	<ul style="list-style-type: none"> The expansion of the bilateral agreements on mutual recognition of academic qualifications aiming to stimulate exchange and cooperation in the field of science and higher education. 	<ul style="list-style-type: none"> (+) Attractive working conditions for researchers in terms of high salaries; (-) Lack of adequate RIs; (-) Deficiencies in the social security system, a lack of harmonisation of pension schemes a complete absence of specific provisions for mobile researchers as well as the delays in adapting and implementing scientific visa packages; (-) No policy actions explicitly addressing low employability of women on the research labour market.
2	Increase public support for research	<ul style="list-style-type: none"> Public budget for R&D increased in nominal value from €67 billion in 2007 to €72 billion in 2008; also as percentage of GDP, remained at the same levels of 0.42% (explained by the increase in GDP levels). 	<ul style="list-style-type: none"> (+)/(-) Continuous significant increase in R&D expenditure, but affected by the crisis (expressed mainly through the decrease of DESMI budget).
3	Increase European coordination and integration of research funding	<ul style="list-style-type: none"> No major changes. The government continues to actively support the Cypriot participation in different European schemes (FP7, ESF, EUREKA, COST etc.). 	<ul style="list-style-type: none"> (+) Strong emphasis given to Cypriot participation in the EU initiatives; (-) Limited interest of the business sector to participate despite the wide range of incentives.
4	Enhance research capacity across Europe	<ul style="list-style-type: none"> Operation of new graduate and post-graduate courses. 	<ul style="list-style-type: none"> (+)/(-) Despite the impressive recent growth of research, focused strategic approach is still lacking with no prioritisation made.
5	Develop world-class research infrastructures (including e-infrastructures) and ensure access to them	<ul style="list-style-type: none"> With the vision of enhancement of the existing infrastructure through the reinforcement of research and academic cooperation, an MoU (memorandum of understanding) was signed by the UCY⁸, the University of Nicosia, CyNet⁹ and the Ministry of Health. 	<ul style="list-style-type: none"> (+) Strong ICT and computing base makes it possible to give strong emphasis on “virtual” infrastructure; (-) Absence of large research infrastructures or scientific technological platforms.

⁸ University of Cyprus

⁹ Cyprus Research and Academic Network

	ERA objectives	Main national policy changes	Assessment of strengths and weaknesses
6	Strengthen research institutions, including notably universities	<ul style="list-style-type: none"> • New privately-financed university, the Neapolis University, has been established and starts operating in the academic year 2010-2011. 	<ul style="list-style-type: none"> • (+) Impressive progress towards the development and enhancement of the higher education system observed over the last years, despite late start; • (-) Universities still need reinforcement.
7	Improve framework conditions for private investment in R&D	<ul style="list-style-type: none"> • Increasing incentives to the business sector; • Opening up more programmes of the RPF to the industry; • Increased number of awareness and training initiatives for SMEs. 	<ul style="list-style-type: none"> • (+)/(-) Despite the continuous increase in national or European funding opportunities for SMEs business interest is still low. This is due to the structure of the economy (service sector dominance) and the small company size.
8	Promote public-private cooperation and knowledge transfer	<ul style="list-style-type: none"> • Increased focus on the improvement of research-industry links and better knowledge transfer expressed through the introduction of the relative initiatives in the current DESMI 2009-2010. 	<ul style="list-style-type: none"> • (+) Strong willingness of the government to bridge the gap between academia and industry; • (-) Weak interest of the enterprises in research and innovation; • (-) Inefficient implementation and operation of intermediaries (to be tackled though the creation of TTOs operational until 2014).
9	Enhance knowledge circulation across Europe and beyond	<ul style="list-style-type: none"> • Cyprus is continuously increasing its participation in the EU initiatives; • National programmes promoted through the current DESMI are open to foreign participation under certain reasonable constraints. 	<ul style="list-style-type: none"> • (+) Increased budget with targeted measures to improve access to international knowledge (bilateral cooperation, international networking); • (-) Extremely low participation of the business sector in the above mentioned initiatives.
10	Strengthen international cooperation in science and technology and the role and attractiveness of European research in the world	<ul style="list-style-type: none"> • Through a specific action "Targeted International Cooperation" introduced in the current DESMI the RPF promotes collaboration with the research organisations of the countries with high R&D profile; • Preliminary discussions are under way for the signing of Agreements with a number of other countries, such as China and Israel. 	<ul style="list-style-type: none"> • (+) Strategic geographical location may help Cyprus to play a leading role in the Eastern Mediterranean.
11	Jointly design and coordinate policies across policy levels and policy areas, notably within the knowledge triangle	<ul style="list-style-type: none"> • Cyprus increases its support towards the joint programming. The current DESMI included the specific measure titled "Participation in Joint European Programmes". 	<ul style="list-style-type: none"> • (+) Clear and strong commitment of the government in favour of further involvement of the country in joint ventures; • (-) A general preference for national research teams to apply for less competitive and less demanding national programmes.

	ERA objectives	Main national policy changes	Assessment of strengths and weaknesses
12	Develop and sustain excellence and overall quality of European research	<ul style="list-style-type: none"> • Significant efforts towards the reorganisation of the RTDI system in Cyprus and the elaboration of the long-term integrated strategy are made. 	<ul style="list-style-type: none"> • (+) The government's strong willingness to develop adequate and focused policy framework; • (-) Lack of prioritisation leading to too broad research orientation.
13	Promote structural change and specialisation towards a more knowledge intensive economy	<ul style="list-style-type: none"> • New governance structure and first steps made towards the elaboration of the new long-term strategy. 	<ul style="list-style-type: none"> • (+) The new strategy is expected to emphasise research priorities; • (-) Research is still fragmented; • (-) Limited knowledge demand and cooperation culture from the side of the business sector.
14	Mobilise research to address major societal challenges and contribute to sustainable development	<ul style="list-style-type: none"> • Increased in comparison to the previous periods DESMI allocations to projects in the field of sustainable urban development, recycling, management of urban waste, control and protection from pollution under the Sustainable Development programme; • Priorities were determined at a high political level, identifying energy, the environment and in particular water resources as the real future challenges for the country. 	<ul style="list-style-type: none"> • (+) Sustainable development is a core target of the national RTDI policy; • (-) Insufficient financial resources directed to further development of RES especially concerning the solar ones despite the comparative advantage of the country.
15	Build mutual trust between science and society and strengthen scientific evidence for policy making	<ul style="list-style-type: none"> • Increased effort mainly from the side of the RPF in the form of initiatives to sensitise the public on the topics such as S&T, research and innovation (information days, awareness campaigns, etc.). 	<ul style="list-style-type: none"> • (-) Lack of evaluation culture creates unfavourable framework for evidence-based policy making.

TABLE OF CONTENTS

Executive Summary.....	3
1 Introduction.....	11
2 Performance of the national research and innovation system and assessment of recent policy changes.....	11
2.1 Structure of the national research and innovation system and its governance	11
2.2 Resource mobilisation	14
2.2.1 Resource provision for research activities.....	15
2.2.2 Evolution of national policy mix geared towards the national R&D investment targets.....	16
2.2.3 Providing qualified human resources	18
2.3 Knowledge demand	20
2.4 Knowledge production.....	21
2.4.1 Quality and excellence of knowledge production	21
2.4.2 Policy aiming at improving the quality and excellence of knowledge production	22
2.5 Knowledge circulation	23
2.5.1 Knowledge circulation between the universities, PROs and business sectors	23
2.5.2 Cross-border knowledge circulation	25
2.5.3 Main societal challenges	25
2.6 Overall assessment.....	26
3 Interactions between national policies and the European Research Area.....	29
3.1 Towards a European labour market for researchers	29
3.1.1 Stocks and mobility flows of researchers	29
3.1.2 Providing attractive employment and working conditions.....	30
3.1.3 Open recruitment and portability of grants	31
3.1.4 Meeting the social security and supplementary pension needs of mobile researchers.....	31
3.1.5 Enhancing the training, skills and experience of European researchers	32
3.2 Research infrastructures	33
3.2.1 National Research Infrastructures roadmap.....	33
3.2.2 National participation in the ESFRI roadmap: Updates 2009-2010.....	34
3.3 Strengthening research institutions	34
3.3.1 Quality of National Higher Education System.....	35
3.3.2 Academic autonomy.....	36
3.3.3 Academic funding.....	37
3.4 Knowledge transfer	37
3.4.1 Intellectual Property Policies	38

3.4.2	Other policy measures aiming to promote public-private knowledge transfer.....	39
3.5	Cooperation, coordination and opening up national research programmes within ERA.....	40
3.5.1	National participation in intergovernmental organisations and schemes.....	40
3.5.2	Bi- and multilateral agreements with other ERA countries	41
3.5.3	Other instruments of cooperation and coordination between national R&D programmes.....	42
3.5.4	Opening up of national R&D programmes	42
3.6	International science and technology cooperation	42
3.6.1	International cooperation.....	43
3.6.2	Mobility schemes for researchers from third countries	43
4	Conclusions.....	44
4.1	Effectiveness of the knowledge triangle	44
4.2	ERA 2020 objectives - a summary	45
	References	49
	List of Abbreviations	51

1 Introduction

The main objective of the ERAWATCH Analytical Country Reports 2010 is to characterise and assess the evolution of the national policy mixes in the perspective of the Lisbon goals and of the 2020, post-Lisbon Strategy. The assessment will focus on the national R&D investments targets, the efficiency and effectiveness of national policies and investments into R&D, the articulation between research, education and innovation, and on the realisation and better governance of ERA. In doing this, the 15 objectives of the ERA 2020 are articulated.

The report builds on the 2009 report streamlining the structure and updating the 2009 policy assessment in the domains of human resource mobilisation, knowledge demand, knowledge production and science-industry knowledge circulation. The information related to the four ERA pillars covered in the 2009 report is also updated and it is extended in order to cover all six ERA pillars and address the corresponding objectives derived from ERA 2020 Vision.

Given the latest developments, the 2010 Country Report has a stronger focus on the link between research and innovation, reflecting the increased focus of innovation in the policy agenda. The report is not aimed to cover innovation per se, but rather the '**interlinkage**' between research and innovation, in terms of their wider governance and policy mix.

2 Performance of the national research and innovation system and assessment of recent policy changes

The aim of this chapter is to assess the performance of the national research system, the '**interlinkages**' between research and innovation systems, in terms of their wider governance and policy and the changes that have occurred in 2009 and 2010 in national policy mixes in the perspective of the Lisbon goals. The analysis builds upon elements in the ERAWATCH Country Report 2009, by updating and extending the 2009 policy assessment in the domains of resource mobilisation, knowledge demand, knowledge production and science-industry knowledge circulation. Each section identifies the main societal challenges addressed by the national research and innovation system and assesses the policy measures that address these challenges. The relevant objectives derived from ERA 2020 Vision are articulated in the assessment.

2.1 Structure of the national research and innovation system and its governance

This section gives the main characteristics of the structure of the national research and innovation systems, in terms of their wider governance.

Cyprus is the third largest Mediterranean island and one of the smallest countries in the European Union with a population of about 797 thousand (0.16% of the EU27). The service sector constitutes the most dynamic economic sector with tourism being the leading economic activity followed by financial services and real estate. The

manufacturing sector, represented mostly by small and very small firms, covers only a small fracture of 7.2% of the total Gross Value Added in 2009.¹⁰

Since the accession of Cyprus to the EU in 2004, significant structural reforms were undertaken: trade and interest rates were liberalised, investment restrictions were lifted and private finance initiatives were introduced for the operation of major infrastructure projects (Ministry of the Interior, 2008).

Over the past decade, economic growth with an average real GDP growth rate of about 3.2%, outperformed by 1.6% the EU27 average.¹¹ The driving forces were foreign direct investment as well as pre- and after EU accession support. In the context of the global economic crisis, during 2009 there has been a significantly lower decline in GDP (-1.7%) compared to the EU average (-4.2%).¹² GDP per capita reached 98% of the EU average.¹³

The structure of the economy leads to very low GERD which equals in 2008 0.46% (about one quarter of the EU average). Almost 2/3 (64.6%) comes from the government sector, while businesses only contribute to 16.4% of overall GERD financing (compared to 33% and 55.2% corresponding EU averages).¹⁴

Main actors and institutions in research governance

The RTDI system in Cyprus developed in the mid 1990s partly following pressure for adapting to the *acquis communautaire*. Progress has been made and the governance of the system is now in a period of transition to help increase efficiency and modernise the government, research and productive sector cooperation. The new system, adopted by the Council of Ministers in October 2007 foresees two new organisations:

- the **National Council for Research and Innovation (NCRI)**, the highest-level organisation with exclusive responsibility for the adoption of long-term strategies in research and innovation; and
- the **Cypriot Scientific Council (CSC)**, an advisory scientific board composed of 10-15 members of qualified scientists.

Both Councils have already become operative and are now in the process of elaboration of the long-term National RTDI Strategy.

The **Planning Bureau** has a coordinator's role regarding the modulation of strategy and representation of Cyprus in the EU institutions. Moreover, it participates in defining the strategic approach as well as in determination of the main achievements in the field of research. At the implementation level, research and innovation activities have been integrated under the **Research Promotion Foundation (RPF)** an autonomous foundation under the supervision of the Planning Bureau.

