European Commission

Analytical Background Report

Specific Support to Cyprus

Horizon 2020 Policy Support Facility

Research and Innovation

Optimal Utilisation of Publicly Funded Research Laboratories by the Business Community

European Commission
Directorate-General for Research and Innovation
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EUROPEAN COMMISSION

Analytical Background Report

Specific Support to Cyprus

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Directorate-General for Research and Innovation
2019 EN

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1 INTRODUCTION

The European Commission's Directorate-General for Research and Innovation set up a Policy Support Facility (PSF) under the European Framework Programme for Research and Innovation 'Horizon 2020' to support Member States in reforming their national science, technology and innovation systems. The PSF provides best practice, leading expertise and guidance to Member States and Associated Countries on a voluntary basis through a broad range of services to address their specific needs: (1) 'Peer Reviews' of national R&I systems; (2) 'Specific Support' to countries; and (3) 'Mutual Learning Exercises' on specific R&I topics.

The Cypriot Government expressed its interest in a PSF Specific Support activity focused on the optimal use of public research infrastructure and laboratories by the business community.

The aim of this report is to provide experts with the main background information regarding the main area of interest.

2 THE CYPRIOT ECONOMY

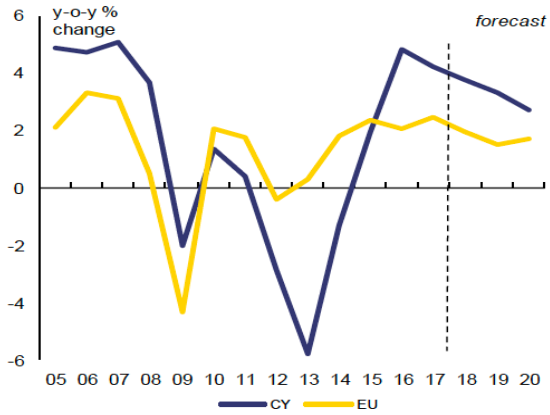
2.1 Macro-economic framework

The Cypriot economy is small, accounting for only 0.03% of global GDP (PPP). Cyprus has been a member of the EU since May 2004 and adopted the euro in January 2008. Between 2004 and 2008 the Cypriot economy grew at an average rate of about 4%, with its unemployment rate at 4% on average (World Bank 2019).

During the financial crisis, the Cypriot economy entered a period of recession starting in 2008. In July 2012, Cyprus requested an economic bailout programme from the European Commission, European Central Bank and the International Monetary Fund. The main sectors that suffered from the crisis were tourism, construction and banking.

The Cypriot economy began its recovery in 2015 and has been expanding rapidly. In 2016, growth reached a high of 4.8% in comparison with an EU-28 average of 2% (Eurostat 2019). Despite the decline in subsequent years to 3.9% in 2018 (3.3% in 2019 and 2.7% in 2020), growth is expected to remain strong and above the EU average, with the country's potential growth estimated at 2% (European Commission 2019) (see Figure 1).

Figure 1: Real GDP growth in Cyprus and the EU

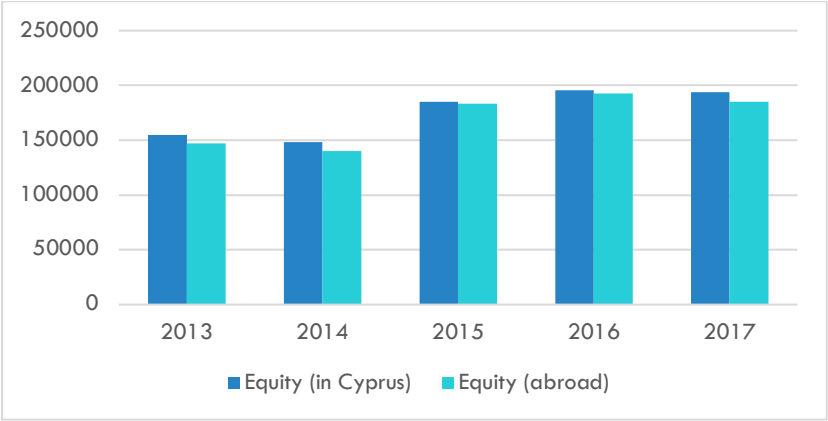


Source: EC, European Semester 2019

The net Foreign Direct Investment (FDI) stock of Cyprus significantly decreased in 2017, from EUR 2975.1 million in 2016 to EUR 8629.1 million in 2017 (Central Bank of Cyprus 2018). Figure 1 below illustrates the trends for FDI stock for the period from 2013 to 2017. Positive trends have been observed between the inward and outward FDI stock with regard to their changes for the period from 2016 to 2017. These can be explained by the large share of special purpose entities (SPEs) in inward and outward FDI stock. In general, FDI returns indicated positive growth in 2017 by comparison with the previous years. A negative tendency has been observed for the net income from FDI due to the excess of

inward FDI stock in comparison with outward stock. The inward and outward FDI stock investments in Cyprus have been mainly coming from Europe. Nevertheless, in terms of outward FDI, America is taking a leading position.

Figure 2: FDI stocks in million Euro



Source: Central Bank of Cyprus, data published on 2/11/2018

Most of the FDI invested in or from Cyprus has been focused on the tertiary sector, especially in financial and insurance activities. Figure 3 illustrates FDI stock by economic activity for the period from 2013 to 2017.

Table 1: FDI stock by economic activity in million Euro

Million Euro	2013		2014		2015		2016		2017	
	abroad	in Cyprus	abroad	in Cyprus	abroad	in Cyprus	abroad	in Cyprus	abroad	in Cyprus
Primary and secondary sectors	14175	1049	12028	1298	65732	453	66849	451	63961	612
Tertiary sector	133185	153325	128071	146850	117419	184388	125803	195176	121118	193096
Financial and insurance activities	114971	136638	113882	134403	97253	169718	104558	177262	99399	172595
Transportation and storage	6591	6532	6384	7255	9139	7594	9289	8526	9359	9787
Real estate activities	1213	2905	1936	3098	1922	3330	1737	3782	2159	4443

Source: Central Bank of Cyprus

Public expenditure has accelerated, reaching 37.5% of GDP in 2017, which is, however, bellow the EU average of 46.6%. Public investments recovered to the level of the EU average from 2.1% of GDP in 2014 to 2.7% of GDP in 2017. Moreover, in terms of total government expenditure, public investments in Cyprus accounted for higher shares than in the EU, reaching 7.3% against 6% respectively in 2017. However, the composition of public expenditure is in favour of short term welfare expenditure compared to longterm investments[1] with a higher impact on growth. The investments of the latter accounted for 32% of total public expenditure compared to the EU average of 49%.

[1] Long term investments include government expenditure on education, R&D, environmental protection, transport and communication. Welfare expenditure consists of expenditure on social protection and health.

Due to steady economic growth, the labour market situation continues to improve. The unemployment rate started to fall in 2015, averaging 14.9% before falling to 12.9% in 2016 and 11% in 2017, reaching 8.4% in Q3 of 2018. However, unemployment is still slightly above the EU average (6.8%).

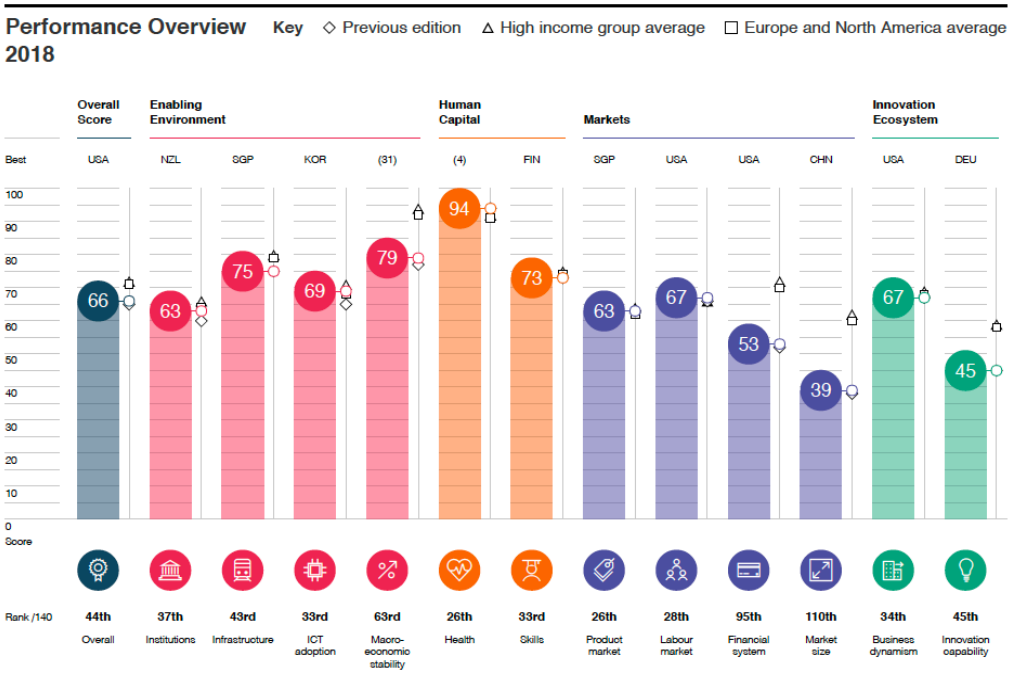
2.2 The competitive position of Cyprus

According to the assessment of the World Economic Forum's Global Competitiveness Report 2018 (see Figure 3), Cyprus is, with a score of 66, ranked 44th out of 140 countries.

A large pool of educated human resources, quality of life and a well functioning labour market — despite the rigidity of labour regulations, low internal mobility and the difficulties hiring foreign labour — are among the country's main strengths. The country's position in terms of ICT adoption has been improved mainly due to investment in infrastructure although the take-up of digital technologies by companies remains relatively low.

Access to finance, primarily for SMEs, is currently among the main drawbacks as banks have only recently started recovering from the crisis and alternative sources of finance, such as venture capital and equity funding, are limited (see also European Commission 2019). The government decided in August 2019 to set up an equity co-investment fund that will invest approximately EUR 20 millions of national resources in combination with private funds mobilised by the fund manager.

Figure 3: Assessment of Cyprus by the World Economic Forum's Global Competitiveness Report 2018



Source: Global Competitiveness Index 4.0 2018 edition

The cost of starting a business remains high, with Cyprus ranked in 86th position. The burden of government regulations remains a problem while there are inefficiencies in the justice system, especially in terms of settling disputes.

2.3 The structure of the Cypriot economy

2.3.1 Overview

An overview of the structure of the Cypriot economy and a comparison with the EU average is presented in the following Table.

Table 2: Performance and structure of the economy

Main indicators	CY	EU
GDP per capita (PPS)	24,600	29,500
Average annual GDP growth (%)	4.1	2.2
Employment share for manufacturing (NACE C) (%)	7.4	15.5
of which high and medium high-tech (%)	11.2	37.5
Employment share for services (NAXE G-N) (%)	53.6	41.8
of which knowledge-intensive services (%)	37.5	35.0
Turnover share SMEs (%)	54.1	37.9
Turnover share large enterprises (%)	21.7	44.4
Foreign-controlled enterprises – share of value added (%)	5.1	12.6

Source: European Innovation Scoreboard 2019

From the data, the following structural differences are striking:

- The concentration of employment in services and especially in knowledge intensive services is higher than the EU average.
- The share of employment accounted for by manufacturing is less than half than that for the EU and the share in high and medium high-tech manufacturing is even lower.
- The contribution of SMEs to the economy is much higher than the EU. The share of large companies in the turnover is less than half the figure for the EU.

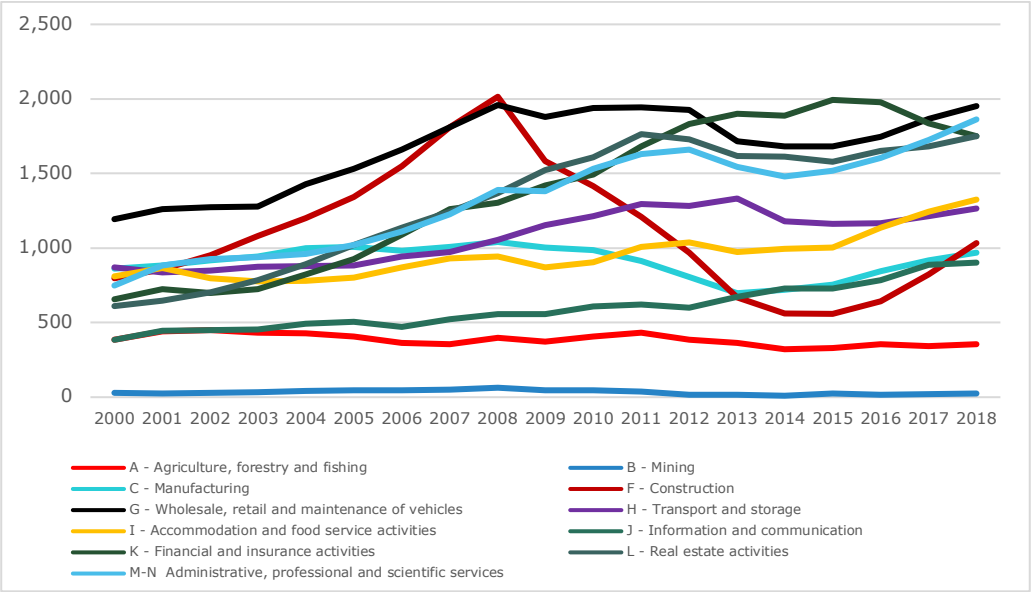
More information on the structure of the economy is provided in the following sections.

2.3.2 Sectoral structure of the Cypriot economy

The service sector dominates the country's economy. After experiencing an acceleration in growth, which reached a peak in 2015, financial services (K) slowed down and accounted for 9.8% of gross value added in 2018 (see Figure 4 and Figure 5 respectively). Administrative and professional services to companies (M-N) continue to grow, after a short period of decline during the crisis, driven by the demand from special purpose entities. In 2018, they were the second biggest sector after trade, accounting for 10.4% of the value added. Trade (G)

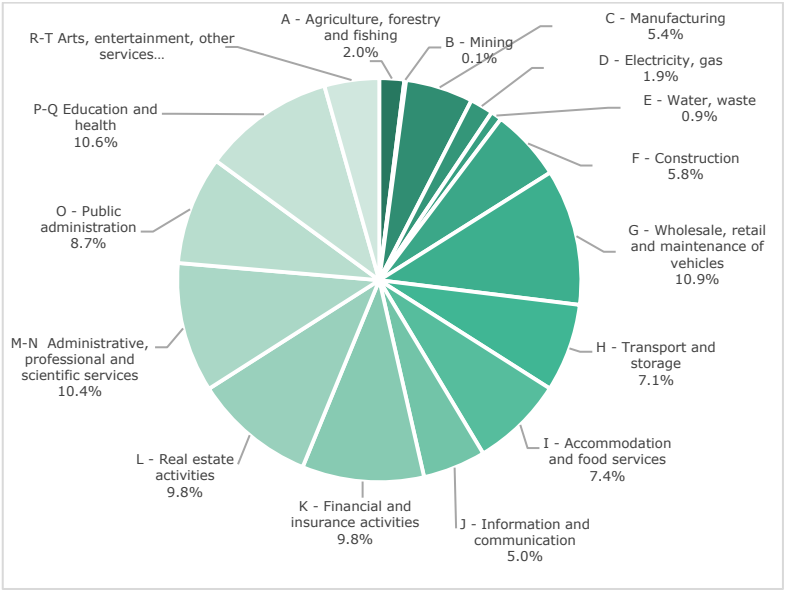
followed a similar trend, retaining first place except for the period of the crisis. In 2018 it accounted for almost 11% of the value added. Construction experienced a steep decline after 2008. The recovery that started in 2015 was driven by foreign direct investments, which also positively affected real estate services. Both of them accounted for 15.6% of value added in 2018.

Figure 4: Sectoral trends in terms of value added in million Euro



Source: CyStat, National accounts

Figure 5: Sectoral structure of value added 2018 — shares



Source: CyStat, National accounts

2.3.3 Business structure

The Cypriot economy is dominated by very small companies with less than 10 employees. The large companies with over 250 employees represent only 0.1% of the population (see Table 3).

Table 3: Number of companies by size class in Cyprus — 2017

Size (Number of persons employed)	Number of enterprises	Share (%)
0-9	92 095	95
10-49	4060	4.2
50-249	674	0.7
259+	107	0.1
Total	96 936	100

Source: National Registry of Cyprus

The largest share of companies operates in household-related activities and trade. In the manufacturing and information and communication sectors, there are 5770 and 1644 companies respectively (see Table 4).

Table 4: Number of companies by sector in Cyprus — 2017

Nace Rev.2	Economic activity	Number of enterprises
A	Agriculture, Forestry and Fishing	3618
B	Mining and Quarrying	50
C	Manufacturing	5024
D	Electricity, Gas, Steam and Air Conditioning Supply	75
E	Water Supply, Sewerage, Waste Management and Remediation Activities	201
F	Construction	7847
G	Wholesale and Retail Trade, Repair of Motor Vehicles and Motorcycles	16 704
H	Transportation and Storage	3113
I	Accommodation and Food Service Activities	5770
J	Information and Communication	1644
K	Financial and Insurance Activities	2956
L	Real Estate Activities	1000
M	Professional, Scientific and Technical Activities	7988
N	Administrative and Support Service Activities	3082
O	Public Administration and Defence, Compulsory Social Security	296
P	Education	2667
Q	Human Health and Social Work Activities	3940
R	Arts, Entertainment and Recreation	2073

Nace Rev.2	Economic activity	Number of enterprises
S	Other Service Activities	5234
T	Activities of Households as Employers; Undifferentiated Goods- and Services-Producing Activities of Households for Own Use	23 653
U	Activities of Extraterritorial Organisations and Bodies	1
	Total	**96 936**

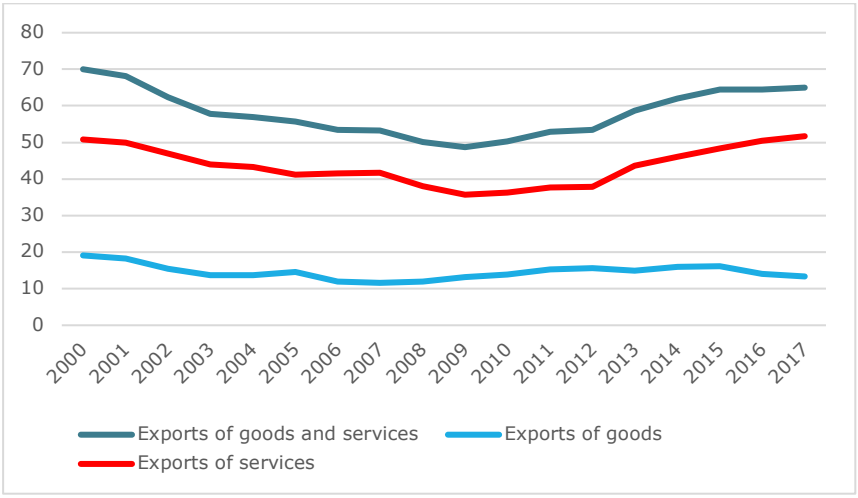
Source: National Registry of Cyprus

2.3.4 Exports

The domination of the service sectors in the Cypriot economy is reflected in itsexports. During the period from 2000 to 2017, the contribution of goods exports to GDP fluctuated between 10% and 20%, with a slight tendency to decrease. In 2017, the contribution to GDP was 13.4%. After falling in the previous decade, the contribution of services' exports, mainly tourism, steadily increased in the last five years, accounting for 51.7% of GDP in 2017 (Figure 6).

Total exports in 2017 amounted to EUR 12.7 billion, with exports of goods reaching EUR 2.6 billion (20.5% exports) and exports of services EUR 10.1 billion (79.5% of exports).

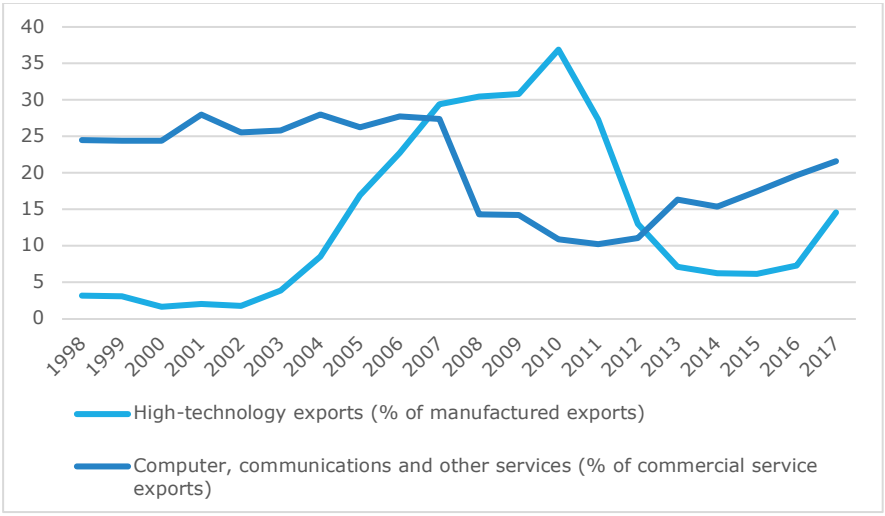
Figure 6: Exports of goods and services as a % of GDP



Source: Eurostat

As a share of manufacturing exports, high-tech exports experienced rapid growth from 2000 until the start of the bailout programme in 2012 and they started recovering only in 2017 (Figure 7). Computer, communications and other high-tech accounted for 25% of services' exports for the whole period prior to the crisis. During the crises, they reached a nadir of 10% and only started recovering after the bailout.

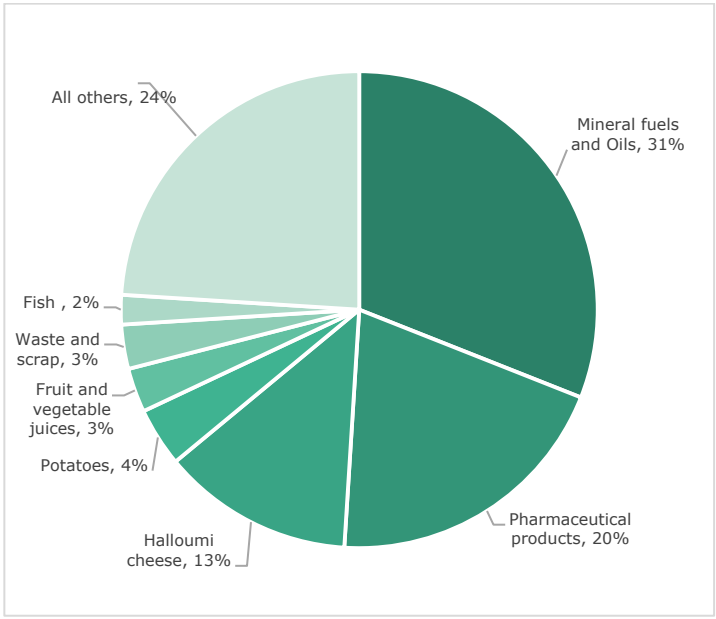
Figure 7: Share of hi-tech manufacturing and services exports to total manufacturing and services exports



Source: The World Bank, World Development Indicators (WDI). Last updated 21/3/2019

In 2017, the last available year for which figures are available, mineral fuels dominated goods exports, accounting for 31%, followed by pharmaceuticals with 20%. Agrifood products (primary and processed) accounted for more than 20% (Figure 8).