The **Ministry of Commerce, Industry and Tourism (MCIT)** is responsible for industrial policy, including the promotion of technology and entrepreneurship. The Industrial Development Service is in charge of the management and implementation of the actions targeting the competitiveness of the manufacturing sector, including

¹⁰ Source: [Eurostat, National Accounts](#)

¹¹ Own calculations for the period 2000-2009 based on the data from Eurostat, Structural indicators

¹² [Eurostat, National Accounts](#)

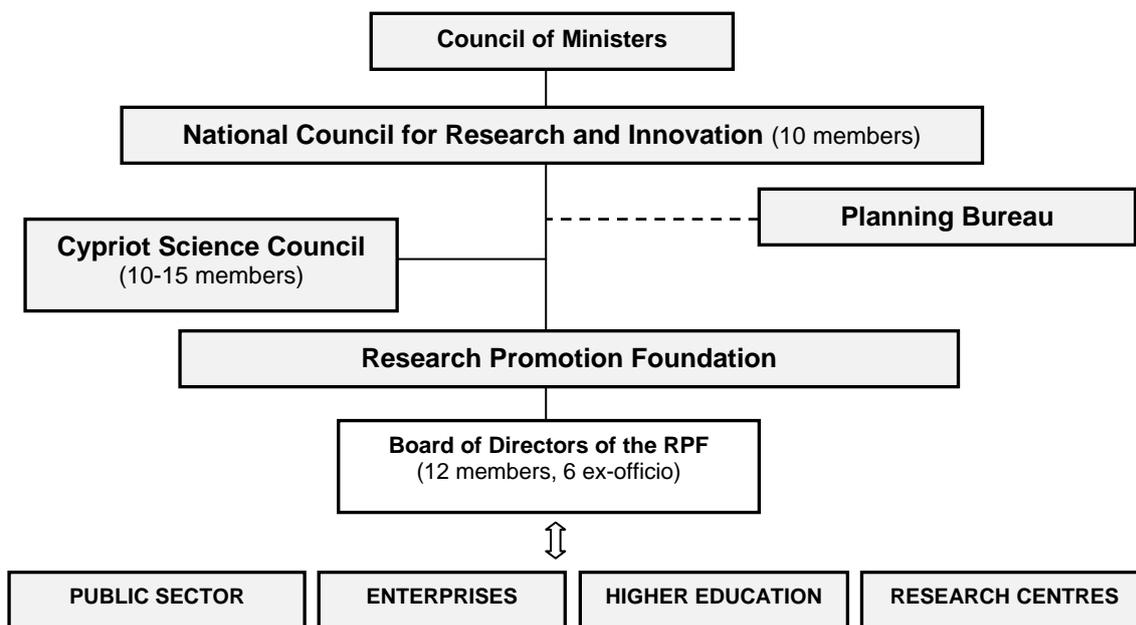
¹³ http://epp.eurostat.ec.europa.eu/tgm/table.do?tab=table&init=1&language=en&pcode=tsieb010&plug_in=1

¹⁴ Eurostat

promotion of entrepreneurship and development and support of new SMEs as well as the development of new high-tech industries.

The **Ministry of Education and Culture** carries responsibility for the development and enhancement of the tertiary education. The **Ministry of Labour and Social Insurance** supports the work of the *Human Resources Development Authority (HRDA)*, a semi-governmental organisation, which designs and implements support measures for the development and upgrading of human resources and promotion of life-long learning. The **Ministry of Agriculture, Natural Resources and Environment** supports the activity of the *Agricultural Research Institute (ARI)*, while the **Ministry of Health** plays significant role in promotion of the work of the *Cyprus Institute of Neurology and Genetics*.

Figure 1: Overview of the Cyprus research system governance structure



Source: the diagram is based on the [diagram provided by the Planning Bureau](#)

The institutional role of regions in research governance

Cyprus is a single region so it is the central government which generates policy. Local authorities, namely districts, municipalities and communities only exceptionally play a role in drawing up and implementing RTDI policies. However, recent provisions have reinforced the sub-regional level. For example the recently established Cyprus University of Technology (CUT) is located in the south (Limassol) and, in the future, will be the location of the first Technology Park in the country. The municipality of Limassol is actively supporting these initiatives.

Main research performer groups

The highest share of GERD is performed by the Higher Education sector, increasing from 35% in 2004 to about 46% in 2008. The government sector performed 22% of the total GERD in 2008, decreasing from 2004 by 1%. Both shares are considerably higher than the EU average (22% and 13% respectively).¹⁵

¹⁵ Own calculations based on the data from Eurostat, provisional data for 2008 for Cyprus

The main research groups are the UCY, established a decade ago, and the CUT established in 2004, with the first enrolment year in 2007. The Open University has very few R&D projects. Three colleges recently upgraded to university level, such as the European University Cyprus, Frederick University Cyprus and University of Nicosia are offering undergraduate degrees and undertake some applied research in the social sciences and humanities.

Other major organisations undertaking research are the ARI, the Cyprus Institute of Neurology and Genetics (CING) and the Meteorological Centre.

A policy for international top class academic cooperation foresees joint research, education and technology initiative for the environment and public health launched by the Cypriot government and the Harvard School of Public Health (HSPH), the [Cyprus International Institute \(CII\) for the Environment and Public Health](#) located in Nicosia. Since the 2009-2010 academic year the CII operates as a semi-autonomous institute within the CUT, offering graduate programme in Environmental Health which will expand to include additional post-graduate degrees in 2010-2011 academic year.¹⁶ Another top-class venture is the [Cyprus Institute \(Cyl\)](#). Established in September 2007, this non-profit science and technology research and educational organisation operates three Research Centres¹⁷ in close collaboration with foreign establishments of international reputation.¹⁸ The organisation aspires to becoming a centre of excellence for the broader Eastern Mediterranean region.

The business enterprise sector accounts for 23% of GERD in Cyprus. This share is much lower than the EU average of 64%, but it is increasing continuously (by more than 3.5% since 2001).¹⁹ However, the structure of the economy is such that it is very unlikely to reach the EU targets in the foreseeable future. Better consultation processes are needed to reinforce the role of the business sector.

The Private non-profit sector (PNPs) is considerably high at 8.5% vis-à-vis the EU average of about 1%.²⁰

2.2 Resource mobilisation

Since 2000, Europe has made evident progress towards ERA but at the same time it is clear that Europe's overall position in research has not improved, especially regarding R&D intensity, which remains too low. The lower R&D spending in the EU is mainly a result of lower levels of private investment. Europe needs to focus on the impact and composition of research spending and to improve the conditions for private sector R&D investments.

This section assesses the progress towards national R&D targets, with particular focus on private R&D and of recent policy measures and governance changes and the status of key existing measures, taking into account recent government budget data. The need for adequate human resources for R&D has been identified as a key challenge since the launch of the Lisbon Strategy in 2000. Hence, the assessment

¹⁶ <http://www.hsph.harvard.edu/cyprus/gradpostgrad.html>

¹⁷ The Energy, Environment and Water Research Centre (EEWRC), the Science and Technology in Archaeology Research Centre (STARC) and the Computation-based Science and Technology Research Centre (CSTRC)

¹⁸ Including the MIT, the University of Illinois and Centre de Recherche et de Restauration des Musées de France

¹⁹ Own calculations based on the data from Eurostat, provisional data for 2008 for Cyprus

²⁰ Ibid.

includes also the human resources for R&D. Main assessment criteria are the degree of compliance with national targets and the coherence of policy objectives and policy instruments.

2.2.1 Resource provision for research activities

Despite the very low level of R&D intensity in the country, a positive trend is observed over the past years, attributed mainly to a considerable expansion of research activities in the public sector. R&D expenditure in 1998 was only 0.22% of GDP, while in 2008 this figure reached 0.46% (compared to the 1.9% EU average).²¹ This figure, however, is increasing very slowly, despite consistent efforts since accession to the EU. Thus, the R&D investment target set at 1% of the annual GDP by 2010 was not achieved.

RTDI is among the key priorities of the National Strategic Development Plan (NSDP) 2007-2013. The promotion of research and development constitutes one of the eight strategic development pillars highlighted in the document foreseeing that the Government makes it its key priority to boost investment in physical and human capital. This is, however, not accompanied by any Action Plan. The positive sign is that the first steps towards the adoption of a coherent research and innovation strategy were already made. The Planning Bureau has elaborated a draft of a future long-term National RTDI Strategy, which will be used as a main input on the first meeting of the CSC in November. After the scientific consultation, the draft will be sent to the NCRI for approval. Based on the approved Strategy, the Action Plan towards the ERA 2020 vision will be prepared and approved in the Council of Ministers.

For the present, the main instrument, through which the national policy is applied, is the multi-annual National Framework Programme for Research and Technological Development (DESMI), designed and managed by the RPF and co-funded for the 80% by the EU Structural Funds. It includes a broad spectrum of measures through which it supports multi-thematic research projects in pre-selected fields (Manufacturing technologies, ICT, Sustainable development, Health and Bio-sciences and Social Sciences and Humanities) and provides for the upgrading of existing and the built up of new research infrastructure. This way it offers a long-term prospect through recurring project funding and facilitates the retention of high quality human resources in the Cypriot universities. Each new DESMI outperforms the previous in terms of budget and number of measures.

The present DESMI 2009-2010 builds on the previous one without major shifts in goals and priorities. These include: the promotion of development process in the sectors mentioned above, the improvement of the quality of life and the reinforcement of the competitiveness of the Cypriot economy. The RPF has adopted a new focus on the innovation support targeting cluster framework policies and innovation, the development of the innovation culture among the economic actors, linking university and the business sector as well as the enhancement of endogenous capacity of enterprises to innovate. It has initially ensured €85m for the two-year period. However, due to internal reorganisation problems in the RPF, the global economic crisis and the review of Structural Funds support the total budgets of the programmes and actions decreased by 35% in 2010. It is hoped that more funds will be earmarked for RTDI in 2011-2012.

²¹ Eurostat

European funding is also playing a very important role in mobilising national research. Cyprus is expected to succeed in raising funds from the FP7 with the RPF encouraging participation of the scientific community through different events and seminars.

The role of European funding in research mobilisation is also underlined in the context of the 2007-2013 Operational Programme (OP) "Sustainable Development and Competitiveness" that will be co-financed with more than €490m from EU funds (European Regional Development Fund and Cohesion Fund). A series of projects targeting at strengthening research and technological development have been included in the OP under the priority axis "Knowledge Economy and Innovation". Funding, provided entirely by the ERDF, exceeds €79m and is directed mainly to the financing of DESMI initiatives.

Competitive funding in the form of grants²² is the main support mechanism. Institutional support is provided to Universities (mainly, the UCY with the major share of funds and the CUT) and state research organisations.²³ It was highlighted in the Policy Mix Peer Review, 2009 that more emphasis should be given to the "button-up" competitive funding in order to guarantee higher quality level of research and to extend to new scientific fields. No special tax incentives for R&D are introduced since corporate tax is already low (see Chapter 2.2.2 for more detailed description).

There is no emphasis on a strategy for science in society, but individual actions are taking place: an Awareness Campaign for the Importance of Innovation and R&D, Information Days, Programmes for the development of Research and Innovation culture within the educational system such as "Schoolchildren in Research Competition", "Students in Research Competition", "Technology and Innovation in Education - TEKE" (new competition that was not included in the previous DESMI 2008),²⁴ Annual Researcher's Evenings, as well as other events and seminars, aimed at creating a greater momentum for research.

Research in the formally determined grand societal challenges is supported mainly through the DESMI allocations to projects in the field of sustainable urban development, recycling, management of urban waste, control and protection from pollution under the Sustainable Development programme. The total budget available for the projects (€1.73m) has decreased in comparison to the initial one (€2.5m) due to general RPF budget cuts. Some relevant topics such as health and environment are also addressed under the Health and Biological Sciences programme funded by €2.5m.

2.2.2 Evolution of national policy mix geared towards the national R&D investment targets

The policy mix is currently composed mainly of public funding but has the increase of BERD as top priority. The share of BERD is slightly but stably increasing. Thus, during the period 2004-2008, BERD has increased by 0.02% reaching 0.1% of GDP in 2008 (that is by far lower than the EU average of 1.21%). The evolution of the EU average BERD was also more significant (0.05%) for the same period.

²² In addition to the measures provided for financing in the form of grants, there are also several non-financial measures as well as competitions providing financial awards to the winners

²³ ERAWATCH Network (2010)

²⁴ More information on these programmes may be found following the link <http://crpf.metacanvas.com/EN/>

The national objective is to achieve the overall increase of the investment in R&D. The target was set at 1% by 2010 (mainly through gradual increase in public funding channelled through RPF) and was not achieved.

To comply with the goal to increase BERD, the Government has directed its efforts towards R&D encouragement in the private sector and defined special objectives, communicated through the NSDP as follows:

- Strengthening the national research and development system and its link with the productive base
- Stimulating the business sector's internal capability to develop innovation-related activities
- Bridging the gap between the business and the academic/research communities
- Developing funding mechanisms for innovative activities
- Developing an innovation culture and sensitising public to R&D

While the objectives, although are in line with the present needs, the business response is still limited. Partly because of the structure of the productive sector and partly because the business culture has not changed, companies do not apply for grants as much as expected and under-exploit the incentives offered. Delays in the creation of an infrastructure of incubators and a technology park may be undermining the confidence of the business sector. Moreover, the lack of tradition in R&D, limited access of R&D companies to bank loans due to rather insufficient interest of the banking sector in high-risk R&D ventures as well as weak coordination mechanisms make the situation still worse. The financial crisis has further deteriorated an already unfavourable situation: contraction of revenues, reduced bank liquidity and negative business expectations discourage firms from risky investments.

Despite the improvements that became visible in the last years since the accession of Cyprus to the EU, the policy mix remains fragmented with no major changes taken place in the last two years. There is still no coherent research strategy directed at stimulating R&D investment, especially concerning the involvement of the business sector in research. The budget cuts of DESMI for the period 2009-2010 resulting in non announcement of some measures would possibly have negative consequences on the overall R&D performance, especially concerning routes 5 and 2. Two new measures²⁵ targeting to bridge the gap and reinforce cooperation between the business sector and the academia and, therefore, contributing to route 5, were introduced by the RPF in 2009 but have never launched their implementation.

In terms of number of measures and budget allocations, the policy mix still focuses on route 6, namely the increasing R&D funding and performance in the public sector. Such measures include programmes targeted at the development of research infrastructure, measures promoting multi-thematic research and those aimed at the development and upgrading of human resources in research, as well as the initiatives promoting industry/academia linkages and international networking in the field of R&D. Practically all of the measures included in DESMI are appropriate for both, private and public sector, but, given that firms are by far more hesitant to apply for

²⁵ "Innovation Clusters" and "Mediation Centres for Research and Innovation". More detailed information could be found in the Chapter 2.5.1

the support in R&D, research and academic representatives constitute the major share of responses.

Special emphasis is also given to the promotion of business R&D investments with the majority of measures aiming at involvement of existing businesses in R&D related activities, and (to a lesser extent) at the development of new high-tech firms (routes 1 and 3). There are also instruments targeted at stimulating greater R&D investment in the firms already performing R&D, but given the general lack of such businesses in the country this is not a priority.

The promotion of research internationalisation is another important part of the policy mix. It seems that this priority remains of relatively higher importance than each of the routes in question and may be seen as the best way for strengthening the platform for higher R&D investments.