Figure 8: Exports of goods 2017 — 20.5% of total exports



Source: CySat

3 THE PERFORMANCE OF THE R&I SYSTEM

3.1 An overview based on the European Innovation Scoreboard

According to the European Innovation Scoreboard (EIS) 2019, Cyprus is a **moderate innovator**. Comparing Cyprus with the performance of the EU (100) in 2010 over time, the performance of Cyprus has continuously declined from 90 in 2013 to 78 in 2016, followed by a recovery reaching the level of the 2011 score (87) in 2018. When we compare Cyprus with the EU for the year 2018, the score for Cyprus falls to 79.7.

Among the strengths identified by the EIS is the existence of **intellectual assets** where Cyprus outperforms the EU average in trademark applications (241.4% of the EU average). However, this is mainly due to the Intellectual Property box scheme (Demetriades & Robledo-Bottcher 2018).[2] Besides, the relative performance in Patent Cooperation Treaty (PCT) patent applications and design applications is significantly lower than the EU (15.7 down, from 23.3 in 2017 and 60.8, down from 82.8 in 2017 respectively).

The **attractiveness of the research system** is modestly higher than the EU average (109.6) due to high shares of international scientific co-publications, although the performance in the most-cited publications is lower than the EU.

The performance in terms of **human resources** is lower but very close to the EU (96.7) due to the high share of the population with tertiary education. However, the performance in terms of new doctorate graduates and lifelong learning is significantly lower compared to the EU.

On the negative side, **finance and support** (24.7) and **linkages** (48.9) within and among the various sectors (business, public, research) are the weakest dimensions.

3.2 Expenditure on R&D by the main actors

Cyprus's R&D system is the second smallest in the EU after Malta, in terms of annual gross domestic expenditure on R&D (GERD), amounting to only EUR 108.7 million in 2017.

In terms of intensity (GERD as a share of GDP), Cyprus is 25th, just ahead of Malta, Latvia and Romania, with GERD accounting for 0.56% of GDP while the EU average was 2.07% for the same year (

Figure 9).

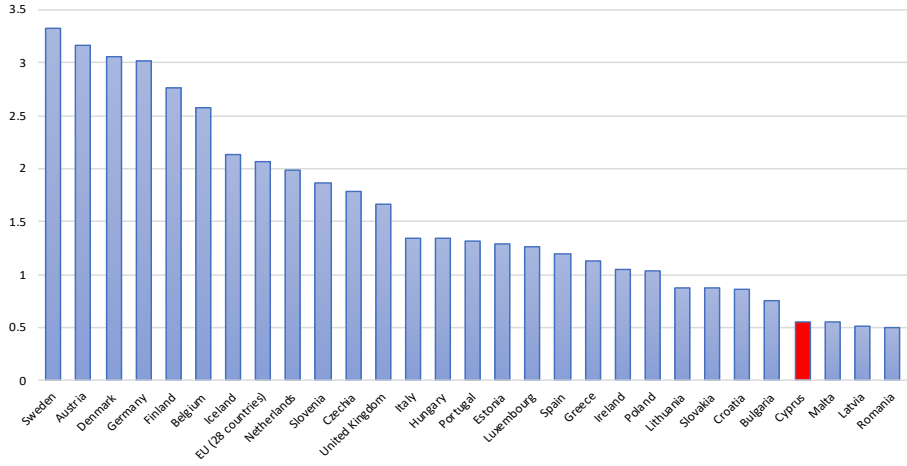
[2] See also the discussion on the impact of the IP box on IP protection in section 5.3.

The spending per capita is also low, with Cyprus ranked 24th with EUR 127.2 per inhabitant compared to the EU average of EUR 1615.

Comparing Cyprus with other small Member States with different types of economies and levels of advancement, its R&D intensity remains the lowest over the years (Figure 10) despite the fact that it has more than doubled from 0.23% of GDP in 2000 to 0.56% in 2017.

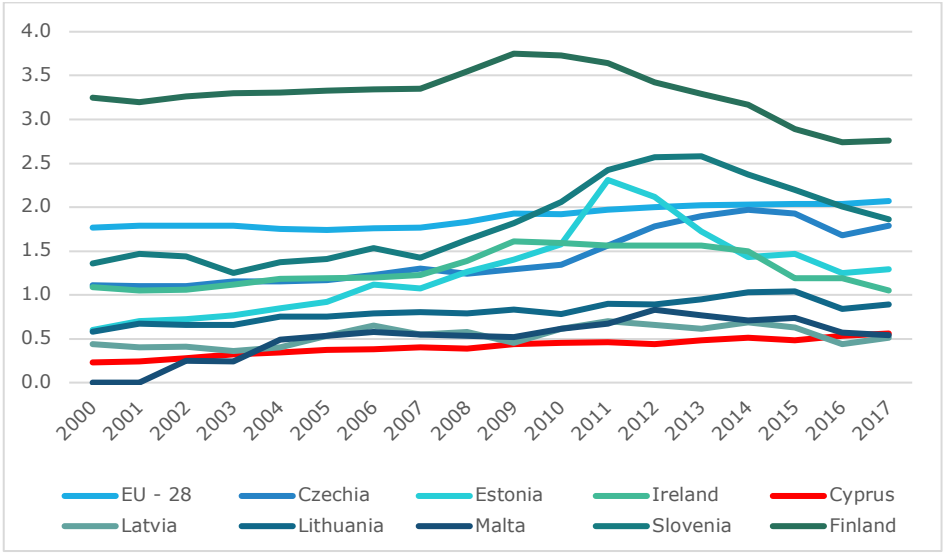
In absolute terms, the R&D expenditure increased much faster from EUR 24 million in 2000 to EUR 108.7 million in 2017 (Figure 11).

Figure 9: R&D spending is among the lowest in EU — GERD as % of GDP



Source: Eurostat

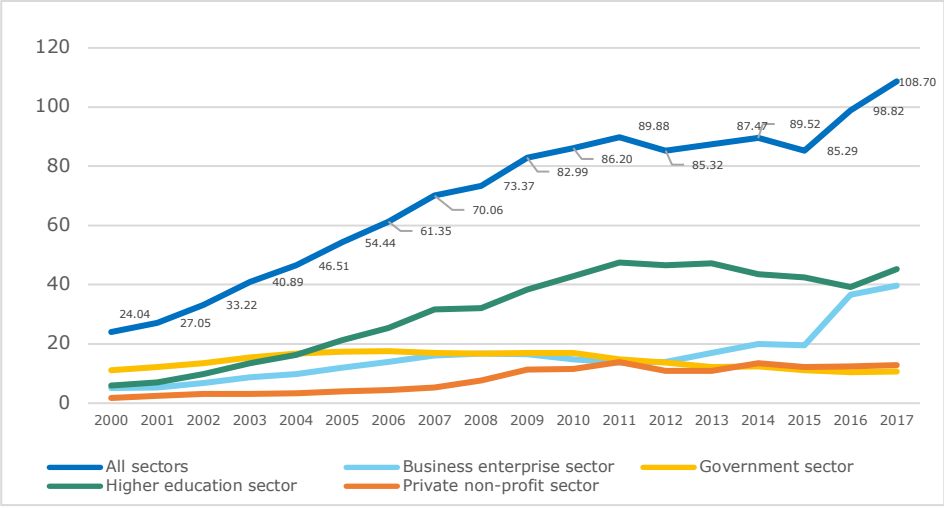
Figure 10: Intensity of R&D and comparison with other countries — GERD as percentage of GDP



Source: Eurostat

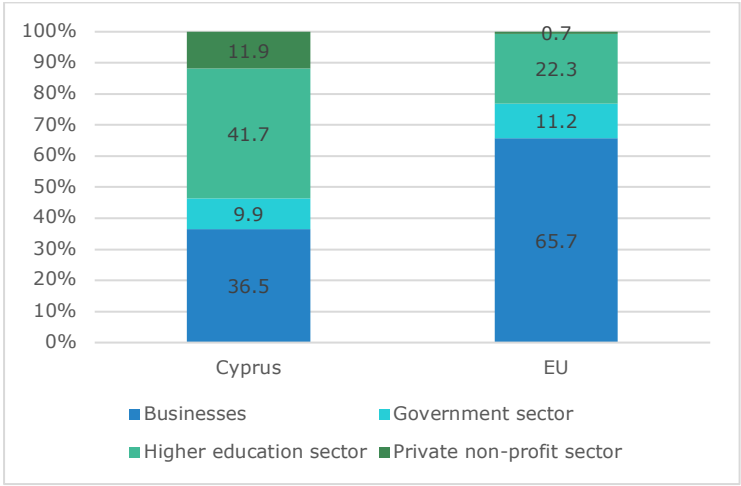
The significant increase is mainly due to universities, which, starting from a very low base, became the most significant sector in R&D expenditure in 2017, accounting for 41.7% of the total spending (Figure 12). The share is almost double the European average (22.3%). The significant increase in spending is related to the expansion of the sector. Starting with one university in 1992, the sector expanded to eight public and private universities today (see section 4.2 and Annex 1 for more information on the university sector). During the period of the crisis, expenditure slightly fell while the first signs of recovery came in 2017.

Figure 11: Gross spending on R&D by sector of performance — millions Euro



Source: CyStat

Figure 12: Shares of expenditure by sector of performance to total gross expenditure of R&D (GERD)



Source: Eurostat

The size of the government research sector, which includes public research institutes and laboratories directly linked to ministries, is relatively small compared to the EU average, representing 9.9% of GERD. The spending of the private non-profit sector, which comprised two high performing institutes, the Cyprus Institute and the Cyprus Institute of Neurology and Genetics (see also section 4.2), experienced a noticeable rise in 2009. After a peak in 2011 (EUR 13.8 million), the spending remained stable, with small fluctuations around EUR 12.5 million. In 2017 expenditure reached EUR 12.9 million, which, as a share of the total R&D expenditure of the country (11.9%), is much higher than the EU average (0.7%) (see Figure 12).

4 THE SUPPLY SIDE OF THE R&I SYSTEM IN CYPRUS

4.1 Overview of research activities of key actors on the supply side

As has been discussed in section 3.2, the best performing sector in research in Cyprus is the Higher Education Institution (HEI) sector, accounting for 41% of the R&D expenditure. The primary source of funding for the universities' research activities is the government budget, with EUR 21.1 million in 2016 (53% of total funding) and Horizon 2020, with EUR 12.3 million (31% of total funding) (Table 5). Horizon is less critical for private non-profit organisations, accounting for 20% of their funding, compared to government funding, which accounts for 72% of their total funding.

Government labs operating under the ministries receive their funding almost exclusively from their ministry budget (96%).

For all types of research organisations, funding from the private sector, local or from abroad, is insignificant.

Table 5: Expenditure on R&D of the main R&D performing sectors in Cyprus by source of funding — 2017, million Euro

Source of funding	Government sector	Higher education sector	Private non-profit sector
All sectors	11.013	45.389	12.869
Business enterprise sector	0	0.541	0.091
Government sector	10.289	21.785	9.580
Higher education sector	0	5.905	0
Private non-profit sector	0.04	0.372	0.545
Abroad - European Commission	0.565	15.586	2.241
Abroad - other	0.119	1.200	0.412

Source: CyStat

4.2 Key research organisations

4.2.1 Higher Education Institutions

The **higher education system** in Cyprus is relatively new, with the first university (the University of Cyprus) established in 1989 and starting its educational actitivies in 1992. Today there are three public universities, five private universities and two non-profit colleges.

- Public universities:
  - University of Cyprus,
  - Cyprus University of Technology,

  - Open University of Cyprus.
- Private universities:
  - University of Nicosia,
  - European University of Cyprus,
  - Frederick University,
  - Neapolis University of Pafos,
  - University of Central Lancashire Cyprus.
- Non-profit colleges offering postgraduate studies and performing research:
  - Cyprus International Institute of Management,
  - Cyprus institute of Marketing,
  - The Postgraduate Research Institute of Science, Technology, Environment and Medicine (PRI).

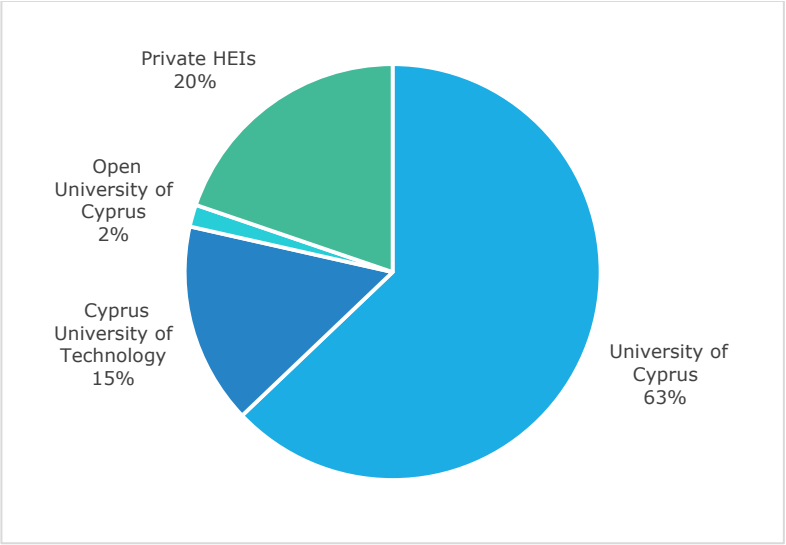
A presentation of the HEIs and their activities can be found in Annex 1.

According to a recent study commissioned by nine universities and research centres, the higher education sector grew by more than 80% in terms of numbers of students during the period from 2006 to 2016, exceeding 44 000 in the academic year 2016/2017. The report estimated that the contribution to the economy in 2016 alone ranged from EUR 739 million to EUR 979 million and directly or indirectly generated approximately 9500 jobs. The international orientation of the universities attracted a significant number of international students, which grew at an average annual rate of 13.5% between 2006 and 2016. In 2016, international students accounted for 47% of the total student population.

The bulk of the research is performed in public universities, where the expenditure on R&D accounts for more than 80% of the total expenditure in the sector. In 2016, total expenditure in the three public universities amounted to EUR 32.25 million while the private HEIs spent only EUR 7.08 million, accounting for only 18% of the total (Figure 13).

Among the universities, the University of Cyprus (UCY) is the main R&D performer, with expenditure amounting to 62% of the total expenditure of the sector.

Figure 13: Share of R&D spending in the HEI sector in 2017 by university



Source: CyStat

4.2.2 Private non-profit research organisations

Outside universities, research is performed in two **private non-profit** research organisations:

- The Cyprus Institute (CyI)
- The Cyprus Institute of Neurology and Genetics (CING).

Ministries are also retaining **laboratories** that provide research and testing services. The most important are those under the Ministry of Agriculture, Rural Development and Environment (MARDE) and the Ministry of Health.

More information on all key research organisations and labs can be found in Annex 1.

4.2.3 Centres of excellence

Two centres of excellences under the 2016-2017 call of the Teaming Action of Horizon 2020, are under implementation. In addition, the government will co-finance, together with Horizon 2020, the development of four more teaming infrastructures with a budget exceeding EUR 30 million (the EU and the Cyprus Government will contribute 15 mln each and each Centre has secured additional funding from private and public sources). In addition each Centre has secured additional funding from private and public sources. The centres of excellence, the partners, the main objectives and the area of specialisation are summarised in Table 6. A detailed presentation of the infrastructure is presented in Annex 1: Teaming infrastructure.

Table 6: Centres of excellence under the Teaming Action of Horizon 2020

Title	Coordinator and the participating organisations	Objectives of the infrastructure
2016-2017 CALL		
KIOS RESEARCH AND INNOVATION CENTRE OF EXCELLENCE	• **University of Cyprus** • Imperial College London	The mission of the KIOS Research and Innovation Excellence (KIOS CoE) is to conduct multidisciplinar and innovation in the area of Information and Com Technologies (ICT) with emphasis on the Monitorin Security and Management of Critical Infrastructu include large-scale, complex systems such as power systems, water systems, transportation telecommunication networks and emergency manag response systems.
RESEARCH CENTRE ON INTERACTIVE MEDIA, SMART SYSTEMS AND EMERGING TECHNOLOGIES	**Municipality of Nicosia /** Max Plank Institute for Informatics, University College London, University of Cyprus, Cyprus University of Technology, Open University of Cyprus	The research focus of RISE is on interactive media. media have become an integral part of our lives, ch way that information is conveyed to the user and users interact with devices, with other people an world around them. Such technologies provide versa for communication, information management, edu entertainment, with applications in almost any aspec discipline.
2018-2019 CALL		
Marine and Maritime Research, Innovation, Technology Centre of Excellence (MARITEC-X)	**Municipality of Larnaka /** Marine Institute of Ireland, Marine Institute of Eastern Mediterranean, Limassol Chamber of Commerce and Industry, Southampton Marine and Maritime Institute, GeoImaging Ltd, SignalGererix Ltd	The aim of MARITEC-X is to contribute to res innovation projects in selected cutting-edge te which are expected to bring about drastic changes i of marine and maritime research in the coming yea 2030. The centre will align mature and emerging te with the competitive advantages of the country i extract gains from the societal spillover and comme of research results. This constant flow of knowledge i and the economy will eventually create a fertile grou opportunities for Cypriot researchers, academics an harvesting an investment on the marine and marit of their own country.

Title	Coordinator and the participating organisations	Objectives of the infrastructure
Eastern Mediterranean and Middle East – Climate and Atmosphere Research centre (EMME-CARE)	**The Cyprus Institute /** Max Planck Institute for Chemistry, Commissariat a l'Energie Atomique, University of Helsinki	– To upgrade an existing centre of excellence by cutting edge infrastructure at the Atmosphere ar Division of the Cyprus Institute (CyI), to establish a research and innovation centre focused on the en - The centre proposes a comprehensive and programme to address climate challenges in the regi a combination of research, innovation and - The programme focuses on greenhouse gases, the and extreme weather atmospheric dust and air pollu
Biobanking and the Cyprus Human Genome Project	**University of Cyprus/** Medizinische Universitat GraAT Biobanking and Biomolecular Resources Research Infrastructure (BBMRI - ERIC) RTD TALOS LTD	The project concerns the upgrading of the Molecula Research Centre (MMRC) that started its activities ago, into a Centre of Excellence.
ERATOSTHENES: Excellence Research Centre for Earth Surveillance and Space-Based Monitoring of the Environment (EXCELSIOR)	**Cyprus University of Technology /** German Aerospace Centre, National Observatory of Athens, Leibniz Institute for Tropospheric Research, Department of Electronic Communications - Ministry of Transport, Communications and Works	– To upgrade the existing ERATOSTHENES Resea established within the Cyprus University of Techno sustainable and viable Centre of Excellence Surveillance and Space-Based Monitoring of the En which will provide the highest quality of related se on the national, European and internation - To conduct basic and applied research and innova areas of the integrated use of remote sensing and sp techniques for monitoring the environment.

Source: Directorate General for European Programmes, Coordination and Development

4.3 The performance of the research organisations

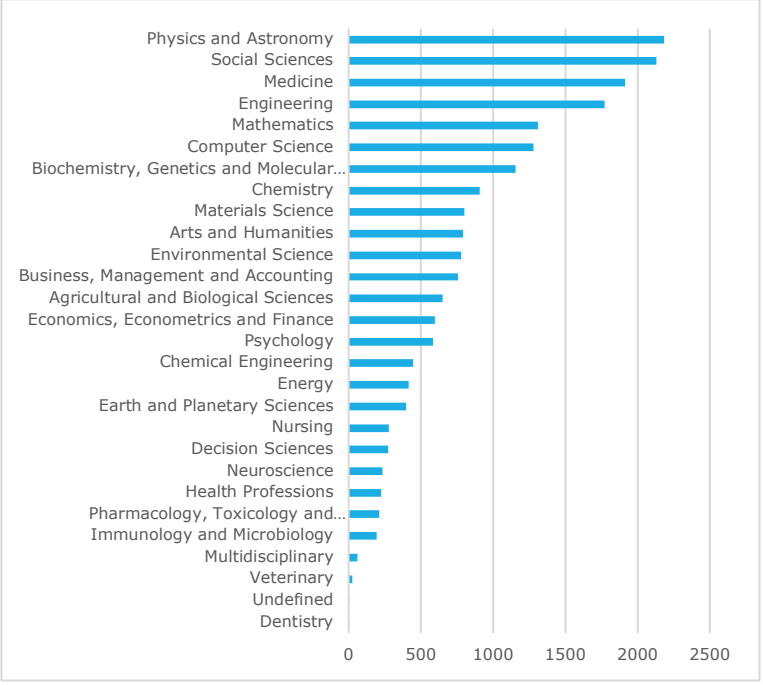
The research activity of research organisations in Cyprus has experienced rapid growth and international recognition as is evident from the publication statistics and the increased participation of Cyprus in Horizon 2020. Regarding the latter, Cyprus receives more than EUR 3 from Horizon 2020 participation for every EUR 1 the country contributes to the budget of Horizon 2020.

During the period from 2013 to 2017 Cypriot authors published 2983 scientific articles, which represents 0.04% of the total global scientific output during this period. The progress that has been made is evident from the significant increase in the number of publications *per capita* from 0.9 for the period from 2000 to 2004 to 3.5, moving up four positions in the ranking compared to other EU Member States. The growth in the number of publications relative to Cyprus's gross public expenditure on R&D was the highest among EU Member States, reaching 220%.[3]

Cypriot researchers tend to co-publish internationally more frequently than the EU-28 aggregate, with the main partners from Greece (37.3%), the UK (35.7%), the US (30.8%) Germany (25.7%) and Italy (25.1%).

Among the disciplines that are relevant to economic activity, medicine, engineering, computer sciences, biochemistry, chemistry and material sciences are among those with the higher number of publications.

Figure 14: Number of publications with Cypriot authors per science field — 2000-2017



Source: Scopus

[3] CWTS for DG-RTD 2019, Web of Science

However, according to the citation impact, only the engineering sciences excelled. Other areas with high citation impact are the Earth and Environmental Sciences and Culture. The performance of Chemistry, Physics and Astronomy was also above the global average, although in a much lower position.

Using the proportion of publications among the top 10% most cited publications worldwide as a criterion, Cyprus underperformed compared to the EU-28 for the whole period from 2000 to 2015.[4]

The research organisations with the highest production of publications during the period from 2016 to 2017 were the University of Cyprus (40.7%) and the Cyprus University of Technology (16.5%). However, the organisations with the highest share of publications in the top 10% most cited are the Cyprus Institute and the Agriculture Research Institute (see Table 7).