The limited awareness and interest of the sectoral ministries to the reinforcement of innovation as significant component for the development of the country made them reluctant to adaptation of modern innovation tools. This led to serious lack or even absence of the lead market initiatives, design or procurement for innovation. This is also linked to the limited business response, mentioned above: companies are not requesting the public sector to take such initiatives. Some progress was made with the approval of the National Action Plan for Green Public Procurement (GPP) in 2007 and already positive results from the implementation of the Plan are visible.²⁶ The aim of this Action Plan is via public procurement to promote the entrance to the market of environmentally friendly products and services and generally stimulate more sustainable production and consumption patterns in the country. This will help enable emerging sectors to grow faster and, therefore, encourage more innovation friendly market framework conditions.

The Cypriot research system almost exclusively relies on direct support. Venture capital is almost non-existent. Introducing tax allowances was studied, but the idea was rejected, as corporate tax is already so low that it would not be a credible incentive to make R&D investment tax free. Tax exemptions are offered to academic institutions operating under a 'non-profit' status and there are tax reductions provided for acquiring research related equipment.

Innovation support in the form of innovation vouchers is in place since 2008 with business enterprises being the main recipients of funding. Despite the quite low funding budget of the measure (about €300,000 for 2008 and €150,000 for 2009-2010), a high leverage effect is expected. It is still early to assess the impact of the measure, but the RPF is optimistic given its direct applicability and bureaucratic simplicity and considers the Innovation vouchers "very appropriate" to increase the number of enterprises involved in RTDI activity.²⁷

2.2.3 Providing qualified human resources

Investment in higher education is the key element needed for the adequate supply of qualified human resources. In Cyprus the total public expenditure on tertiary

²⁶ For more detailed info see <http://gpp.itcilo.org/index.php?id=163,173>

²⁷ See ERAWATCH Network, 2010 (The European Inventory of Research and Innovation Policy Measures, Support measures for Cyprus)

education is well above the EU average of (1.61% vs 1.12 % of GDP).²⁸ The higher education graduates account for 34.5% of the overall human resources supply.²⁹

According to the Eurostat Science and Technology statistics, the share of human resources in S&T (HRST) aged 25-64 is satisfactory and reaches 43% in 2009. In the same period, graduates from science and engineering accounted for only 56% of the European average. More disappointing is the situation concerning PhD holders in the field with the share of only 0.09 per 1000 population aged 25-34 in 2007 that is less than one tenth of the EU average of about 1 per 1000 population aged 25-34.³⁰ Researchers constitute only 0.2% of the total employed (or slightly more than 30% of the EU average). Low S&E graduates rates in combination with increasing but still low life-long learning levels (88% of the EU average, according to EIS 2009) creates unfavourable frameworks for development of highly-skilled human resources in research. An additional barrier for engineers to become researchers is that the public sector offers better remuneration packages to S&E, thus competing with the universities and the business sector for scientific skills. It is also the lack of research culture that hinders the university graduates from building a research career in.

National policy has addressed the problem of inadequate S&E graduates level by the development in 2004 of CUT, which is expected to grow significantly in size over the next decade covering current and future market needs in S&E graduates. The continuously rising number of post-graduate courses in universities and expanding research institutes will contribute to raising PhD S&E graduates. This is, in the first place, the case of Cyl and CII expanding graduate and post-graduate programmes.³¹

Several measures to promote a research culture at all levels of education and create a critical mass of researchers were introduced in the DESMI under the strategic pillar "Development of Human Resources in Research". Thus, the measure "DIDACTOR" supports young PhD holders to be involved in research activity in both the public and the private sector, while "Programme for the Support of Young Researchers (PENEK)" aims to support doctorate candidates to work as researchers in research organisations or in companies. The programme "Development of Research and Innovative Culture" aims to promote the research culture among young people at all levels of education. There is also a programme to attract both new and experienced foreign researchers and to incorporate them for a specific period of time into the local research system.

Effort towards the enhancement of life-long learning, strengthened also in the Country Specific Recommendations, has been expressed through the design of the national life-long learning Strategy, approved in late 2007. The HRDA provides continuous education and lifelong training in all kinds of human development issues. The Cyprus Productivity Centre (CPC) has included in its Action Plan 2010-2011 the programme targeting at the incorporation of the R&D in enterprises through provision of incentives for the implementation of life-long learning mechanisms and continuous improvement in businesses. The programme is expected to be implemented during

²⁸ Eurostat, the last available data is for 2007

²⁹ Source: EIS 2009; the percentage concerns the population with tertiary education per 100 population aged 25-64

³⁰ The percentages are own calculations based on the data from the EIS 2009

³¹ More information on Cyl and CII operation and expansion can be found in the Chapter 2.1 (Main research performer groups)

the period from September 2008 to December 2009 with funding of about €400,000.³²

2.3 Knowledge demand

This section focuses on structure of knowledge demand drivers and analysis of recent policy changes.

Knowledge demand was and still is extremely limited in Cyprus and dominated by the public sector. This does not come as a surprise given the very low BERD as well as unfavourable to knowledge-intensive activity sectoral structure of the economy, which is dominated by the service sector.³³ Most enterprises tend to concentrate on low value added activities. The role of the business community remains marginal as the strategy it follows is limited to buying knowledge incorporated in new vintages of machinery. This helps increase productivity but prevents the local manufacturing sector from reaping the benefits of the knowledge based economy.

Despite its high FDI Intensity (7.9%) exceeding both the EU average (3.4%) and that of the Euro area (4.6%)³⁴ Cyprus has hardly any R&D-intensive FDI. One example of foreign enterprises operating in the field of research and development is the Amdocs development centre in Cyprus, established in 1997 and focusing on the development of new industry leading products and the enhancements and upgrades to existing offerings.³⁵ Composed of more than 750 employees (programmers and finance and operations staff), the Centre contributes to higher demand for research in the field of ICT. In recent years the Government has made some efforts to develop attractive conditions for foreign firms, establishing in 2005 of the Cyprus Investment Promotion Agency (CIPA) and in 2007 the One-Stop-Shop (OSS) for business start-up with a view to enhancing competitiveness of the economy. The CIPA aims to promote Cyprus as an entrepreneurial base to attract direct foreign investments in key priority growth sectors (R&D, ICT, energy, shipping, financial service, education, professional and health services and tourism). The initiatives aiming to address FDI in general can also make a substantial contribution to attracting FDI in the high-tech industries.

Demand-side policies are not explicit in Cyprus. ICT is the area with the highest demand for R&D services³⁶ and can potentially become one of the first priorities for demand-driven research. Significant effort is made by the government to develop an integrated National Strategy for the Information Society. Measures promoting e-Government, e-health, e-learning, e-commerce, as well as the introduction of Office Automation System in all government departments and development of e-procurement system may have a positive impact on the R&D and innovation performance, but mostly on an indirect way. The e-Procurement System, that started its pilot operation in *June 2009* has been awarded in *October 2009*, within the framework of the 4th European e-Government Awards 2009, the Good Practice

³² <http://www.mlsi.gov.cy/mlsi/kepa/kepa.nsf/c7015a40e5647bbac22570f30034b1b6/7757490ea8185a70c22575b0002603c1?OpenDocument>

³³ For more detailed description of the sectoral structure of the Cypriot economy see Chapter 2.1

³⁴ www.cipa.org.cy

³⁵ <http://www.cipa.org.cy/success-stories/Amdocs/>

³⁶ This conclusion is based on the response rates and success rates of applications to both the EU and the national framework programmes respectively where it appears that ICT is the area mostly demanded by Cypriot researchers

Label by e-Practice.³⁷ It is expected that the system will enhance transparency and increase speed in the public procurement process. Until now, more than 1,500 Cypriot and foreign firms, as well as all state contracting authorities were already registered on the e-procurement system and more than 500 real competitions were proclaimed. The competitions were assessed as successful and have received a positive feedback, both from contracting authorities and economic operators.³⁸

As regards the major societal challenges, priorities were determined at a high political level, identifying energy, the environment and in particular water resources as the real future challenges for the country. The Support Scheme for Energy Conservation and the Promotion of Renewable Energy Sources, promoted by the MCIT, covers investments for the purchase and installation of new equipment or/and materials. Health is supported through the joint venture with Harvard.

According to the data from the Eurostat, the total GBAORD increased more than two times since 2004 (€39m) and reached €81m in 2009. The major share of the general budget appropriations (about 74% of the total GBAORD) are directed to the general advancement of knowledge financed from the General University Funds (GUF) (32%) and from other sources than GUF (42%). Agriculture, health and, to a lesser extent, education hold relatively significant shares of the total budget appropriations (10.8%, 7.2% and 3.7% correspondingly).³⁹

2.4 Knowledge production

The production of scientific and technological knowledge is the core function that a research system must fulfil. While different aspects may be included in the analysis of this function, the assessment provided in this section focuses on the following dimensions: quality of the knowledge production, the exploitability of the knowledge creation and policy measures aiming to improve the knowledge creation.

2.4.1 Quality and excellence of knowledge production

Although the knowledge production mechanism in Cyprus is still weak, it is improving. One of the most important steps towards larger and better knowledge production was the prioritisation of research and innovation in the country's development plan and the following substantial increase in funding appropriations towards R&D.

The level of human resources in S&T is satisfactory high and steadily increasing from 38.8% in 2005 to 43% in 2009.⁴⁰ Research infrastructure has also improved significantly. The operation and expansion (in terms of research priorities and graduate programmes)⁴¹ of CUT and the operation of engineering faculty in the UCY with the respective research centres are expected to increase knowledge production. The universities and based on them research centres produce more knowledge than in the past: universities and research centres are expanding over the last decade and

³⁷ <http://www.epractice.eu/en/document/288187>

³⁸ According to the Accountant General of the of the Treasury of the Republic of Cyprus (<http://www.thefreelibrary.com/E-procurement+Now+Reality+in+Cyprus-a0212512398>)

³⁹ Data for 2009, Eurostat

⁴⁰ The figures refer to the HRST aged 25-64 as a percentage of active population from the Eurostat. More information is available in the Chapter 2.2.3

⁴¹ The university launched the operation of two new departments, namely the Department of Commerce, Finance and Shipping and Department of Environmental management

the decision to generously fund cooperation with world-class universities may further improve results. Moreover, international cooperation as well as emphasis of policy on supporting FP participation is expected to increase competence and nurture excellence.

The research output remains low. This is associated with both the limited demand for knowledge and inadequate exploitation system for research results. Inadequate investment contribution of businesses to R&D results inevitably in the observed very few patent applications. Patenting in the EPO is very low and it rates Cyprus only at about 21% of the European average. Over the past three years for which the data is available (2004-2006), the number of patent applications to the EPO per million population has doubled (from 8.2 to 25.0).⁴² In terms of scientific publications, there has also been observed significant growth of about 42% during the same period (from 239 to 340) with the major concentration in engineering sciences, physics, astronomy and computer sciences (ERAWATCH Network, 2010).

No matter how effective the knowledge production will become it risks to run out of steam, or to be abandoned as irrelevant for national well being, if demand does not increase and exploitation is almost non-existent. This situation is difficult to tackle, because there are neither systematic university-industry linkages, nor efficient intermediary organisations or drives of knowledge production for social purposes. This is again linked to the structure and culture of the business sector. However, new policy initiatives, mentioned below, are adopted in an effort to meet this challenge. The fact that professors cannot appropriate intellectual property (professors' privileges as such do not exist in Cyprus) does not help improve incentives for research in Universities.

2.4.2 Policy aiming at improving the quality and excellence of knowledge production

The government has become aware of the considerable gap between knowledge production and its exploitation. This has led to an increased effort to encourage utilisation and commercial exploitation of research results. In order to limit obstacles and create incentives for patenting, the RPF has launched a measure called "Patents". This action aims at motivating individuals, research organisations and enterprises to file patent applications with the aim of raising the profile of IPR in Cyprus. In order to increase the public awareness on the topics concerning the fortification processes and exploitation of IP rights the RPF organised in March 2010 a special workshop titled «Introduction to the Patent System and Commercialisation of IPR».

Measures for the improvement of research infrastructure are adopted by the RPF and incorporated in DESMI. Support for updating of the existent research infrastructure is funded by €1.7m in 2009-2010⁴³ and concerns mainly units operative in the areas of technology, ICT and health and biological sciences.⁴⁴

Another way the government tries to promote excellence in Cyprus is through the agreements with foreign establishments of high reputation resulting in the creation of

⁴² Own calculations based on the last available data (2006) from the EIS 2009

⁴³ According to the DESMI 2009-2010 proposals evaluation results available at http://www.research.org.cy/EL/cy_research_fund/proposal_evaluations/evaluation_results.html (in Greek)

⁴⁴ Based on the results of the evaluation of DESMI calls announced on September 2010

the Cyl and the CII. Special emphasis is also given to the promotion of participation of Cypriot researchers in the European initiatives. It is mostly expressed through active informing (web-based information, publishing of on-going calls, relative articles and special "Researcher's evenings") of research community on funding opportunities provided via FP7, the Competitiveness and Innovation Framework Programme (CIP), COST, EUROSTARS, ESF and other EU initiatives. The participation of Cypriot scientists in the projects selected and evaluated on the basis of the European criteria leads to the production of higher quality and excellence research.

Efforts are also made as regards the encouragement of trans-national cooperation. They are expressed through signing-up bilateral agreements or Protocols for Research and Technological Development between the government of Cyprus and the third countries.⁴⁵ The cooperation and networking between Cypriot research organisations and enterprises and respective organisations from other countries is promoted also through openness of the majority of the national research calls (DESMI) to foreign representatives.

As it is apparent from the above analysis, the Cypriot research system bases its support for knowledge production on direct grants to research activity communicated through DESMI calls and the active promotion of trans-national networking. The system, however, still lacks adequate mechanisms able to increase exploitability of research results.

2.5 Knowledge circulation

Tackling the challenges that European society faces in the 21st century will require a multi-disciplinary approach and coordinated efforts. Many debates and conferences, e.g. the Lund Declaration recognise that such complex issues cannot be solved by single institutions, technology sectors or MS acting alone. Hence strong interactions within the "knowledge triangle" (education, research and innovation) should be promoted at all levels. Moreover, in the context of increasing globalisation, cross-border flows of knowledge are becoming increasingly important. This section provides an assessment of the actions at national level aiming to allow an efficient flow of knowledge between different R&D actors and across borders.