Table 7: Publication activity by research organisation

Sector	Organisation	Publications 2016-2017	% Publications in the top 10% most cited	% Publications of the country
Higher Education	University of Cyprus	455.4	10.8%	40.7%
Higher Education	Cyprus University of Technology	185.0	7.8%	16.5%
Higher Education	University of Nicosia	45.8	6.0%	4.1%
Private non-profit	Cyprus Institute of Neurology and Genetics	37.6	7.3%	3.4%
Higher Education	Frederick University	35.7	6.9%	3.2%
Private non-profit	Cyprus Institute	32.0	18.6%	2.9%
Higher Education	European University Cyprus	28.6	7.0%	2.6%
Government laboratory	Agricultural Research Institute	9.2	17.3%	0.8%

Source: CWTS for DG-RTD 2019, Web of Science

4.4 Technology and innovation support organisations

Research and technological services to companies are underdeveloped in Cyprus. However, some progress has been observed recently with the establishment of CYRIC, a private company offering research engineering and prototyping services

[4] CWTS for DG-RTD 2019, Web of Science based on the Web of Sciences

in the fields of mechanical engineering, electrical and electronics engineering, embedded systems, mechatronics, robotics, software design and development.

A Microsoft Innovation Centre has also been established in Cyprus, in 2015, offering facilities and resources to students, entrepreneurs and start-ups in the area of software.

The first incubator established in Cyprus was the Diogenes Business Incubator (established in 2003). Since then, nine start-ups have graduated successfully. During the period of recovery from the crisis, starting in 2015, several other incubators and working spaces have been established and offer their services to young entrepreneurs and start-ups such as ARIS, IDEA, Gravity Incubator and the Limassol Grind Co-working Space.

More information about the support organisation and incubators can be found in Annex 1.

5 THE DEMAND SIDE OF THE R&I SYSTEM IN CYPRUS

5.1 Innovation activities in the business sector

The business sector is dominated by micro companies, which account for 95% of the business population. Several are risk averse, family-run businesses without professional management and innovation capacity. According to the Global Competitiveness Report 2018 (World Economic Forum, 2018), Cyprus is ranked 101st in terms of the reliance of companies on professional management. In terms of the attitudes towards entrepreneurial risk, it is ranked 40th, while it is ranked 78th with regard to embracing disruptive ideas.

Data for the innovation performance of the companies are collected by the Community Innovation Survey (CIS) only for companies with more than 10 employees and therefore any conclusion derived from it applies only to 5% of companies. Instead, the Global Entrepreneurial Monitor (GEM) could provide insight regarding the innovation potential of those micro companies that are at an early stage of their life.

According to the GEM report, the total early-stage entrepreneurial activity[5] (TEA) in Cyprus was slightly lower than the European average in 2017/2018 — 7.3% compared to European 8.1%.

The GEM observed that there is a positive perception of entrepreneurship and entrepreneurial opportunities in Cyprus and that an encouraging share of the population expresses entrepreneurial intentions. Compared to the European average, bureaucracy and government policies regarding taxes are regarded as more favourable to entrepreneurship. Also, the physical and legal infrastructure is considered comparable to the European average.

On the negative side, there is an increased fear of failure, which is fuelled by the imbalance between the expected rewards and the risks undertaken due to the small size of the economy and the absence of networks that connect local entrepreneurs with global finance and big markets.

The fact that the majority of the TEA is opportunity-driven and not necessity-driven indicates that entrepreneurial activity has not been seen as a way out of unemployment. However, the sectoral composition of new entrepreneurial activities reveals that only a few of them are driven by innovative ideas. Early-stage entrepreneurial activity is mainly observed in the wholesale and retail sectors (45.4%) while rapidly growing, innovation-intensive sectors like ICT, renewable energy or intelligent manufacturing attract a modest share of early-stage entrepreneurial activity. Besides, few entrepreneurs consider that their early-stage entrepreneurial activity is internationally oriented (10%), whereas activity relevant to medium-tech or high-tech is minimal (4.9%).

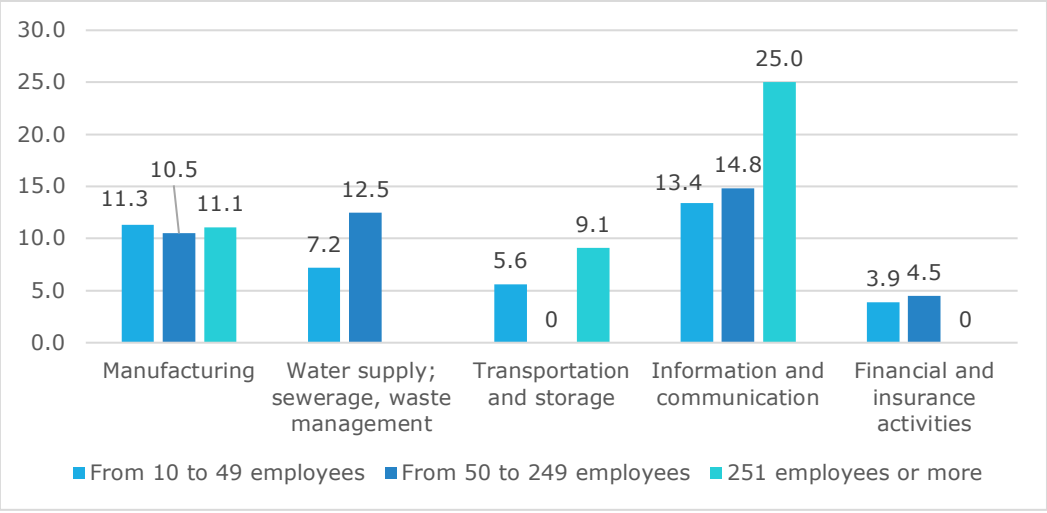
[5] Total Early-stage Entrepreneurial Activity – TEA: Percentage of the adult population between 18 and 64 who are in the process of starting a business (nascent entrepreneurs) or are owner-managers of a business which is younger than 42 months old.

For companies with more than 10 employees, the data provided by the CIS 2016, indicate that their innovation performance is below the EU average for all sectors (NACE[6] 1st digit) where data[7] are available. In **manufacturing**, the share of Cypriot companies with product or process innovations was 11.2%, compared to 16.9% for the EU. In the **information and communication** sector, the share in Cyprus (13.9%) is also smaller than in the EU (15.8%).

Comparing the sectors and size classes of companies, the information and communication sector (which represents 5% of the GVA)[8] is the most innovative in all size classes. Within the sector there are significant differences between big companies (over 250 employees) and the other size classes. The share of innovative companies in the financial sector, which accounts for 10% of the GVA, is the lowest among the sectors. For the size class of '10 to 49' employees the share of innovative companies is 3.9%, which is almost half of the share in the EU (7.3%) (Figure 15).

A more detailed picture of the innovation performance of subsectors of manufacturing and services is presented in Figure 16 and Figure 17.

Figure 15: Share of companies with product or process innovation per sector and size class — 2016



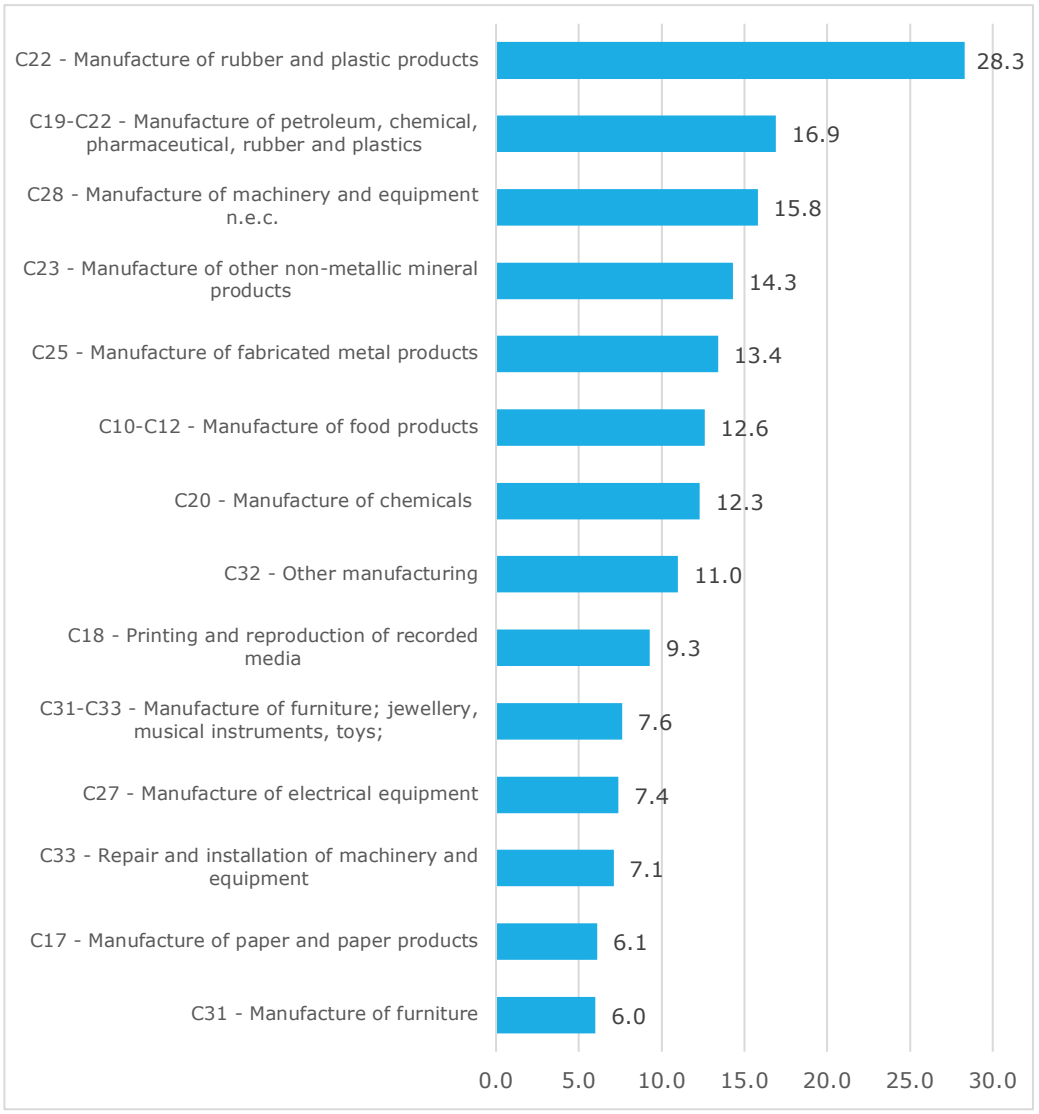
Source: Eurostat CIS 2016, database inn_cis10_type

[6] Nomenclature statistique des activités économiques dans la Communauté européenne (NACE), or 'Statistical nomenclature of economic activities in the European Community'

[7] For reasons related to confidentiality, Eurostat does not publish data strata representing a small population.

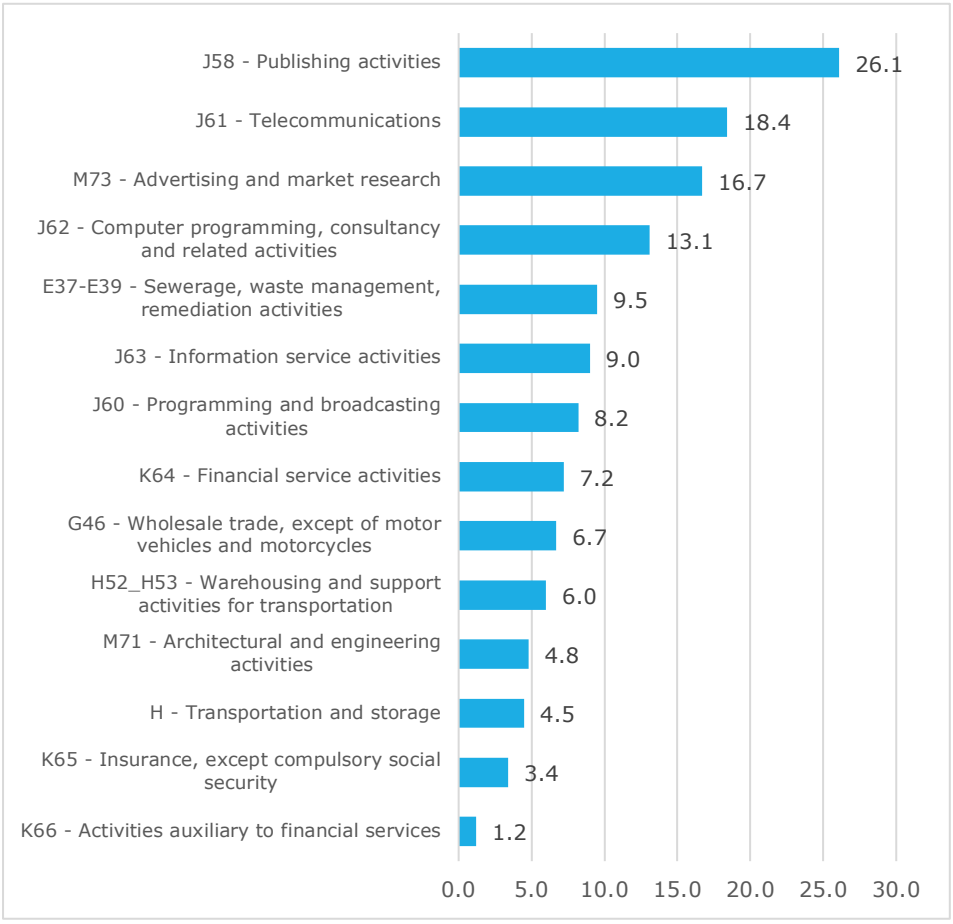
[8] Gross Value Added

Figure 16: Share of product and/or process innovative enterprises in manufacturing — Cyprus 2016



Source: Eurostat CIS 2016, database inn_cis10_type

Figure 17:Share Product and/or process innovative enterprises in services — Cyprus 2016

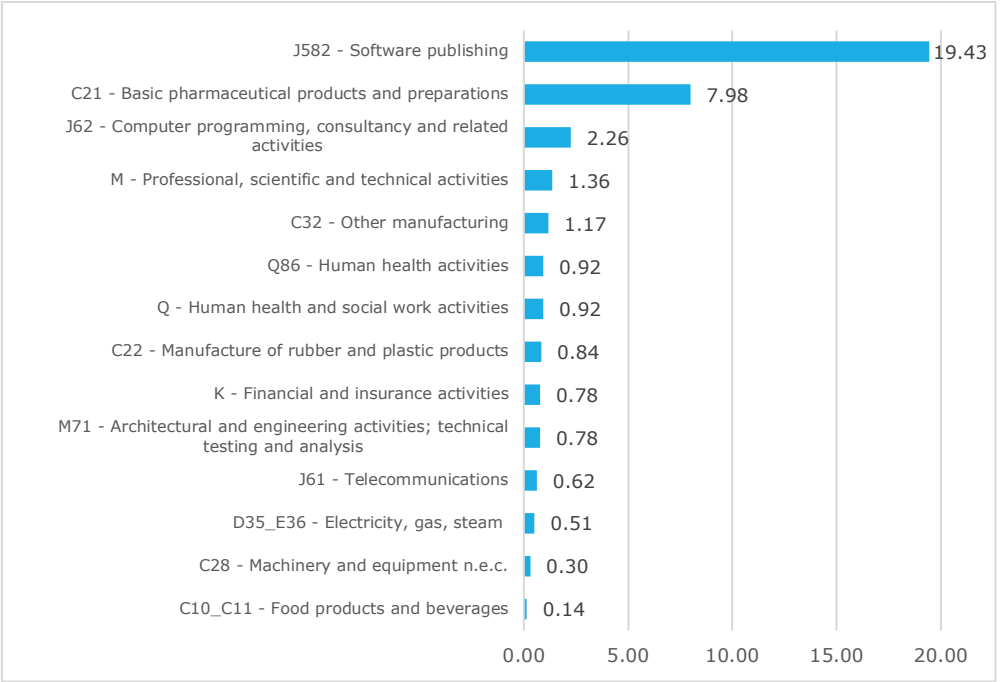


Source: Eurostat CIS 2016, database inn_cis10_type

5.2 R&D activities in the business sector

The overall expenditure of the business sector is very low compared to the EU average. In fact, it is lower than expected, based on the differences between Cyprus and the EU average in the share of innovative companies. Business R&D expenditure accounts for only 36.5% of the R&D expenditure in the country and this expenditure is very concentrated in two sectors. The R&D expenditure of the **ICT** and **pharmaceutical** sectors together **accounted for 83% of business R&D expenditure in 2016** (Figure 18), **while they accounted for only 5.5% of the Gross Value Added in Cyprus.** Services, which dominate the Cypriot economy**,** excluding ICT, accounted for only 10% of business expenditure on R&D.

Figure 18: Business expenditures on R&D per sector in Cyprus — million Euro 2016



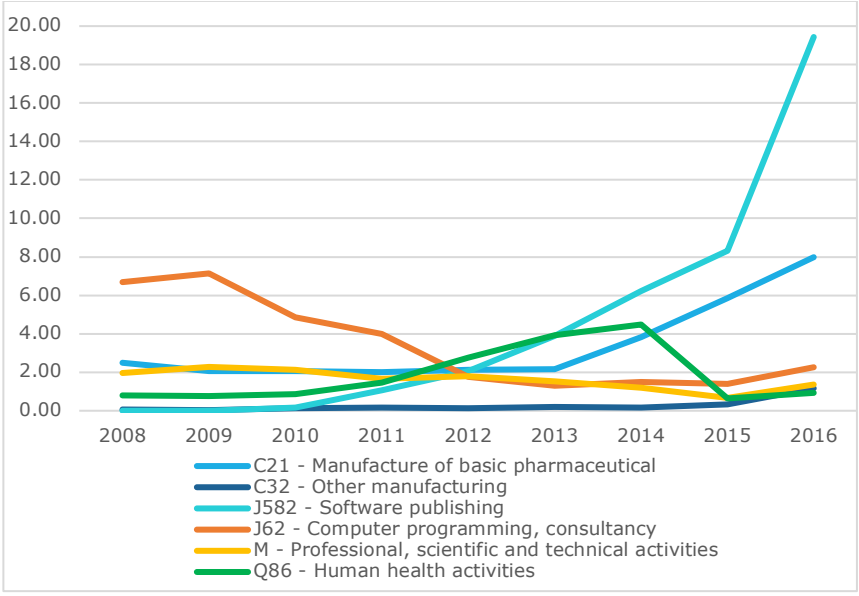
Source: Eurostat, data extracted October 2019

Within the ICT sector, higher spending is observed in software publishing,[9] followed by computer programming. Looking at the trends, the two subsectors followed opposite trajectories in their spending, which might indicate either a gradual shift of the focus of companies or a change in the classification of the activities. The latter seems to be the most probable as Cyprus is the only Member State with higher R&D expenditure in software publishing than in computer programming.

The striking increase in spending in the pharmaceutical sector after 2014 is due to the fast development of two dominant pharmaceutical companies, Medochemie and Remedica.

[9] A software publisher is a publishing company in the software industry between the developer and the distributor. In statistics, software publishing includes the publishing of computer games on all platforms, off-the-shelf software, including its translation and adaptation for a particular market (retail sales or online provision of software are excluded)

Figure 19: Business expenditure on R&D per sector — Cyprus 2016



Source: Eurostat, data extracted October 2019

5.3 Intellectual assets of companies

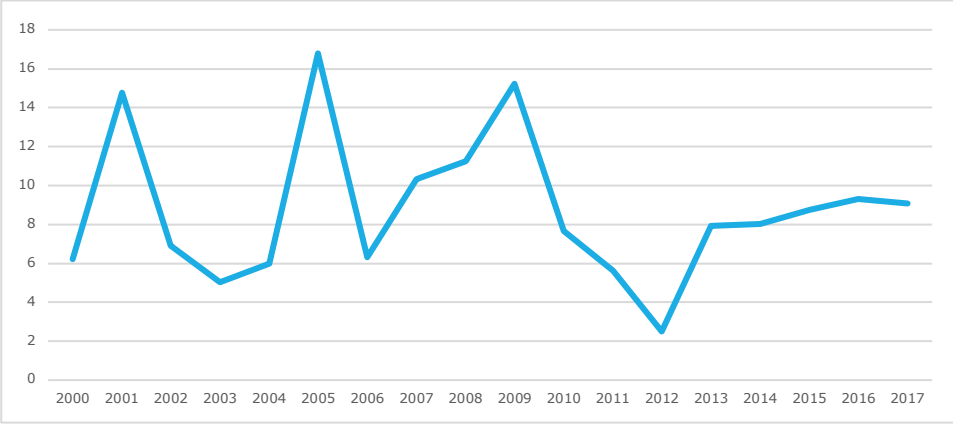
Patenting activity provides an indication about the intellectual assets of companies since most of the patent applications in Cyprus are filed by companies. According to the data provided below, the overall patenting activity is low, reflecting the low business R&D expenditure and the very small size of the economy. Taking into consideration also the effect of tax incentives, the number of patents filed by Cypriot companies with innovation capacity in Cyprus might be even less.

Between 2010 and 2014, 97% of PCT applications from Cyprus were filed by companies (INCENTIM 2019). Specifically, between 2000 and 2010, 75% of the patent applications at the European Patent Office (EPO) were filed by SMEs, compared to 38.5% for the EU-27. During the period from 2000 to 2017, the total number of patent applications filed with the EPO by Cypriots came to 158, 8.8 per year on average.

Following a period of significant decline in patenting activity (Figure 20), the number of applications rose again in 2013, the year after the introduction of a very favourable Intellectual Property (IP) box regime which applies a very low tax (2.5%) on the qualified profits from IPs (for more information see section 0). A comparison of the performance of the country with other countries raises the question as to whether the increase in the filing of patents is due to the IP box regime and the very favourable tax legislation or to the innovation activity of Cypriot companies. According to EIS, The score of Cyprus in terms of PCT patent applications is 23.3% of the score of the EU-28. This score is better compared to

other countries with higher business R&D spending, such as Lithuania, Greece, Poland, Slovakia and Croatia.

Figure 20: Patent applications to the EPO from Cypriot applicants



Source: Eurostat

The above conclusion is also supported by the characteristics of companies with high levels of patenting activity. As can be seen in Table 8, two out of the five companies with the highest number of patents in the period from 2010 to 2014 are holding and Intellectual Property Rights (IPR) management companies without any productive activity in Cyprus. Besides, no information for any production or research activity could be found for the remaining three companies in the table.