2.5.1 Knowledge circulation between the universities, PROs and business sectors

The business structure and the recently promoted research activities in the country have not built bridges to each other yet. The market has not generated any interaction and it is a challenge for policy to do so.

Channelling research results and new technology to business is now very high in the agenda and the initially (prior to budget cuts) increased budget could have made it possible to direct more resources to this. Thus, the "Development of Industrial Research and Innovation Activities" Pillar accounted for 1/6 of the RPF's DESMI in 2008, which is more than €11m. Due to economic crisis, however, there has been a cut in the overall DESMI resources resulted in decrease of the budgets available for the measures implemented within 2009-2010 and even in non-announcements of the calls for several planned measures (included in DESMI 2009-2010).

⁴⁵ More detailed information is available in the sections 2.5 and 3.5

The RPF supports the development of the “liaison offices” to facilitate the interaction between the academic and business sectors. "EUREKA Cyprus" is another measure supporting business R&D that gives the opportunity to enterprises, PROs and HEIs to develop and exploit technologies essential for the reinforcement of the competitiveness. It was introduced for the first time in the period 2003-2005 and has continued ever since. There are also a number of other measures introduced in DESMI that may contribute indirectly to the enhancement of R&D cooperation linkages including actions for SMEs, in which the participation of research organisations is also foreseen.

There are also two new measures that were introduced by the RPF for the period 2009-2010. They are the “Mediation Centres for Research and Innovation” aiming to bridge the gap between the supply and demand of innovation through a mechanism of inter-mediation among research/academic institutions and SMEs, while the "Innovation Clusters" target the creation of cooperation networks between enterprises, PROs and intermediaries. In the case of the “Mediation Centres for Research and Innovation”, financial support is planned to be directed to the development of the mechanism and not to SMEs or research organisations. The calls for both measures were planned in 2010, but due to the budget cuts of the RPF, no calls were launched.

Funding is also foreseen for the establishment of Technology Park in the area of about 1.8m sq.m⁴⁶ in the municipality of Limassol which will host research centres, business incubators and innovative SMEs. The project is undertaken by the MCIT and is included in the OP "Sustainable Development and Competitiveness" for the period 2007-2013 for co-funding from the EU Structural Funds. The implementation, however, follows really slow path: after more than half-decade from the first announcement of the Park (the decision was taken in 2005), the tasks completed include only the feasibility study, the land expropriation in the area and the construction of the access road. The establishment of the Park was eventually formalised in August 2009 after the decision of Council of Ministers. The large companies such as Google, Microsoft and several other have already displayed their interest to participate in the Park.⁴⁷

Funds are earmarked for incubators but the implementation of the incubators scheme is delayed due to administrative and budgetary constraints.

The institutionalisation concerning knowledge transfer from HEIs and PROs to the industry is still in its infancy. Linkages between research and academia and the enterprises started very low. Knowledge transfer offices did not exist in the country until very recently. The UCY, as a coordinator of the funded by the EU Structural Funds project titled “Development and operation of Offices acting as a liaison between Business/ Industry and the various Universities in the Republic of Cyprus”, has established the Office for Liaison with Industry. The project targets at the establishment and operation of the network of model offices for liaison between the academic and business worlds in each of the six Cypriot universities. It is expected that the operation of these offices will enhance communication and cooperation between the business sector and the Universities on subjects such as technology transfer, collaboration in research, promotion of applied research that responds to specific needs of the industry, utilisation of the results of universities research,

⁴⁶ http://www.kypros.org/hightech/omilies/simerini_loannou_Parko_29102006.htm

⁴⁷ Cyprus Institute, 2010

enhancement of employment potential of students in enterprises and, generally, the promotion of innovation in business and the universities.

There is no data available on the funding of the each Liaison Office separately. The only data available is the amount of the total funding of the Project (for the six Offices for 5 years, 2009-2013), which is €3.5m. The whole amount will be financed by the EU Structural Funds and the national government. It is expected that the whole structure will be operational in 2014. Despite the increased focus to this field expressed in the numbered measures, the climate for improving the research results circulation is not encouraging as the demand side is still unwilling to take a risk to innovate in cooperation with the researchers. Intermediary organisations have not gained the trust of the productive sector. However, this may improve, as more incentives are offered and new organisations are created.

2.5.2 Cross-border knowledge circulation

Because of the small size of the country and its scientific community Cyprus has emphasised access to international knowledge through reinforcing international cooperation. This again is almost exclusively an initiative of the public sector, as there is hardly any FDI active in R&D.

International cooperation is assessed as an important factor contributing to higher quality research. Cooperation with Harvard and MIT is expected to improve the quantity and quality of research results and specialisation in knowledge areas relevant for the country and the broader region.

Cyprus' intention to access the international knowledge is explicit and expressed through a wide range of measures. Support to European cooperation is the most important one. Thus, participation in EU FP and Structural Funds, international networking, hosting and participation in the international conferences as well as hosting of young and experienced researchers from abroad have been adopted by the RPF for its current programming period and the majority of them are on-going. Despite the small scale of the country and the limited national funding for research national teams have scored fairly well in the FPs especially in the field of ICT.

There are additional support funds for EUREKA and EUROSTARS. Joint venture with the Harvard University allows Cypriot researchers to participate in projects involving top-quality Harvard research infrastructures. Cross-border cooperation in areas with European value added are institutionalised through bilateral research and technological development agreements with Greece, France, Italy, Slovenia, Romania and Egypt, while preliminary discussions are under way for the signing of agreements with a number of other countries, such as China and Israel.

Universities as well make efforts to "open horizons" for local researchers. The [Service for Research, International Collaboration and Public Relations](#) (SPIPR), established in the CUT, apart from the administrative support to the research activities of the academic community and the managerial services for research projects funded by the CUT, provides support and expertise to prepare research proposal for external (mostly EU) funding.

2.5.3 Main societal challenges

No thematic priorities were set for international research cooperation in Cyprus. However, each of the six signed bilateral agreements for cooperation in the area of research and technology specify its field of cooperation. Thus, for example, the Joint

Cooperation Programme between Cyprus and Greece covers the thematic priorities of Health, IT, Agriculture and Environment, while the Cooperation Agreement with France covered all scientific fields, including human and social sciences, as the area of joint activity.

2.6 Overall assessment

The main instrument through which resources are mobilised to R&D is the multi-annual DESMI introduced by the RPF. The will of the government to prioritise research and innovation activity in the country was expressed by continuous and significant increase in DESMI budgets since 2003. Moreover, the current DESMI linking R&D to innovation for the first time reveals a far more coherent approach towards research and technological development. European funding plays a very important role for the mobilisation of the national research effort. The active participation of Cyprus in the FPs, apart from funding, offers the opportunity to learn more from EU practices to better design its own R&D policies.

Although there have been visible improvements in the recent years, the resource mobilisation is still very limited and is explained mainly by the size and composition of the productive sector. Despite the continuous increase in national or European funding opportunities for SMEs, interest from enterprises is still low. Knowledge demand was and remains very low both from the side of the business and the public sector. R&D policy remains supply driven. The increase in high-skilled S&E human resources, stimulated by the expansion of under- and post-graduate programmes in the universities may help stimulate demand for knowledge, but also to improve excellence in research. To this end the close collaboration with top-class organisations (MIT and Harvard) contributes significantly as well.

The increase of international cooperation beyond the EU is a strategic element of national policy and the best way to pursue excellence. The internationalisation opportunities offered by the EU have contributed to opening up the system but in an unbalanced way, since it is almost exclusively the universities and research organisations that have been successful.

The major problem is the inadequate knowledge exploitation. Firms are unwilling to undertake the risk related to it. Specific instruments for the diffusion of R&D and innovation to the industrial structure of the country are needed, which are still inadequate. Moreover, production and commercial exploitation of knowledge is difficult to increase further without adequate increase in demand, which is still too weak to stimulate improvements.

Reorganisation of the governance system and the efforts made towards the elaboration of the new long-term RTDI strategy are the major changes that took place recently. New measures have been introduced mainly through DESMI with special emphasis to knowledge production (research thematic programmes), exploitation (business research and innovation) and circulation (to link academia with the business sector). The overall delays, however, in launching programmes and the bureaucracy constitute a risk for successful implementation of policies drafted to tackle the country specific challenges. Moreover, due to the global financial crisis, the resources for research were contracted and the RPF budget was cut by about 35%.

Table 1: Summary of main policy related opportunities and risks

Domain	Main policy opportunities	Main policy-related risks
Resource mobilisation	<ul style="list-style-type: none"> • Continuous and significant increases in DESMI budgets; • Active promotion of participation in the EU programmes. 	<ul style="list-style-type: none"> • New incentives do not mobilise sufficient business resources; • Public funding is still among the lowest in the EU; • Crisis-related budget cuts.
Knowledge demand	<ul style="list-style-type: none"> • Future increase in S&E graduates; • Raising of awareness of SMEs to encourage their involvement in the R&D related activities. 	<ul style="list-style-type: none"> • Persistent low demand due to structural composition of the business sector; • Risk-averse culture and traditions in the business sector.
Knowledge production	<ul style="list-style-type: none"> • New RTDI governance scheme; • Increased FP participation levels; • Research centres based on the international cooperation with top academic organisations; • Expanding university departments and institutes. 	<ul style="list-style-type: none"> • Inability of the system to provide for adequate knowledge exploitation; • Low demand for new knowledge, especially from the business sector.
Knowledge circulation	<ul style="list-style-type: none"> • Further emphasis on bridging the gap between the research and business communities; • Active role in EU R&D-related initiatives and further promotion of international cooperation; • Universities' initiatives to promote international collaboration. 	<ul style="list-style-type: none"> • Lack of university-industry cooperation history and culture; • Frequent delays in launching and implementing measures lead to the lack of private sector trust; • Unbalanced contribution of the internationalisation opportunities offered by the EU (mostly universities, few business enterprises); • Lack of effectively functioning TTOs.

The Cypriot research system has been for years characterised by the lack of integrated RTDI strategy directed at stimulating R&D investment, especially concerning the involvement of the business sector in research. The multi-annual DESMI partly addresses this problem, providing more integrated and long-term approach. Insufficient involvement of the MCIT in RTDI policy-design and implementation does not help stimulate business investment in R&D. The establishment of the new governance system is expected to improve this situation. The operation of the new Councils will make it possible to decide on few priority areas to focus on. The major development expected to be realised in the near future is the final elaboration and approval of the long-term National RTDI Strategy and the Action Plan focusing on the ERA priorities. The new governance system will also provide better coordination with ministries, which is one of the major challenges of the Cypriot research system. The creation of a systematic evaluation mechanism, almost non-existent in Cyprus that will allow for early warning and help adopt evidence-based policies is also needed.

A number of measures are in place targeted to stimulate R&D investments. Special focus is given to the business sector involvement. It is expressed through the openness of the majority of DESMI measures to both, research institutions and SMEs and through the set of specific measures aiming to boost R&D and innovation

in enterprises. Despite this, the mobilisation of SMEs is lower than anticipated. Representatives from universities and research centres remain the main recipients of funding provided through the DESMI calls. Strong emphasis on enhancing ICT potential both in business and public sectors (active promotion of e-services: e-government, e-business, e-procurement etc.) may lead to higher R&D activities and investments in the field.

A positive sign is a great emphasis on the internationalisation of research activities (bilateral and multilateral agreements, greater stimulation to participate in EU programmes, international collaboration) in the country. This may contribute successfully to the strengthening the platform for higher R&D investments.

Table 2: Main barriers to R&D investments and respective policy opportunities and risks

Barriers to R&D investment	Opportunities and Risks generated by the policy mix
The structure of the productive system and the small size of enterprises	<ul style="list-style-type: none"> • Many measures oriented to SMEs; • Strong emphasis on enhancing ICT potential both in business and public sectors may lead to higher R&D activities and investments in the field; • Limited stakeholders' involvement; • Specialisation in the service industry.
The attitude of the productive sector	<ul style="list-style-type: none"> • A range of measures targeted at raising the awareness of the business community as to the advantages of R&D and funding opportunities provided may boost business R&D investment; • New incentives do not mobilise sufficient business resources; • Inefficient implementation of expected interventions may lead to further disappointment and lack of company confidence.
Lack of coordination and inadequate evaluation mechanisms that inhibit adopting evidence-based policies	<ul style="list-style-type: none"> • The creation and operation of the National Council of Research and Innovation and the Cypriot Science Council are expected to lead to better focus research priorities and more systematic evaluation mechanism; • The whole governance system is in the period of transition the fact that may imply the existence of some complexities and confusions as regards distribution of responsibilities and overall coordination.
The lack of integrated R&D strategy to secure long-term investments Limited opportunities for IPR protection	<ul style="list-style-type: none"> • Modernised new governance scheme; • Reorganisation of the research governance and elaboration of the long-term National RTDI Strategy is on the way; • Multiannual and multithematic RPF's DESMI with special focus on business R&D shows more coherent approach towards research and technological development; • Integration of research and innovation activities under the RPF; • Significant delays observed in the implementation of the reorganisation may also be noticeable during the preparation of the National Strategy.

3 Interactions between national policies and the European Research Area

3.1 Towards a European labour market for researchers

The [Communication Better careers and more mobility: A European Partnership for Researchers](#) proposed by EC in May 2008 aims to accelerate progress in four key areas:

- Open recruitment and portability of grants;
- Meeting the social security and supplementary pension needs of mobile researchers;
- Providing attractive employment and working conditions;
- Enhancing the training, skills and experience of researchers

The Commission has also launched concrete initiatives, such as dedicated information services for researchers, in particular through the activities grouped under the name of [EURAXESS – Researchers in Motion](#). Based on the assessment of the national situation in the four key dimensions detailed above, this section will conclude if national policy efforts are supporting a balanced ‘brain circulation’, with outward mobility levels matching inward mobility levels. High levels of outward mobility coupled with low levels of inward mobility often signal an unattractive national labour market for researchers and unsuitable research infrastructures. This may trigger, despite the policy efforts supporting the mobility the ‘brain drain’ rather than brain circulation.

3.1.1 Stocks and mobility flows of researchers

Although Cyprus disposes of highly educated human resources, the labour market for researchers is very small. The share of researchers in total employment is only 0.21%, while the corresponding EU average is 0.66%.⁴⁸ The extremely low levels of knowledge demand discourage S&T graduates to build research careers in Cyprus. Moreover, the still comparatively limited (whereas continuously increasing) number of post-graduate studies make it difficult to retain students in Cyprus. All these lead to substantial brain-drain of S&T graduates to other countries (mainly, the UK and USA). The expansion of PhD programmes and other initiatives aiming to make research careers in Cyprus more attractive are expected to reverse this trend. The share of researchers in the total employment portrays significant increase by almost 0.11%⁴⁹ during the only seven-year period 2000-2007.

The vast majority of researchers are hired by the higher education sector (61%). The UCY is the major “employer” of S&T graduates, followed (to a much lesser degree) by the remaining universities. The business sector employs 22% of all researchers, while the corresponding share of the government sector decreased three times since 2000 and stood at only 9%.⁵⁰ The decrease of the government sector’s share may be explained mainly by the significant increase in the number of researchers working in

⁴⁸ Source: Eurostat, figures for 2008

⁴⁹ Ibid.

⁵⁰ The percentages are own calculations based on the data from the Eurostat, the last data available is for 2007

the higher education sector (from 326 in 2000 to 871 in 2007) apparently due to the emergence of the new universities and research centres and their continuous expansion, while the relative numbers for the government sector have not been changed significantly (from 177 in 2000 to 225 in 2007).⁵¹

With the aim of enlarging the critical mass of researchers the government offers incentives to individual researchers as well as to research organisations and private enterprises to hire new researchers.

There is no specific statistical data on inward and outward flows of researchers. The Eurostat data on the citizenship of the researchers employed in Cyprus suggests that the majority of researchers are Cypriot nationals with only 22% coming from abroad. The vast majority of foreign researchers come from the EU member states (91%). The percentage of non-nationals in the overall employment in research decreased since 2002 by 5%. The share of non-EU researchers has declined. Most researchers from abroad are engaged in higher education.⁵²

Mobility of students and researchers (especially within the EU) is actively supported by both, the specific actions taken at the national level and by the efforts from the site of the Universities and research organisations. Foreign researchers are given incentives to work in Cyprus but emigration of Cypriot researchers is not discouraged, as long as their country of destination is in the EU. The relative actions and policies are described in detail in the section 3.1.5 and 3.6.2.

3.1.2 Providing attractive employment and working conditions

High salaries, coupled with other incentives offered to researchers, including financial assistance and employment support for young talented scientists, make research a highly attractive career in Cyprus. According to the study of the EC on the "Remuneration of researchers in the Public and Private Sectors" (CARSA, 2007), the annual average salary of a researcher reaches slightly more than €45,000, a figure well above the EU25 average of approximately €38,000. Researcher pay is also quite high compared to similar occupations in all scientific domains. Moreover, a researcher in Cyprus can expect annual increments throughout his career.

The process of adoption of the European Charter for Researchers, setting out the general principles for defining the role, responsibilities and rights of researchers as well as employers and research funding bodies in both the public and private sectors, was launched in Cyprus but is still very slow. Only three organisations, namely, the European University of Cyprus, University of Nicosia and Frederick University has signed the Charter so far.⁵³

There is a profound gender imbalance concerning S&T (and particularly researchers) careers. Thus, in the higher education and government sectors, women represent only about 34% above the EU average of 29%.⁵⁴ There are no policy actions explicitly addressing either low employability of women on the research labour market, or gender imbalance on academic and research boards or committees. However, the general aim of the government to promote entrepreneurship among all social groups, especially in the sectors of special economic interest such as tourism, manufacturing and trade, has been expressed through a measure called "Support to

⁵¹ Source: Eurostat, the figures refer to Headcount (HC)

⁵² Ibid.

⁵³ ERAWATCH Network, 2010

⁵⁴ Source: Eurostat. The figures are for 2007 and represents FTE shares

Female Entrepreneurship” funded and managed by the MCIT. The measure includes a 6-month training programmes for women aged 18 to 55 years who wish to establish an enterprise in manufacturing, trade, services or tourism sectors and provides start-up funding.

In 2002, the law on “The Equal Treatment of Men and Women in Employment and Vocational Training” was promulgated (Law, No. 205(I)/2002). This Law targets “the application of the principle of equal treatment for men and women in respect of employment, access to vocational guidance, vocational education and training and the conditions of their provision, including professional development and the conditions and preconditions of dismissal” without affecting the provisions related to women’s protection (concerning pregnancy, childbirth, breastfeeding and maternity).

3.1.3 Open recruitment and portability of grants

The research positions are open to foreign applicants. An indirect limitation for some positions may be the requirement for knowledge of the Greek language.

Directive 2005/36/EC on the recognition of professional qualifications was transposed into national law by the Parliament of the Republic of Cyprus in 2008 establishing comparably easier mutual recognition of professional qualifications and greater liberalisation for the provision of related services. To further improve global recognition of academic qualifications Cyprus adopted credit transfer systems (ECTS) and the Diploma.

With the purpose to stimulate exchange and cooperation in the field of science and higher education the bilateral agreements on mutual recognition of academic qualifications were signed with Germany (in 2006), Romania (2008) and Italy (2009). The agreement between the Cyprus Council for the Recognition of Higher Education Qualifications (KY.S.A.T.S) and the Greek National Academic Recognition Information Centre (Hellenic NARIC) was signed in October 2010. The agreement foresees the recognition of titles in engineering, geonics and some other relevant titles by the Universities in Greece.⁵⁵

As far as researcher mobility is concerned, there is still no national portal on the European Commission’s EURAXESS Services Network. Some of the relevant information is included in the “Researcher’s Guide to Cyprus” issued by the Cyprus Mobility Centre.

3.1.4 Meeting the social security and supplementary pension needs of mobile researchers

The Social Insurance Scheme covers compulsorily every remunerated person occupied in Cyprus regardless of his/her legal status (employed, self-employed as well as new forms of employment such as part-time and temporary employment, fixed-time contract) without any differentiation between Cypriots, Europeans or third-country citizens. The Scheme covers all the professions without any specific differentiation for researchers. It provides pensions and benefits in all areas of social security and is financed by contributions from employees, employers and the state. Anyone contributing to Cypriot social insurance is entitled to free or subsidised medical and dental treatment.

⁵⁵ <http://www.kathimerini.com.cy/index.php?pageaction=kat&modid=1&artid=30032&show=Y>

Students enrolled in full-time programmes in Cypriot tertiary education institutions (including PhD candidates) are eligible to medical insurance.

Council Regulation No 1408/71 has been transposed into national legislation since 1.05.2004. The Department of Social Insurance Services of the Ministry of Labour and Social Insurance is responsible for government policy implementation of social insurance legislation. Cyprus has concluded social security bilateral agreements with the United Kingdom, Greece, Egypt, Canada, Quebec, Australia, Austria, Slovakia, Switzerland, the Czech Republic, Bulgaria and the Netherlands but there are no specific regulations for researchers in these Agreements. The bilateral agreements give the possibility to the persons who are not covered by the EC regulation⁵⁶ to get some cash benefits.⁵⁷

Concerning facilitation of third-countries researchers' entry and integration into the Cypriot labour market, the "Scientific Visa Package" has been incorporated into national legislation since 2008 but has not yet been applied.

3.1.5 Enhancing the training, skills and experience of European researchers

The geographical position of the country and its small size make the issue of interactions with the rest of the world, especially with other EU countries, one of the major topics in the development of the stronger research system. Strong connectivity with the rest of the EU may offer a potential to scale up some research activities and benefit from exchanges.

Universities and research organisations have increased their efforts towards stimulating researcher mobility at the PhD level. The UCY has signed a Bilateral Framework of Cooperation with about fifty universities all over the world (Europe, Australia, Asia and the USA). The Framework consists of a range of inter-university and inter-departmental agreements providing for mutual exchanges of student and academic staff, joint research programmes and exchange of teaching and research material. Moreover, it offers programmes in an international language. This allows foreign students to enrol in the national postgraduate programmes. Much the same provision is incorporated in the legislation of the other two public universities. In addition, the UCY and the CUT operate Foreign Language Centres facilitating mobility for incoming and outgoing students.

Other example is the Cyprus Institute of Neurology and Genetics. Having an international reputation, it offers several research and teaching programmes in collaboration with research and academic organisations from abroad. For example, the Institute is recognised for PhD studies by the London Imperial College of Science, Technology and Medicine, as well as by Greek universities. Students are able to pursue their studies at the Institute with joint supervision and by spending some time abroad.

Trans-national mobility is also reinforced through the increasing collaboration with the world-wide top-quality academic and research organisations promoted by the Cyl and the CII. The HSPH-Cyprus Program (HCP) in Boston accepts Cypriot qualified students to study, train and get a degree at the Harvard School of Public Health. Moreover, it collaborates with the CII in developing in-depth research.

⁵⁶ In very limited situations this also stands for persons that are covered by the EC regulation

⁵⁷ Cyprus Research Promotion Foundation, 2007

In recognition of the importance of integrating Cypriot researchers into international R&D activities, the government has adopted substantial initiatives and activities to this end. The RPF introduced a wide range of measures and instruments aimed at promoting participation of Cypriot researchers in EU research programmes (FP, COST, EUREKA), as well as collaboration with international organisations supporting research activities (“Bilateral Collaboration” and “International Cooperation” programmes). The organisation also promotes Cypriot researcher participation in the activities of the EU Joint Research Centre (JRC).

A programme called “Hosting of Researchers Based Abroad” aims to host talented researchers from abroad and help them incorporate for a specific period into the research system of Cyprus. Currently, 16 projects were selected for this programme.⁵⁸ The overall budget for this programme for 2009-2010 period reaches €650,000.

3.2 Research infrastructures

Research infrastructures (RIs) are a key instrument in the creation of new knowledge and, by implication, innovation, in bringing together a wide diversity of stakeholders, helping to create a new research environment in which researchers have shared access to scientific facilities. Recently, most EU countries have begun to identify their future national RI needs, budgets and priorities in the so called National Roadmaps for Research Infrastructures. These strategic documents also set out a strategic view on how to guarantee and maintain access to research facilities. Although some countries invest heavily in RIs, none can provide all the required state-of-the-art facilities on a national basis. Several large RIs have already been created in Europe. While optimising the use and development of existing RIs remains important, new infrastructures are needed to respond to the latest research needs and challenges. European Strategic Forum for Research Infrastructures ([ESFRI](#)) was established in April 2002 to support a coherent approach to policy-making on RIs in Europe and to act as an incubator for international negotiations on concrete initiatives. This section assesses the research infrastructures national landscape, focusing on the national RI roadmap and national participation in ESFRI.

3.2.1 National Research Infrastructures roadmap

Cypriot research base does not provide for large national infrastructures or scientific technological platforms that may be of special interest for foreign access. One of the largest and oldest research infrastructures is the ARI established in 1962 as a cooperative project between the Government of Cyprus and the UNDP. The CING hosts also the most technologically developed RI in Cyprus and the neighbouring countries in the sectors of neurology, genetics, biomedical and other related sciences. The UCY hosts several laboratories with unique research facilities, such as the Micro- and Nano-Systems Laboratory dedicated to micro- and nano-manufacturing and analysis. The UCY has also established the High Performance Computing Systems Lab (HPCL) aiming to promote and coordinate research activities in the areas of Parallel and Distributed Systems, Grid and Internet Computing, Middleware and Performance Engineering.

⁵⁸ Other 6 projects were called for negotiations and are expected to be incorporated as well if come to an agreement (DESMI results 24.09.2010)

The Cypriot relatively strong ICT and computing base makes it possible to give strong emphasis on “virtual” infrastructure which has become a top priority in political, research and scientific circles. The Cyprus Research and Academic Network (CyNet), established by the UCY, the RPF and the Planning Bureau, aims at the creation of a network infrastructure and the provision of advanced on-line services to the local research and scientific community. The CyGrid initiative, launched by the HPCL at the UCY premises, aims at establishing a contact point for local scientific community users interested in Grid. With the vision of enhancement of the existing infrastructure through the reinforcement of research and academic cooperation, a relative Memorandum of Understanding was signed by the UCY, the University of Nicosia, the CyNet and the Ministry of Health.⁵⁹ Given the high profile in the areas of ICT and computing, further development in the field of grid computing and e-infrastructure have become top. The development of the national strategy in relation to e-infrastructures could be highly beneficial and could help the country to play a leading role in the Eastern Mediterranean as an e-infrastructure centre.

There is no overall RI strategy. The National Roadmap has not been designed nor has the process to formulate it started.⁶⁰ The Government’s intention to upgrade the national RI was expressed mainly through individual instruments and measures shaped without any integrative approach towards overall RI development. However, driven by the Government effort to achieve the Lisbon goals, where reinforcement of RIs is among the objectives as well as the availability and increase in Structural Funding committed to the country, the investments in RIs have increased significantly over the last years until the economic crisis affected them negatively. The “Development of Research Infrastructure”, one of the five Priority Axes of DESMI includes programmes aimed at developing new research infrastructure, upgrading and supporting existing research laboratories and providing access to important research infrastructure abroad. For 2008 period, the budget for this programme constituted €37m with the major share of funding directed to the programme for the development of new infrastructure. Due to the budget cuts following the economic crisis, in the 2009-2010 period this programme was not even announced. This limited the budget to €1.7m for the upgrade of the existing infrastructure plus some (not yet determined) amount for the “Access to CERN” programme.

3.2.2 National participation in the *ESFRI roadmap*: Updates 2009-2010

No funds are committed for the second phase of ESFRI infrastructures implementation, nor are there an explicit policy expressed for ESFRI schemes. The absence of appropriate mechanisms hinders commitment of funds to specific ESFRI programmes. As referred in the ESFRI Implementation report 2009,⁶¹ the process to formulate a national roadmap has not started yet.

3.3 Strengthening research institutions

The ERA green paper highlights the importance of excellent research institutions engaged in effective public-private cooperation and partnerships, forming the core of research and innovation 'clusters', mostly specialised in interdisciplinary areas and attracting a critical mass of human and financial resources. The Universities/

⁵⁹ <http://grid.ucy.ac.cy/egee/technical-information.html>

⁶⁰ ESFRI European Strategy Forum on Research Infrastructures, 2009

⁶¹ ESFRI European Strategy Forum on Research Infrastructures, 2009

research institutions should be embedded in the social and economic life where they are based, while competing and cooperating across Europe and beyond. This section gives an overview of the main features of the national higher education system, assessing its research performance, the level of academic autonomy achieved so far, dominant governing and funding models.