Table 8: Cypriot companies with the higher number of patents during the period from 2010 to 2014

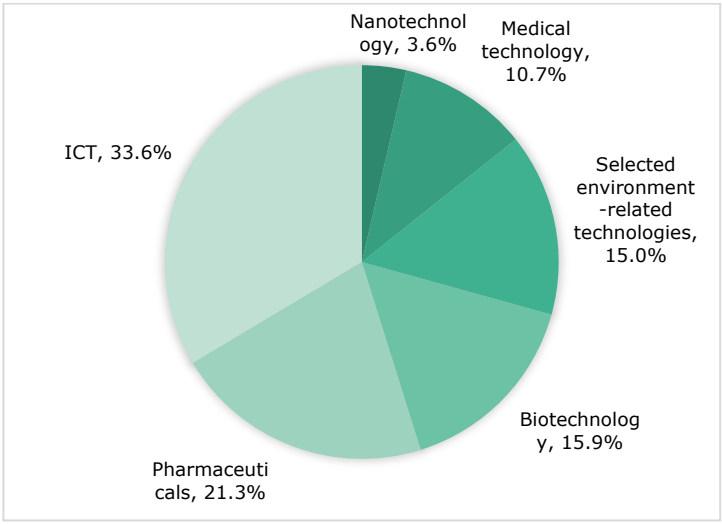
Applicant name	Patent count 2010-2014	% PCTs	Main business (NACE 2.0 and/or web info)
X6D	12	5.31%	Manufacture of Computer, Electronic and Optical Products [C26] - Optical Instruments and Photographic Equipment (3D Technology)
UNIBIND	11	4.87%	Manufacture of Paper and Paper Products [C17]
BITDEFENDER IPR MANAGEMENT	11	4.87%	Computer Programming, Consultancy and Related Activities [J62]
BISERKON HOLDINGS	8	3.54%	Manufacture of Machinery and Equipment N.E.C. [C28] Capsules for beverage bottles
XIGEN INFLAMMATION	7	3.10%	Manufacture of Basic Pharmaceutical Products and Pharmaceutical Preparations [C21]

Numbers in brackets: NACE code of company's activity
Source: INCENTIM for DG RTD 2019

Similar concerns can be raised about Cyprus's high performance in terms of trademark applications (246.6% of the EU-28 average) as is also pointed out in Demetriades & Robledo-Bottcher (2018).

Looking at the technology areas of patents – International Patent Classification (IPC) classes – ICT and health-related technologies dominate. Around 33% of the patent applications filed in the period from 2002 to 2013 are related to ICT. Health-related patents (pharmaceuticals, medical technology and biotechnology) account for 47.8% of the total (Figure 21).

Figure 21: Number and share of patent applications filed with the EPO by Cypriots per IPC class — 2002-2013



Source: Eurostat

5.4 Research intensity of the innovation activities

Comparing the innovation performance of the sectors, as is expressed by the share of companies with product or process innovation activities in the period from 2014 to 2016, with the expenditure on R&D during the same period, it is evident that there is a mismatch between the two. The low R&D expenditure indicates that companies invest more on incremental changes or they adopt existing technologies mainly through the purchase of new equipment with low adaptation or improvement.

Exceptions are the sectors of 'chemicals, pharmaceuticals, rubber and plastic products' due to very high R&D spending on pharmaceuticals and ICT activities.

The two areas, **pharmaceuticals** and **ICT,** are among the economic activities that have been identified as priorities in the Smart Specialisation Strategy of Cyprus (S^3Cy) (green in Table 9): the former as part of the broader area of **health** and the latter as a horizontal activity supporting all other priorities. The majority of the patents for the period from 2002 to 2013 are concentrated in these two areas (see Figure 21): ICT 33.6% and health-related patents 47.8%.

Table 9: Comparison of innovation and R&D activities in Cypriot companies — 2014-2016

Sectors	Innovation (Share)	R&D 2014-2016 (EUR million)	S³Cy Priority
A - Agriculture, forestry and fishing	0	0.023	
C10_C11 - Food products and beverages	12.6	0.454	
C17 - Manufacture of paper and paper products	6.1		
C18 - Printing and reproduction of recorded media	9.3		
C19-C22 - Manufacture of petroleum, chemical, pharmaceutical, rubber and plastic products	16.9	17.819	
C20 - Chemicals and chemical products	12.3	0.158	
C21 - Manufacture of basic pharmaceutical products and pharmaceutical preparations		17.666	
C22 - Manufacture of rubber and plastic products	28.3	0.838	
C23 - Manufacture of other non-metallic mineral products	14.3	0.046	
C24 - Manufacture of basic metals	0.0	0.105	
C25 - Manufacture of fabricated metal products, except machinery and equipment	13.4	0.022	
C27 - Manufacture of electrical equipment	7.4	0.264	
C28 - Manufacture of machinery and equipment n.e.c.	15.8	0.517	
C31 - Manufacture of furniture	6.0		
C32 - Other manufacturing	11.0	1.668	
C33 - Repair and installation of machinery and equipment	7.1	0.048	
D35_E36 - Electricity, gas, steam and air conditioning supply; water collection, treatment and supply		0.819	
E - Water supply; sewerage, waste management and remediation activities	8.2	0.022	
F Construction		0.033	
G - Wholesale and retail trade; repair of motor vehicles and motorcycles	6.7	0.367	
J58 - Publishing activities		33.976	
J582 - Software publishing	26.1		
J61 – Telecommunications	18.4	1.450	
J62 - Computer programming, consultancy and related activities	13.1	5.138	
J631 - Data processing, hosting and related activities; web portals	9	0.019	
K - Financial and insurance activities		1.262	
K64 - Financial service activities, except insurance and pension funding	7.2	0.674	
K65 - Insurance, reinsurance and pension funding, except compulsory social security	3.4	0.548	

Sectors	Innovation (Share)	R&D 2014-2016 (EUR million)	S³Cy Priority
K66 - Activities auxiliary to financial services and insurance activities	1.2	0.040	
M - Professional, scientific and technical activities		3.217	
M70 - Activities of head offices; management consultancy activities		0.507	
M71 - Architectural and engineering activities; technical testing and analysis	4.8	2.301	
M73 - Advertising and market research	16.7	0.275	
P85 – Education		0.359	
Q86 - Human health activities		6.042	

Minimum value
Median (50% percentile)
Maximum value

R&D activities in the **food sector**, which is another priority area of S³Cy, were rather low, with expenditure below the EUR 0.5 million (below median) in 2016. Despite the low R&D expenditure, innovation activity was relatively high (above the median) as several innovations are related to the improvement in packaging or increase the processing of the products. Innovations often rely on investments in equipment and know-how, which is also transferred by the providers of the equipment. To comply with the strict European regulations and market demand for high quality and healthy products, the agrifood companies usually perform several tests as part of their routine production activities.

In the priority area of **energy**, there is some R&D expenditure (EUR 0.8 million) in the sector of energy production although there is no evidence that there is a sufficient production base with the necessary technological knowledge and production capacity to penetrate the highly competitive international markets. However, the expected exploitation of offshore oil and gas resources could raise the demand for local maintenance and provision of support services for the extractions and transfer of gas and oil, which could potentially benefit transport and engineering services.

In the **construction** sector, research expenditure is very low (EUR 0.03 million in 2014). Despite the rising levels of investment in housing and tourism, no research activities have been recorded after 2014.

Innovations introduced in the food, energy and construction sector are often based on products produced in other sectors, such as ICT, manufacture of fabricated metal products (C25), manufacture of machinery (C28), and manufacture of electrical and electronic equipment (C27). Among them, innovation activity in the manufacture of fabricated products and manufacture of machinery is above the median (13.4% and 15.8% respectively). However, R&D expenditure is quite modest to justify expectations for a significant contribution to the innovation activities in the other priority sectors.

6 SCIENCE AND INDUSTRY COLLABORATION

6.1 Collaboration between science and industry

Collaboration between companies and research organisations of any type is quite limited as is evident from several indicators.

According to the Global Competitiveness Report, Cyprus is ranked 82nd out of 140 countries in terms of 'Multi-stakeholder collaboration' (World Economic Forum, 2018). Similarly, the Global Innovation Index ranks Cyprus 69th out of 126 countries in university-industry research collaboration (Dutta et al. 2018).

Comparing the funding of research organisations by companies in small countries with the different levels of advancement of their R&D systems, the funding from Cypriot companies is the lowest. According to Table 10, 99% of the R&D funding of companies is directed to companies and only 0.8% and 0.2% goes to universities and private non-profit research organisations respectively.

Similarly, the contribution of business funding to the annual expenditure of universities and private non-profit research organisations in Cyprus is only 0.7% compared to 10% for the former and 74.1% for the latter in Slovenia or 12.2% for universities in Lithuania (Table 11).

Table 10: Allocation of business funding by type of research performer — 2016

Country	Sector of performance %				
	Business enterprise sector	Government sector	Higher education sector	Private non-profit sector	Total
EU - 28		1.6	2.6		
Cyprus	99.0	0.0	0.8	0.2	100
Slovenia	97.0	1.3	1.7	0.0	100
Lithuania	78.7	9.1	12.2		100
Estonia	93.6	0.7	5.5	0.2	100
Malta	99.2	0.5	0.3		100
Finland	97.1	1.3	1.6	0.0	100
Latvia	74.4	14.3	11.3		100
Czechia	95.6	1.8	2.4	0.1	100

Source: Eurostat

The very low level of subcontracting of research activities to research organisations is also reflected in the very low level of collaboration for the development of innovations. According to CIS 2016 (see Table 11), the share of innovative companies that have cooperated with a university or any other type of research organisation during their innovation activity remains below 8% for all sectors except for ICT, where the collaboration with universities reaches 21.5%.

Comparing the universities with the research institutes and government labs, the shares for collaboration with universities are higher for all economic sectors.

Table 11: Contribution of the business sector to the spending of research performers as share of funding to sectors' expenditure — 2016

Country	Sector of performance			
	Business enterprise sector	Government sector	Higher education sector	Private non-profit sector
EU - 28		8.3	6.5	
Cyprus	93.4	0.0	0.7	0.7
Slovenia	88.7	6.8	10.6	74.1
Lithuania	87.7	13.5	12.2	
Estonia	87.7	2.9	7.4	7.2
Malta	87.2	20.9	0.4	
Finland	84.0	9.1	3.7	2.1
Latvia	65.6	9.7	5.6	
Czechia	61.8	4.0	4.7	18.5

Source: Eurostat

Table 12: Collaborations of innovative companies during their innovation activity per sector — shares to innovative companies

NACE	Any type of co-operation	Universities or other higher education institutions	Government or public research institutes
C – Manufacturing	29.6	7.4	6.3
H - Transportation and storage	33.4	6.7	4.6
E - Water supply; sewerage, waste management and remediation activities	35.8	8	8
J - Information and communication	41.9	21.5	7.6
K - Financial and insurance activities	51.5	4.3	0

Source: Eurostat, CIS 2016

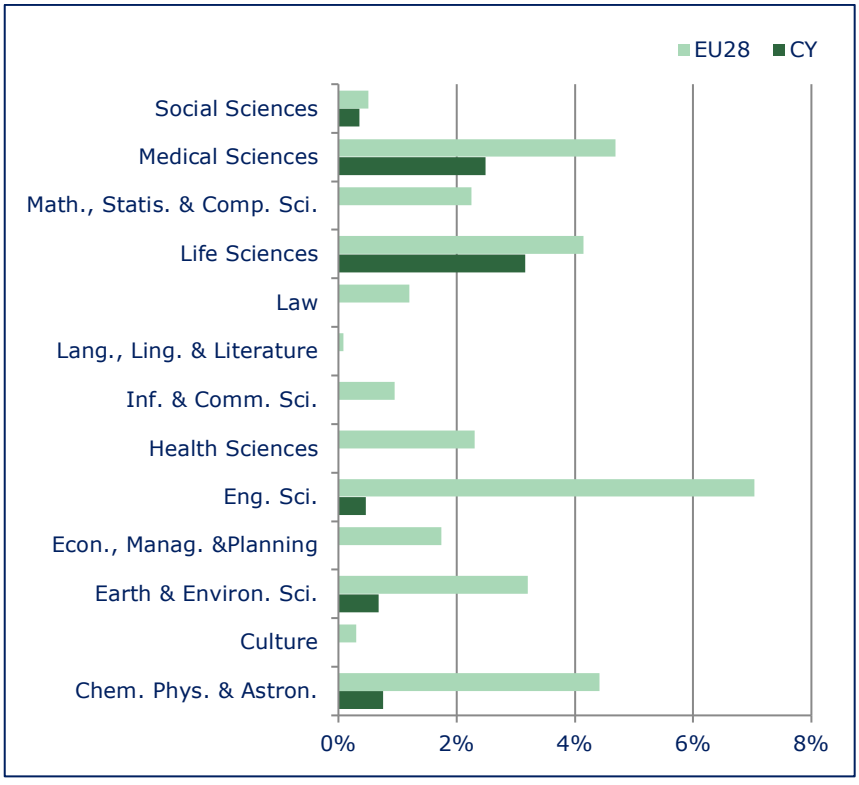
6.2 Alignment between science and business specialisation

A critical factor for collaboration between science and businesses is the alignment of their specialisation. While it is essential that the local research system has the capacity to serve the sectors with a high concentration of research activities, it is also important to be able to provide services to sectors that are important for the country's economy.