3.3.1 Quality of National Higher Education System

The Cypriot higher education system is very young with the first university being established in 1992 (the UCY), which basically remained the only university in the country until 2006 when the Open University accepted its first students. Since then, other four universities (one public, the CUT, and three private already mentioned in the Section 2.1) have become operative. One more private university, the Neapolis University Cyprus, starts operating in the academic year 2010-2011 and has the ambition to become a leading innovation organisation in the service sector. In total, three public (the UCY, the CUT and the Open University) and four private (European University of Cyprus, University of Nicosia, Frederick University and Neapolis University Cyprus) are now operative.

In 2007-2008 academic year (the year when four new universities launched their operation), there has been a sharp increase in number of Cypriot students in the local HEIs (from about 15,000 in 2006-2007 academic year to about 25,000 in the next year).⁶² Steady increase in foreign students (in absolute numbers) has also been observed (the figures have almost tripled in the period from 2002 to 2008).⁶³ According to Eurostat Education and Training data, from the total of students, almost 50% are women. Foreigners constitute 1/5 of the total enrolments. The majority of students (almost 50%) are enrolled in social sciences, business and law, followed by humanities and art and science, mathematics and computing (about 10% each). The level of the S&E and SSH graduates is very low, reaching only slightly more than half of the EU average level. Still more disappointing is the situation concerning PhD holders in the field with only 8.7% of the EU average. These rates are justified by the long-term absence of the technical and engineering faculties in the past.

Universities in Cyprus play an extremely important role in both basic and applied research. All state universities in Cyprus are research-oriented, while the private universities also try to strengthen their research activities through instigating the proper institutions and providing incentives to their academic members to pursue quality research with an international impact and visibility. HERD attributed for about 46% in the total GERD. The research implemented in the universities is funded mainly publicly (by more than 70%), with industry contributing only 2% of the total HERD funding.⁶⁴ The main explanation is still very low interest and awareness of the business sector for R&D and its benefits. However, it was observed⁶⁵ that the universities tend to suffer from the lack of financial and human resources, insufficient infrastructure facilities and delays in the creation of new ones as well as tremendous bureaucracy that hinders both their research and educational activities.

The UCY is the oldest and the main research performer among the HEIs in the country. It employs about 500 new researchers in the European projects. The

⁶² Approximate figures from the graph provided by the Cyprus Ministry of Education and Culture (<http://www.highereducation.ac.cy/en/historical-background.html>)

⁶³ Ibid.

⁶⁴ Own calculations based on the data (in millions Euro) from the Eurostat

⁶⁵ Policy Mix Peer Review, 2009

representatives of the UCY hold the major share of Cypriot researchers participating in the FP7. Its publications grew from 20 in 1992 to 327 in 2008.⁶⁶ However, up to the moment, it owns only 3 patents and there is only one patent the revenues from the sale of the licence from which amounted to €79,110.⁶⁷ The low rate in patenting is part of the general “picture” of the local R&D system characterised by extremely limited levels of exploitation of research results.

Cypriot universities are not included in the main international ranking lists such as Shanghai Ranking, Times Higher Education Supplement (THES), Leiden Ranking, Green and Orange Rankings. No national research performance rankings were produced in the country.

3.3.2 Academic autonomy

Universities in Cyprus are characterised by high level of autonomy in terms of management of budgets including this for research and hiring academic and research personnel. As autonomous entities, universities are responsible for their development and institutional goals. In this context, the strategic plan is a key instrument for determining activities and priorities.

Public universities receive funds from the public budget. Cyprus is among the countries that allocate public funding to institutions according to budget headings, which have to be strictly respected (Eurydice, 2008). One significant step towards higher autonomy of the HEIs was the adoption in 2004 of the ‘Social Agreement’ by the UCY (the only University in the country at the time). The Agreement provides for more flexibility in the management of government funds, which would be decided automatically using special formulae based on the number of full-time students. At the same time, this document provides for better accountability mechanisms, such as mandatory annual reporting on activities implemented and goals achieved that should be submitted by the HEIs.

As concerns decision-making processes for salaries and promotions public universities are at a disadvantage. Salary scales for academic and research personnel tend to follow the regulatory state models leading to serious limitations of institutional autonomy in this respect. University professors and associate professors in addition to these predefined salaries may be offered additional remuneration in the form of research bonuses. Private university and research institute remuneration for academic and research personnel are set by the institutions and are generally more flexible.

There is more autonomy granted to universities and research organisations concerning the design of their research agendas and topics of their research specialisation. It was, however, observed that higher autonomy of the HEIs to decide on the research fields led to excessively broad spectrum of disciplines covered hence hindering prioritisation and contributing to fragmentation in research.⁶⁸

As regards the dominant university governance model, the UCY may be the greater example. As an autonomous public corporation it is governed by a Council and a Senate. The Council is a decision-making and advisory body of the University and is responsible for the management of the administrative and financial matters, shaping institutional strategic and development planning of the organisation. The annual

⁶⁶ Web of Science 1900-2009 of the Thomson Reuters

⁶⁷ University of Cyprus, Financial Services

⁶⁸ Policy Mix Peer Review, 2009

budget, salary scales and fringe benefits as well as funding distribution for the building infrastructure of the University are also among the core responsibilities of the Council. The Council also has the authority to sanction appointments or promotions of the academic or the administrative staff. It is composed of internal and external stakeholders:

Concerning the other two state universities, the CUT follows the same governance pattern as the UCY, while the Open University until its complete autonomy is governed by an Interim Governing Board appointed by the Council of Ministers. The three private universities have the status of a corporation and are considered private law organisations.

3.3.3 Academic funding

The government core funding is the main source of financial resources in Cypriot public universities. In the UCY, they reached 78% of the total budget in 2008. Only about 2.5% of the budget was financed by the government competitive funding and about 11.5% by the international sources, mostly the EU (from participation of university representatives in the international research projects). Industry and non-governmental sector contribute only 0.2% to the total budget. Public incentives implemented by the country to support HEIs in their search for private funding and in their partnerships with the private sector are very limited. There is no tax relief for universities relating to donations or other types of private funding, nor are there any tax incentives for sponsors and private partners. Moreover, an organisation's capacity to obtain private funding is not taken into consideration when determining the amount of public funding.

There are no funding formulas or specific criteria (in terms of the number of students or scientific results) used to define the level of the allocation of university block funding for research. The basic funding for research is based on the needs presented by institutions during the negotiation phase. The financial resources received in the form of block grants from the state are allocated by the universities in autonomous way through internal competitions and in line with their own research priorities.

Most research undertaken in universities is financed through external funding via competitive bidding procedures for specific research programmes in the framework of either the RPF or the EU calls. Since there is no government block funding private universities have a greater incentive to seek out competitive research funding opportunities.

One major aspect of university autonomy with respect to financial management is the possibility of access to private funds. Diversification of HEI funding is a key aspect in developing the entrepreneurial university model. In this context, Cypriot institutions have a very high level of autonomy in establishing companies, making financial investments and borrowing money without any limitations.

3.4 Knowledge transfer

The importance of knowledge dissemination and exploitation in boosting competitiveness and contributing to the effectiveness of public research has been increasingly recognised by EC and EU Member States. Following the publication of the [ERA Green Paper](#) in April 2007, the EC Communication "[Improving knowledge transfer between research institutions and industry across Europe](#)" was issued, highlighting the importance of the effective knowledge transfer between those who do

research, particularly HEIs and PROs, and those who transform it into products and services, namely the industry/SMEs.

Several Member States have taken initiatives to promote and facilitate knowledge transfer (for instance new laws, IPR regimes, guidelines or model contracts) and many others are planning to intensify their efforts in this direction. However, these initiatives are often designed with a national perspective, and fail to address the transnational dimension of knowledge transfer. This section will assess the national policy efforts aimed to promote the national and trans-national public-private knowledge transfer.

3.4.1 Intellectual Property Policies

Historically there has been limited demand for IPR protection. In a chicken and egg situation there was no demand for IPR support and no incentives were given. The common practise is that the majority of the universities share the commercial exploitation of patents and copyrights with the research personnel that carried out research. Specific regulatory framework authorises HEIs to own the intellectual property rights to the results of research conducted by their staff and allowing them to generate resources from the possible commercialisation of results (Eurydice, 2008). Provisions are now made to improve the situation. The University of Cyprus is taking initiatives to organise IPR protection for its researchers. A small budget (€170,000) is earmarked to support applications for patent protection. Interested researchers apply for support to an ad hoc committee (composed of members of the university council and external experts, including patent lawyers). The committee gives an opinion to the University Council, which takes a final decision.

The CUT have some provisions concerning the agreements on the IP rights during the elaboration of undergraduate theses. There are no specific regulations on it but in general, if no specific agreements (e.g. with the business enterprises for the further exploitation of results) are signed, the IP right is considered to belong to the student or the group of students that undertook research and to the supervising professor.

In general, institutional ownership in Cyprus is expected to lead to a general improvement in the technology transfer capability of institutions. However, the fact that professors cannot appropriate intellectual property (professors' privileges as such do not exist in Cyprus) does not help improve incentives for research in Universities. All this led to very limited results in terms of patent applications and grants owned by the universities. Thus, at the moment the UCY is owner of 7 patents and for other 4 the applications were made.⁶⁹

In order to improve the general frameworks for research exploitation through limitation of obstacles and creation of incentives for patenting, the RPF has launched a measure called "Patents". This action aims at motivating individuals, research organisations and enterprises to file patent applications with the aim of raising the profile of IPR in Cyprus. The measure provides funding to cover all costs incurred in obtaining and validating patents, including drawing up the application, filing, translation, prosecution and defence of the validity of the right during any official prosecution of the application and possible defence proceedings, as well as annual fees for the protection of patents for a period of two years. This therefore provides the possibility of patenting significant research results that arise from research programmes managed and/or funded by the RPF, the EU or any other organisation.

⁶⁹ University of Cyprus, 2009

The measure mainly aims at an annual increase in the number of patents submitted by Cypriot enterprises, research organisations and individual researchers / inventors and the further commercial exploitation of these patents by local individuals and bodies. Funding for the “Patents” action for 2009-2010 period was determined at €200,000.

3.4.2 Other policy measures aiming to promote public-private knowledge transfer

Involvement of private sectors in the governance bodies of HEIs and PROs

The common practise is that the business sector is not involved in the governance bodies of the academic and research institutions.

Inter-sectoral mobility

There is no quantitative data available on the inter-sectoral mobility of researchers but the overall impression is that is very limited. University professors have a right within some limitations to work in parallel in the private sector organisations and enterprises. This actually may give a possibility to identify some needs of the industry and better relate the research and educational work of the university with the specific needs of the business sector and the economy and general.

Promoting research institutions - SME interactions

Linkages between research and academic institutions and the business sector, which almost exclusively consists of small and very small enterprises, are almost non-existent in Cyprus. The government has recognised the problem and the importance of the existence of such linkages and the development of strong university-industry cooperation has recently become one of the most important topics of the agenda. Two new measures were introduced by the RPF for the period 2009-2010. They are the “Mediation Centres for Research and Innovation” and the “Innovation Clusters”, described in detail in the Chapter 2.5.1. Calls for proposals for either of these measures, were not implemented due to budget cuts of the RPF. “Innovation vouchers” scheme may also help to create some linkages and it offers comparatively easier way to be applied. In general, it is obvious that the current DESMI gives much more emphasis on bridging the gap with industry in comparison with the previous periods.

The “Development and operation of Offices acting as a liaison between Business/ Industry and the various Universities in the Republic of Cyprus” programme, described in the Section 3.4.1 also aims to improve mutual collaboration between firms and universities.

Four business incubators were also developed in the period 2003-2004, while three of them are now operative.⁷⁰ If appropriately operating, they could serve as a means to spin-out knowledge to the market. However, the way incubators and support to their tenants is designed is criticised (for more details, see Sections 2.2.2 and 2.5.1) and have undermined the confidence of the business sector. The creation of a Technology Park in the area of Limassol is under way, but follows generally slow path (Section 2.5.1 provides more extensive description of the programme).

An initiative for the promotion of the research-industry interactions and enhancement of technology transfer was the proposal submitted by the UCY and the Cyprus

⁷⁰ [ERMIS Research & Incubator Center](#), [HELIX Business Incubator](#), [Diogenes Business Incubator](#)

Employers & Industrialists Federation to the Planning Bureau for the creation of innovation zone in the Nicosia area ('Knowledge Region Nicosia')⁷¹ could not ensure the necessary funding.

EU cohesion policy

The new incubators programme and the technology park in Limassol, as well as the two measures of the RPF ("Innovation clusters" and "Mediation Centres for Research and Innovation") are included in the OP "Sustainable Development and Entrepreneurship" of the EU Cohesion Policy in Cyprus and are co-funded by the ERDF.

Spin-offs

As a result of the limited access to other forms of financing, research support programmes are funded mainly via public grants with venture capital and other alternative forms of financing being almost absent in the country. This limits opportunities offered to stimulate the creation and expansion of innovative companies.

3.5 Cooperation, coordination and opening up national research programmes within ERA

This section assesses the effectiveness of national policy efforts aiming to improve the coordination of policies and policy instruments across the EU, all part of the drive to create an integrated ERA.

3.5.1 National participation in intergovernmental organisations and schemes

International networking and cooperation, especially at the EU level is seen as an opportunity for a small country such as Cyprus with a weak research profile, limited experience in research policy making and a lack of human and financial capital to derive major benefits from participating in joint initiatives. The government support for European initiatives on joining and coordinating with national research programmes is expressed through the development of special strategies aimed at promoting Cypriot stakeholders' participation in such initiatives. The design and implementation of these strategies is the responsibility of the RPF.

The RPF introduced a wide range of measures and instruments aimed at promoting participation of Cypriot researchers in EU research programmes such as FP, COST, and EUREKA. The RPF, as the National Contact Point of the FP7 in Cyprus, actively promote the participation of local researchers in the initiative through providing information and advisory services concerning finding partners, handling procedural subjects, communication with the EC etc. To this end, the RPF organises occasionally special informative events or educational seminars. Following this effort, the participation of the Cypriot representatives seems to follow an upward path. Thus, while within the previous five year period (2002-2006, FP6) Cyprus secured about €27.6m, the first two years of the FP7 (2007-2008) brought in already €14m⁷² from 76 contracts signed (Cyprus Research Promotion Foundation, 2009). Although

⁷¹ Policy Mix Peer Review, 2009

⁷² The amount was calculated based on the contracts for the projects signed till May 2009

these figures constitute only small fracture of the total EU results,⁷³ the results were assessed as satisfactory given the size and the structural characteristics of the country.⁷⁴ According to more recent data, by the end of 2009, Cypriot researchers managed to absorb about €22.5m from the 120 agreements signed FP7.⁷⁵ Explained mainly by the high country profile in the area, the Cypriot organisations recorded especial success (about 40% of all the agreements signed) in the field of ICT, followed with the huge interval by the “Transport” and “Energy” areas (about 6.2% and 2.2% correspondingly). There is also a special action foreseen by DESMI for 2009-2010 period that provides for matching funds where they are necessary making it possible for more local research organisations to participate in the FP7 programme. However, the call announced in June 2009 of the total budget €1.5m was eventually “frozen” in October 2009 due to the organisation’s budget cuts.

Regarding the COST scheme, Cyprus participates in 25% of the total of running actions in 2009.⁷⁶ Given the small size of the country and limited human resources in research, these rates may be assumed as satisfactory. As it can be seen from the results of the finalised actions, Cyprus participants were almost equally distributed among all the thematic fields.

The RPF runs the “EUREKA Cyprus” programme since 2003 and included it in the Organisation’s Multiannual bundle of measures. The RPF functions as the funding mechanism for the participation of Cypriot organisations in EUREKA projects, publishes calls in a regular basis and monitor the approved projects. For 2009-2010 period, DESMI secured about €2.4m for the programme. Due to RPF budget cuts, however, it is still unknown if the eventual budget will be decreased or not.

The strategies developed by the RPF mainly aim at developing and upgrading small-scale local-level infrastructure without particular emphasis on the broader European vision. The organisation, however, supports the participation of Cypriot scientists in CERN programmes and promotes further collaboration with the organisation. However, there has been raised an issue of bureaucracy related to participation in the CERN projects.⁷⁷ Given its high profile in ICT, Cyprus promotes “virtual” infrastructure connections. Thus, the infrastructure established by the CyNet connects it to the European research and academic network GEANT2 and the Euro-Mediterranean research and academic network EUMEDCONNECT. Two Resource Centres established by CyGrid provide the connection to the European Grid Infrastructure of EGEE.

3.5.2 Bi- and multilateral agreements with other ERA countries

Bilateral research and technological development agreements were signed with Greece, France, Italy, Slovenia and Romania. In the context of these agreements, Joint Scientific and Technological Cooperation Programmes are organised by the RPF and the respective organisation of the other country for selected thematic priorities, in areas of common strategic interest, such as ICT, environment and sustainable development, health, education and social sciences (more information on the topic is available in the Section 2.5.3). In the last two years (2009-2010) no new

⁷³ The corresponding shares of the Cypriot participation reached 0.21% in funding and 2.1% in terms of the contracts signed (source: Cyprus Research Promotion Foundation, 2009)

⁷⁴ Cyprus Research Promotion Foundation, 2009

⁷⁵ http://crpf.metacanvas.com/EL/int_cooperation/framework_programme/index.html

⁷⁶ COST, 2009

⁷⁷ Policy Mix Peer Review, 2009

cooperation agreements were signed. The second Joint Programme with Romania was announced in June 2009, while in March 2010 the fourth call in the framework of cooperation programme with France was published.

3.5.3 Other instruments of cooperation and coordination between national R&D programmes

The main instruments introduced by the RPF for promoting joint actions at the international level are special actions under the “International Collaboration” programme, which has been included in the current DESMI. The general objective of the programme is to foster cooperation between Cypriot and prominent international research organisations. Apart from encouraging knowledge and experience transfer to Cyprus, a re-orientation of the research activities of the Cypriot organisations to new research and technology areas in issues important to the development of their activities are expected to be achieved. To this end, the actions such as “Targeted international cooperation”, “Participation in ESF” and “Participation in Joint European Programmes” are promoted by the programme titled “International Collaboration”.

The proposals submitted should be placed between the following thematic fields: technology, ICT, sustainable development, health and biological sciences, social and human sciences.

The RPF have become a member of the ESF since 2002 and pays annual subscription, the fact that allows Cypriot researchers participate in its activities. Apart from the support for Cypriot participants in the ESF, DESMI foresees additional funding to organisations that organise and host in Cyprus Research Workshops of the ESF.⁷⁸

Cyprus has been involved in a series of ERA-NET and participates in the Joint Technology Initiative ARTEMIS, as well as in the AMBIENT ASSISTED LIVING (AAL) and the EUROSTARS joint programmes based on the Article 185 and the EUROCORES collaborative scheme of the ESF.

3.5.4 Opening up of national R&D programmes

Research organisations and non-profit organisations from abroad are eligible to participate as partner organisations with the possibility of obtaining up to 30% of the funding in the national programmes run by the RPF. However, for SMEs based abroad the regulation is different: they are eligible for participation as partner organisations but cannot receive any funding. There are almost no barriers for foreign researchers to participate in national programmes. The only possible limitation for some positions may be the requirement for knowledge of the Greek language. However, the lack of regulations that facilitate researchers' mobility (social security, pensions and visa schemes) may impede successful opening up of national programmes.

3.6 International science and technology cooperation

In 2008, the European Commission proposed the [Strategic European Framework for International Science and Technology Cooperation](#) to strengthen science and

⁷⁸ This additional support is foreseen to be provided through special measure “ESF Exploratory Workshops”, but the Call announced in June 2009 was “frozen” in October 2009 due to RPF budget cuts

technology cooperation with non-EU countries. The strategy identifies general principles which should underpin European cooperation with the rest of the world and proposed specific orientations for action to: 1) strengthen the international dimension of ERA through FPs and to foster strategic cooperation with key third countries through geographic and thematic targeting; 2) improve the framework conditions for international cooperation in S&T and for the promotion of European technologies worldwide. Having in view these aspects, the following section analyses how national policy measures reflect the need to strengthen the international cooperation in S&T.

3.6.1 International cooperation

Given its geographical location and the ambitious to play a leading role in the Eastern Mediterranean, Cyprus has particular interest in cooperation with the countries from this geographic region. Thus, in May 2006 a Protocol of Scientific Cooperation on Research and Development was signed with the Arab Republic of Egypt. In the framework of this Protocol, a launch of a Joint Research Cooperation Programme inviting parties from the two countries to submit research proposals is foreseen. The first (and the only one so far) Joint Programme was announced on the 31st of August 2007 and was focused on the thematic fields such as energy, environment, agriculture, health, cultural heritage protection and new technologies.

Preliminary discussions are under way for the signing of Agreements with a number of other countries, such as China and Israel.

Through a specific action "Targeted International Cooperation" the RPF promotes collaboration with the research organisations of the countries with high R&D profile such as USA, Canada, Japan, China, India, Singapore, Korea, Malaysia, Australia, New Zealand and Russia. This action is used as an instrument for creation of collaboration networks with the research organisations from the third countries with which no bi-lateral agreements were signed. Projects implemented in the context of such cooperation networks should concern (as the majority of the projects supported by the RPF) one of the following thematic area: technology, ICT, sustainable development, health and biological sciences, social and humane sciences. The new call for the action was announced in 2009 with the budget amounted to €550,000.

At the level of separate organisations, Cypriot Universities and research organisations have established significant number of research collaborations with universities and research institutes abroad.

3.6.2 Mobility schemes for researchers from third countries

In order to create collaboration networks with researchers from abroad, the RPF is currently running two programmes aimed primarily at hosting experienced as well as young researchers based abroad and their involvement in the activities of Cypriot research organisations and enterprises. The action targeted at experienced researchers could also apply to Cypriot citizens that went abroad to study but remained to work after completion of their studies for more than five years. This is not, however, the case for hosting young scientists. This action does not distinguish between the EU and non-EU representatives.

4 Conclusions

4.1 Effectiveness of the knowledge triangle

The knowledge triangle is not operating effectively yet, although progress is visible in the last decade. The education and research parts are significantly better developed and achieve more progress than innovation.

One should recognise that both education and research policies have started only in the last two decades in Cyprus and, taking this late start into consideration, as well as the constraints by the size and peripheral location of the island, progress is remarkable, but far from having achieved a satisfactory level yet. In particular, what could not have built up yet is the modernisation of the business sector, identifying research as an opportunity and taking risks to launch new products and restructure the national production system. The sectoral specialisation of the economy and the relative prosperity of the island do not make any changes felt as a priority of the business community.

Hence, in parallel to the increasing budgets and efforts of research and education, more emphasis is needed to create bridges and reinforce the triangle. Knowledge demand remains the weak factor, despite significant and generous incentives. Policy is emphasising this priority yet without any visible changes in terms of outcomes and impacts. Partly because of the structure of the productive sector (small companies in traditional sectors and hardly any R&-intensive FDI) and partly because the business culture has not changed, companies do not apply for grants and under-exploit the incentives offered. The role of the business community remains marginal as the strategy it follows is limited to buying knowledge incorporated in new vintages of machinery. A vicious circle of low demand for and limited supply of knowledge needs to be broken. Positive elements are the increase of human capital (despite persisting brain drain), significantly increasing incentives, visible improvements in the universities and the decision to establish new intermediaries (TTOs). But the limited absorptive capacity of the business sector remains a major drawback that will take time to be eliminated.

Table 3: Effectiveness of knowledge triangle policies

	Recent policy changes	Assessment of strengths and weaknesses
Research policy	<ul style="list-style-type: none"> • Establishment and operation of the two new governance bodies, the NCRI and the CSC, which are going to play the main role in the new system; • The elaboration of the first long-term National RTDI Strategy started; • Reduction by about 35% the budget of DESMI due to the economic crisis and internal organisational delays. 	<ul style="list-style-type: none"> • (+) The new governance system allowing (if properly operating) for better coordination and more focused approach; • (+) Increasing efforts to raise long-term investments in RTDI; • (+) Intensive use of European funding as an investment instrument towards mobilisation of national research; • (-) R&D budget negatively affected by the crisis; • (-) Lack of clear strategic research priorities resulting in too broad allocation of funds among different research themes; • (-) Inadequate science-industry dialog; • (-) Low willingness and absorptive capacity of the business sector.

	Recent policy changes	Assessment of strengths and weaknesses
Innovation policy	<ul style="list-style-type: none"> • The new strategic approach consolidates research and innovation under the single policy framework that is being elaborated at the moment. This policy framework will be communicated through the long-term National RTDI Strategy; • For many of the innovation-related measures introduced by DESMI in 2009-2010 (such as creation of mediation centres between research/academia and SMEs, innovation clusters, promotion of collective research in SMEs) no calls were announced due to the budget cuts of the RPF. 	<ul style="list-style-type: none"> • (+) Increased focus by policy makers on the business sector R&D and innovation; • (+) Increased efforts towards the creation of adequate strategic and integrated framework for policy-making; • (-) Limited response of the business sector to the numerous measures; • (-) Linkages between enterprises and the research and academia are almost absent; • (-) Slow and not very effective implementation of the infrastructure in the form of incubators and technology parks; • (-) The lack of emphasis on RTDI policy by the MCIT; • (-) Little attention to non-technological or organisational) innovation.
Education policy	<ul style="list-style-type: none"> • Expansion of the post-graduate courses in the universities; • Further expansion is planned for the near future (new master programmes in Mathematics in cooperation with the French University Poitiers, specialised master programmes in Informatics and Education); • New initiatives targeting awareness raising of science and research culture in primary and secondary education. 	<ul style="list-style-type: none"> • (+) Very high youth education levels and further efforts to maintain them in terms of expansion of universities programmes; • (+) Strong political commitment to develop cooperation links with the leading foreign HEIs (Harvard, MIT); • (+) Increased focus on the cultivation of research culture among the youngest population; • (+) A range of measures foreseen aiming to promote research as a potential career among students; • (-) Low levels of S&E graduates, especially post-graduates; • (-) Insufficient financial resources limit research and educational potential of both, private and public HEIs, • (-) Brain drain.
Other policies	<ul style="list-style-type: none"> • The e-Procurement System; • The contract for the preparation of an e-Inclusion National Strategy was signed in summer 2009 and is expected to be completed by mid 2010; • Co-financed by the EU Structural Funds projects targeting the promotion of the renewable energy sources (RES) launched their implementation within 2009; • Application of the JEREMIE Initiative. 	<ul style="list-style-type: none"> • (+) ICT is a highly developed area in the country; it has a potential to become one of the first priorities for demand-driven research; • (+) The comparative advantage of Cyprus in the area of RES (especially solar) gives possibility to foster demand-driven R&D and innovation; • (+) Promotion of new (non-traditional) financial instruments with more favourable reimbursement conditions; • (+) IPR support schemes in HEIs.

4.2 ERA 2020 objectives - a summary

The government of Cyprus has adopted the ERA as a major opportunity to integrate the small Cypriot research system into a broader and more ambitious community. It is one of the pioneers in opening up research and academic positions as well as national research programmes. Its efforts to internationalise within and beyond the EU are evident. However, it is still lagging behind in terms of gender equality and

Research Infrastructures, the latter both in terms of national establishments and international cooperation.

Despite the apparent and increasing emphasis given to business R&D, one of the major challenges in relation to ERA remains to increase the business sector involvement in research through more responsive policies focusing R&D and innovation. Moreover, more focused strategic approach and better prioritisation are needed in order to narrow down research priorities and enhance national research capacity.

Table 4: Assessment of the national policies/measures supporting the strategic ERA objectives (derived from ERA 2020 Vision)

	ERA objectives	Main policy changes	Assessment of national strengths and weaknesses with regard the specific ERA objective
1	Ensure an adequate supply of human resources for research and an open, attractive and competitive single European labour market for male and female researchers	<ul style="list-style-type: none"> The expansion of the bilateral agreements on mutual recognition of academic qualifications aiming to stimulate exchange and cooperation in the field of science and higher education (with Italy in 2009 and with Greece in 2010). 	<ul style="list-style-type: none"> (+) Attractive working conditions for researchers in terms of high salaries; (-) Lack of adequate RIs; (-) Deficiencies in the social security system, a lack of harmonisation of pension schemes a complete absence of specific provisions for mobile researchers as well as the delays in adapting and implementing scientific visa packages; (-) No policy actions explicitly addressing low employability of women on the research labour market.
2	Increase public support for research	<ul style="list-style-type: none"> Public budget for R&D increased in nominal value from €67 billion in 2007 to €72 billion in 2008; also as percentage of GDP, remained at the same levels of 0.42% (explained by the increase in GDP levels). 	<ul style="list-style-type: none"> (+)/(-) Continuous significant increase in R&D expenditure, but affected by the crisis (expressed mainly through the decrease of DESMI budget).
3	Increase European coordination and integration of research funding	<ul style="list-style-type: none"> No major changes. The government continues to actively support the Cypriot participation in different European schemes (FP7, ESF, EUREKA, COST etc.). 	<ul style="list-style-type: none"> (+) Strong emphasis given to Cypriot participation in the EU initiatives; (-) Limited interest of the business sector to participate despite the wide range of incentives.
4	Enhance research capacity across Europe	<ul style="list-style-type: none"> Operation of new graduate and post-graduate courses. 	<ul style="list-style-type: none"> (+)/(-) Despite the impressive recent growth of research, focused strategic approach is still lacking with no prioritisation made.

	ERA objectives	Main policy changes	Assessment of national strengths and weaknesses with regard the specific ERA objective
5	Develop world-class research infrastructures (including e-infrastructures) and ensure access to them	<ul style="list-style-type: none"> • With the vision of enhancement of the existing infrastructure through the reinforcement of research and academic cooperation, an MoU (memorandum of understanding) was signed by the UCY, the University of Nicosia, CyNet and the Ministry of Health. 	<ul style="list-style-type: none"> • (+) Strong ICT and computing base makes it possible to give strong emphasis on “virtual” infrastructure; • (-) Absence of large research infrastructures or scientific technological platforms.
6	Strengthen research institutions, including notably universities	<ul style="list-style-type: none"> • New privately-financed university, the Neapolis University, has been established and starts operating in the academic year 2010-2011. 	<ul style="list-style-type: none"> • (+) Impressive progress towards the development and enhancement of the higher education system observed over the last years, despite late start; • (-) Universities still need reinforcement.
7	Improve framework conditions for private investment in R&D	<ul style="list-style-type: none"> • Increasing incentives to the business sector; • Opening up more programmes of the RPF to the industry; • Increased number of awareness and training initiatives for SMEs. 	<ul style="list-style-type: none"> • (+)/(-) Despite the continuous increase in national or European funding opportunities for SMEs business interest is still low. This is due to the structure of the economy (service sector dominance) and the small company size.
8	Promote public-private cooperation and knowledge transfer	<ul style="list-style-type: none"> • Increased focus on the improvement of research-industry links and better knowledge transfer expressed through the introduction of the relative initiatives in the current DESMI 2009-2010. 	<ul style="list-style-type: none"> • (+) Strong willingness of the government to bridge the gap between academia and industry; • (-) Weak interest of the enterprises in research and innovation; • (-) Inefficient implementation and operation of intermediaries (to be tackled though the creation of TTOs operational until 2014).
9	Enhance knowledge circulation across Europe and beyond	<ul style="list-style-type: none"> • Cyprus is continuously increasing its participation in the EU initiatives; • National programmes promoted through the current DESMI are open to foreign participation under certain reasonable constraints. 	<ul style="list-style-type: none"> • (+) Increased budget with targeted measures to improve access to international knowledge (bilateral cooperation, international networking); • (-) Extremely low participation of the business sector in the above mentioned initiatives.
10	Strengthen international cooperation in science and technology and the role and attractiveness of European research in the world	<ul style="list-style-type: none"> • Through a specific action “Targeted International Cooperation” introduced in the current DESMI the RPF promotes collaboration with the research organisations of the countries with high R&D profile; • Preliminary discussions are under way for the signing of Agreements with a number of other countries, such as China and Israel. 	<ul style="list-style-type: none"> • (+) Strategic geographical location may help Cyprus to play a leading role in the Eastern Mediterranean.

	ERA objectives	Main policy changes	Assessment of national strengths and weaknesses with regard the specific ERA objective
11	Jointly design and coordinate policies across policy levels and policy areas, notably within the knowledge triangle	<ul style="list-style-type: none"> • Cyprus increases its support towards the joint programming. The current DESMI included the specific measure titled "Participation in Joint European Programmes". 	<ul style="list-style-type: none"> • (+) Clear and strong commitment of the government in favour of further involvement of the country in joint ventures; • (-) A general preference for national research teams to apply for less competitive and less demanding national programmes.
12	Develop and sustain excellence and overall quality of European research	<ul style="list-style-type: none"> • Significant efforts towards the reorganisation of the RTDI system in Cyprus and the elaboration of the long-term integrated strategy are made. 	<ul style="list-style-type: none"> • (+) The government's strong willingness to develop adequate and focused policy framework; • (-) Lack of prioritisation leading to too broad research orientation;
13	Promote structural change and specialisation towards a more knowledge intensive economy	<ul style="list-style-type: none"> • New governance structure and first steps made towards the elaboration of the new long-term strategy. 	<ul style="list-style-type: none"> • (+) The new strategy is expected to emphasise research priorities; • (-) Research is still fragmented; • (-) Limited knowledge demand and cooperation culture from the side of the business sector.
14	Mobilise research to address major societal challenges and contribute to sustainable development	<ul style="list-style-type: none"> • Increased in comparison to the previous periods DESMI allocations to projects in the field of sustainable urban development, recycling, management of urban waste, control and protection from pollution under the Sustainable Development programme; • Priorities were determined at a high political level, identifying energy, the environment and in particular water resources as the real future challenges for the country. 	<ul style="list-style-type: none"> • (+) Sustainable development is a core target of the national RTDI policy; • (-) Insufficient financial resources directed to further development of RES especially concerning the solar ones despite the comparative advantage of the country.
15	Build mutual trust between science and society and strengthen scientific evidence for policy making	<ul style="list-style-type: none"> • Increased effort mainly from the side of the RPF in the form of initiatives to sensitise the public on the topics such as S&T, research and innovation (information days, awareness campaigns, etc.). 	<ul style="list-style-type: none"> • (-) Lack of evaluation culture creates unfavourable framework for evidence-based policy making.

References

- Agricultural Research Institute: <http://arinet.ari.gov.cy/>
- CARSA (2007): Remuneration of Researchers in the Public and Private sectors, European Commission, Final Report, Brussels. <http://www.cipur.it/Varie/Forum%20DDL112/Study%20remuneration%20researchers.pdf>
- COST (2009): Annual Report 2009.
- Cyprus Chamber of Commerce and Industry: <http://www.ccci.org.cy/>
- Cyprus Employers' and Industrialists' Federation: <http://www.oeb.org.cy/main/default.aspx>
- Cyprus Institute: <http://www.cyi.ac.cy/>
- Cyprus Institute (2010): RealPlanet, January 3, 2010. <http://www.cyi.ac.cy/system/files/realplanet3Jan10.pdf>
- Cyprus Organisation for Standardisation (2007): Annual Report 2007. <http://www.cys.org.cy/applications/assets/annual%20report.pdf>
- Cyprus Productivity Centre: www.mlsi.gov.cy/kepa
- Cyprus Research Promotion Foundation: <http://www.research.org.cy/>
- Cyprus Research Promotion Foundation (2007): Researcher's Guide to Cyprus.
- Cyprus Research Promotion Foundation (2009): Ipsipetis Magazine, v.27. http://crpf.metacanvas.com/EL/user_info/ipsipetis.html
- Cyprus Research Promotion Foundation (2009): National Framework Programme for Research and Technological Development 2009-2010.
- ERAWATCH Network (2010): Research inventory.
- ESFRI European Strategy Forum on Research Infrastructures (2009): European Roadmap for Research Infrastructures, Implementation Report 2009. http://ec.europa.eu/research/infrastructures/pdf/esfri/home/implementation_report_2009_en.pdf
- European Commission (2005): Charter for Researchers, The Code of Conduct for the Recruitment of Researchers. <http://www.cyresearch.org/template/files/charterforresearchers.pdf>
- European Commission (2006): She Figures 2006, Women and Science Statistics and Indicators. http://ec.europa.eu/research/science-society/pdf/she_figures_2006_en.pdf
- European Commission, Education and Training. http://ec.europa.eu/education/lifelong-learning-programme/doc78_en.htm
- Eurostat: <http://epp.eurostat.ec.europa.eu>
- Eurydice (2008): Higher Education Governance in Europe. Policies, structures, funding and academic staff. Comparative study, 2008.
- Human Resources Development Authority of Cyprus: <http://www.hrdauth.org.cy/>
- Ministry of Agriculture, Natural Resources and Environment: http://www.cyprus.gov.cy/moa/Agriculture.nsf/index_en/index_en
- Ministry of Education and Culture: <http://www.moec.gov.cy/>
- Ministry of the Interior: <http://www.moi.gov.cy>
- Ministry of the Interior (2008): Cyprus at a Glance, 2008.

- Ministry of Commerce, Industry and Tourism:
http://www.mcit.gov.cy/mcit/mcit.nsf/dmlindex_en/dmlindex_en
- National Strategic Development Plan 2007-2013:
<http://www.planning.gov.cy/planning/planning.nsf/All/078AEA4386EB7B74C225750C003B48AC?OpenDocument>
- Open University of Cyprus: <http://www.ouc.ac.cy/>
- Planning Bureau of Republic of Cyprus: <http://www.planning.gov.cy/>
- Planning Bureau of Republic of Cyprus (2008): Lisbon Strategy, Renewed National Reform Programme of the Republic of Cyprus, October 2008.
<http://ec.europa.eu/growthandjobs/pdf/member-states-2008-2010-reports/RENEWED%20%20NRP%202008-2010%20Draft%20GSC%20%20%2023%2010%2008.pdf>
- Policy Mix Peer Review (2009): Cyprus Peer Review Outcome Report and Cyprus Background Report. http://ec.europa.eu/research/era/pdf/policy-mix-peer-review_cyprus_en.pdf
- PRO INNO Europe: <http://www.proinno-europe.eu/>
- PRO INNO Europe (2010): European Innovation Scoreboard (EIS) 2009, Comparative analysis of innovation performance, European Commission.
<http://www.proinno-europe.eu/page/european-innovation-scoreboard-2009>
- Rublova D. (2009): INNO-Policy TrendChart, Innovation Policy Progress Report: Cyprus, European Commission. http://www.proinno-europe.eu/trendchart/extranet/upload/countryreports/Country_Report_Cyprus_2009.pdf
- Statistical Service of Cyprus (2008): Cyprus in the EU Scale, November 2008.
- Statistical Service of Cyprus:
http://www.mof.gov.cy/mof/cystat/statistics.nsf/index_gr/index_gr?OpenDocument
- Technical University of Cyprus: <http://www.cut.ac.cy/>
- Tsipouri L., Rublova D. (2009): ERAWATCH Country Report 2009, Analysis of policy mixes to foster R&D investment and to contribute to the ERA: Cyprus, JRC Scientific and Technical Reports.
- Tsipouri L., Rublova D., Kolomitsini M. (2009): ERAWATCH Country Report 2008, An assessment of research system and policies: Cyprus, JRC Scientific and Technical Reports.
- University of Cyprus: <http://www.ucy.ac.cy/>
- University of Cyprus (2009): Annual Report 2009.
http://www.ucy.ac.cy/data/puof/Ekdoseis%20pdf/UcCy_Annual%20Report2009_small.pdf
<http://gpp.itcilo.org/index.php?id=163,173>
<http://www.epractice.eu>
<http://www.kathimerini.com.cy/index.php?pageaction=kat&modid=1&artid=30032&show=Y>
<http://www.highereducation.ac.cy/en/historical-background.html>

List of Abbreviations

ARI	Agriculture Research Institute
BERD	Business Enterprise Expenditure on R&D
CEIF	Cyprus Employers' and Industrialists' Federation
CERN	European Council for Nuclear research
CII	Cyprus International Institute for the Environment and Public Health
CING	Cyprus Institute of Neurology and Genetics
CIP	Competitiveness and Innovation Framework Programme
CIPA	Cyprus Investment Promotion Agency
COST	European Cooperation in Science and Technology
CPC	Cyprus Productivity Centre
CSC	Cypriot Scientific Council
CUT	Cyprus University of Technology
Cyl	Cyprus Institute
CyNet	Cyprus Research and Academic Network
DESMI	Research Promotion Foundation's Framework Programme for Research, Technological Development and Innovation
EEWRC	Energy, Environment and Water Research Centre
EIS	European Innovation Scoreboard
EPO	European Patent Office
ERA	European Research Area
ERA-NET	European Research Area Network
ESA	European Space Agency
ESF	European Science Foundation
ESFRI	European Strategy Forum on Research Infrastructures
EU	European Union
EU-27	European Union including 27 Member States
FDI	Foreign Direct Investment
FP	Framework Programme
GBAORD	Government Budget Appropriations or Outlays on R&D
GERD	Gross Domestic Expenditure on R&D
GOVERD	Government Intramural Expenditure on R&D
GPP	Green Public Procurement
GUF	General University Funds
HEIs	Higher Education Institutions
Hellenic	Greek National Academic Recognition Information Centre
NARIC	
HERD	Higher Education Expenditure on R&D
HES	Higher education sector
HPCL	High Performance Computing Systems Laboratory
HRDA	Human Resource Development Authority of Cyprus
HRST	Human Resources in Science and Technology
ICT	Information Communication Technology

IP	Intellectual Property
JRC	Joint Research Centre
KY.S.A.T.S	Cyprus Council for the Recognition of Higher Education Qualifications
MCIT	Ministry of Commerce, Industry and Tourism
NCRI	National Research Council for Research and Innovation
NRP	National Reform Programme
NSDP	National Strategic Development Plan
OECD	Organisation for Economic Co-operation and Development
PNP	Private non-profit sector
PRO	Public Research Organisations
R&D	Research and Development
RES	Renewable Energy Sources
RIPF	Research and Innovation Promotion Foundation
RIs	Research infrastructures
RPF	Research Promotion Foundation
RTDI	Research Technology Development Innovation
S&E	Science and Engineering
S&T	Science and technology
SF	Structural Funds
SME	Small and Medium Sized Enterprise
SPIPR	Service for Research, International Collaboration and Public Relations
STARC	Science and Technology in Archaeology Research Centre
THES	Times Higher Education Supplement
TTO	Technology Transfer Office
UCY	University of Cyprus
UNDP	United nations Development Programme
UROP	Undergraduate Research Opportunities Programme
VC	Venture Capital