As was discussed in section 5.2, 83% of the business R&D is concentrated in ICT and pharmaceuticals. Looking at the specialisation of the research organisations, as is captured by the number of publications per scientific field, medicine, computer science and biochemistry, which are among the areas with a high number of publications, match with the areas where the business R&D is concentrated. However, these areas account for only 5.5% of the economy while services, besides ICT, which dominate the economy have less presence in the research activities of research organisations and account for only 10% of the research activities of businesses.

Looking at the co-publications in scientific journals by companies and public research organisations (Figure 22), which reflect, to some extent, the collaboration between science and businesses, the areas with the higher shares are those of medical science and life sciences. However, it is striking that there are no co-publications in information and communication sciences, at least during the period from 2016 to 2017, despite the high level of R&D activities in both science and business sectors and the high level of collaboration during the innovation process (see Table 12). In other areas relevant to the economy, such as engineering, the share is meagre, especially if we compare it with the EU-28.

Figure 22: Co-publications in scientific journals by businesses and public research organisations by scientific field (2016-2017) — share in total publications



Source: CWTS for DG-RTD 2019, Web of Science

6.3 Regulatory framework for technology transfer and commercialisation of research

Until recently, technology transfer activities in public research organisations and their cooperation with the private sector was performed *ad hoc* given that a clear regulatory framework was not yet in place.

In 2018, after a broad consultation among the universities and relevant sgtakholderes, a national framework for the **commercialisation of research results** of public univerisities was approved by the Council of Ministers (9/10/2018). As a result, the **contribution to the economy and entrepreneurial activities** through the support of innovation was introduced into the **mission** of public universities. The framework also allows the public universities to participate in activities related to the **exploitation of research results**, including the **use of their research infrastructure and services** for these purposes. Finally, it provides broad conditions for the **establishment of new companies or for participation in existing companies**.

The framework has not been translated into a universal national law, but the existing founding laws of the research organisations were updated according to the new principles and internal regulations should be adopted to define the specific terms and conditions. The available internal regulations are discussed in the next sections.[10]

Regarding the establishment of spin-off companies, a university can establish or participate as a shareholder in a company provided that its activities are consistent with the mission and interest of the university and the public interest.

The university can hold **up to a 49% equity share**, **including any share held by members of the university**. There are several negative implications of such an arrangement, including:

- The university and the inventor lose control of the spin-off company, in favour of the third parties owning the 51%.
- Investors are requested to provide funding that can cover the 51% and subsequently to undertake a significant risk at a very early stage of the spin-off life, making the offer less attractive.
- The restriction affects other aspects of the technology transfer process as the university is prevented from using a wholly owned company for managing and invoicing services provided to companies.

The specific terms and conditions regarding the decision-making and the allocation of shares or any other type of revenue related to the exploitation of the IPs shall be provided in the respective regulations of the institution.

The activities of the companies should remain completely separate from the operation of the university and any **use of facilities or equipment or the use**

[10] Information for other research organsiations will be added as soon as it becomes available.

of personnel is possible only in exceptional cases and subject to the approval of the University Council. This condition is controversial and incoherent with the broader national policy to facilitate the access of businesses to public research facilities and puts the spin-off companies in an inferior position compared to other companies.

The **university should charge any such use to the companies at current market prices.** Also, the i**nvolvement of the university in the establishment of companies should be funded exclusively by private resources** and **any return on the university's investment shall be used for the benefit of the university**. The representative or representatives of the university on the board of such companies shall be entirely independent of any member of the university staff holding shares in the same company.

The approach of each university to establish spin-offs is discussed in the next section.

6.4 Technology transfer and the commercialisation policy of research organisations

Technology transfer from the Cypriot research organisations is not developed hindered by the low demand from the local business sector. Although there is no evidence that attempts of collaboration between the public research sector and the business sector have failed due to an insufficient regulatory framework, the existing framework remains a hampering factor.

In the last few years, both public universities and private non-profit research organisations have started developing internal policies on technology transfer and the commercialisation of IPs and considered the creation of the necessary organisational structures, such as technology transfer offices. The current status regarding the technology transfer offices is discussed in the following section.

A detailed account of the technology transfer and commercialisation policies of the main research organisations is discussed in sections 6.4.3 to 6.4.7.

6.4.1 Technology Transfer Offices

Currently, only the Cyprus University of Technology has created a small office with the responsibility for technology transfer, while other research organisations use other types of units, such as the liaison offices or research offices, for technology transfer activities.

The three public and four of the private universities have established a network of University-Industry Liaison Offices which has been operating since 2010. The network aims at facilitating the collaboration of the universities with other universities, research organisations and industry by undertaking the following tasks:

- placement of students in industry
- promotion of cross-national agreements-partnerships with other universities in Europe, especially for student placements and internships

- promotion of research results to industry and encouraging research collaboration.

The operation of the network was successful, especially regarding the placement of graduates in enterprises. Since 2010, 1980 students have been placed in companies, exceeding the initial target of 400 placements by a long way. In addition, 36 collaboration agreements have been signed between universities and companies. Based on these achievements, a decision was taken to prolong the network over the period from 2014 to 2020, funded by RESTART.

In the Cyprus Institute of Neurology and Genetics, the Research Office is involved in coordination and decision-making regarding the technology transfer, commercialisation of IPs and establishment of spin-offs. In the case of spin-offs, CING Innovations Ltd, a wholly owned subsidiary company of the institute, is also involved in the decisions regarding potential partners and external investors.

The Cyprus University of Technology (CUT) is the only research organisation with an office dedicated to technology transfer, the 'Innovation and Technology Transfer Organisation' (INENT). The INENT has responsibility for the commercialisation activities and for setting up spin-offs. According to the policy document of the CUT published by INENT, the latter participates in the decision-making on issues such as what will be patented, how the IPs will be exploited or whether licences will be assigned to the creators of the IPs.

The existing set-up in the country is currently changing as the government has decided, via the Research and Innovation Foundation (RIF), to establish a National Knowledge Transfer Office (KTO). The KTO will provide technology transfer support to the universities and research organisations of the public and private sector in Cyprus. When established, the KTO will operate as a central hub, working closely with Knowledge Transfer Units (KTUs) hosted in each research organisation and leveraging on synergies with other units such as the Research Offices, the Industrial Liaison Offices and the Centres for Entrepreneurship of universities and research organisations.

The KTO's business plan was prepared by ISIS Innovation (Oxford University subsidiary) in 2015. In August 2016, an additional study for the legal arrangements necessary for the establishment of the KTO was delivered by a law firm. There have also been efforts to clarify the compatibility of the temporary arrangements of the KTO with the provisions of the State Aid Regulations and Public Procurement Law. DG Competition has clarified that it is not necessary for the measure to be notified to the EU and the handling of state aid issues will therefore only take place at the national level. In 2019, there will be consultations with KTO beneficiary organisations and stakeholders and it is expected that the KTO will be operational in 2020.

6.4.2 Incentives provided by research organisations for collaboration with industry

The three public universities have some freedom to provide incentives to their researchers to encourage the commercialisation of the research results. The incentives are related to the allocation of the revenues from the commercialisation or the conditions for providing services to companies (for

example see section 6.4.3 for the Cyprus University of Technology's policy). However, the career advancement of academic staff depends on purely teaching and research criteria, such as years of experience in teaching and research, management of doctoral theses, number of publications, participation in conferences, editorial committees of journals or their ability to attract research funding. Contribution to the exploitation of research results, the number of patents or revenues from the exploitation are not among the advancement criteria.

The Open University of Cyprus allows university staff to provide consulting services to businesses and the employees are entitled to additional fees. A precondition for the provision of services is the approval of the university's management.

Similarly, the research organisations operating as private entities of public interest also have some flexibility in defining incentives. An example is the Cyprus Institute of Neurology and Genetics (see also section 6.4.6). The internal regulation of the institute not only permits but encourages employees to undertake work outside the institute, especially if that work increases the opportunities for the institute to develop industrial and commercial collaboration and to generate additional revenue. Staff being employed by private companies is permitted under the following conditions:

- The employee has requested the permission of the Chief Executive Medical Director (CEMD) and the final approval of the Institute's Board of Directors (BoD).
- The work cannot exceed 20% of the available productive days per year. Such work can take place both within or outside working hours and should be for up to a year.
- Renewal of Outside Work for more than a year should be re-examined and receive approval by the CEMD.
- The employee should disclose the earnings from their outside work to the institute.

In addition to the above incentives, researchers can receive payment when they participate in research projects funded by external funding provided that this is allowed by the regulations of the funder. Such payments should not cumulatively exceed 20% of their gross annual salary and should not be more than EUR 5000 per research grant.

Government laboratories such as those in the Ministry of Agriculture operate under more restrictive rules and their employees are not allowed to work for or provide services to the private sector.

6.4.3 The commercialisation policy of the University of Cyprus

Commitment to commercialisation

The university aims to provide support services to promote the creation of Intellectual Property (IP) whilst seeking to maximise the commercial exploitation of the resulting Intellectual Property Rights (IPR).

Governance of IPs

The Intellectual Property Rights Committee (IPRC) and the Research and International Relations Service (RIRS) have responsibility for the administration of IPs. Once the national Technology Transfer Facility (TTF) has been established, the RIRS will be its contact point within the University of Cyprus.

Disclosure of IPs

All employees, students and persons engaged by the university under contract should disclose all IP arising from their work to the RIRS. In addition, they need to notify the RIRS about the ownership by a third party of any IP referred to or used for their work; any use to be made of existing univeristy's IPs during their work as well as any IP which they themselves own, which is proposed for use by the University.

The creators must not apply for patents or other protection in relation to the Disclosable Work and/or use any Disclosable Work for their own personal and/or business purposes and/or on their own account.

Ownership of IPs

The university claims ownership of all intellectual property produced by all employees, students and persons engaged by the university under contract with the excusion of IPs produced as a result of contractual work financed by third parties.

In the cases where the university decides that it has no interest in protecting and exploiting the relevant IPR or if it fails to inform the creator about its decision within three months, the university may assign all its rights, title and interest in such IP to the creator, whilst the organisation retains the right to use the said IP in whichever manifestation for strictly non-commercial purposes.

Routes for exploitation

The preparation and negotiation of any IP agreements or contracts involving the allocation of rights will be undertaken by a competent person authorised for this purpose by the university.

If the university decides to protect and exploit the IP:

- the creator collaborates with the university, through the RIRS, to develop an action plan for the protection and commercial exploitation of the IP;
- the RIRS will, in collaboration with the creator, ensure that third party rights are not infringed in any way through the process; and

- the university shall seek to protect the right of the creator to use the IP for strictly non-commercial purposes.

Responsibility and cost of protection

The IPRC and RIRS have responsibility for the administration of IPs. Patent protection requires that all materials made publicly available by any members of staff and/or students of the university should include a copyright notice. Any decisions relating to the registration of any IP rights should be made in consultation with the person or persons appointed for this purpose by the university. The IP registration process can be very expensive and IP protection costs are not incurred without appropriate consideration of how such costs will be recovered.

Responsibility for exploitation

The university is entitled to commercially exploit any result obtained under its aegis.

Allocation of benefits

The organisation's members of staff and/or students can benefit from the Revenue Sharing Scheme if their work generates income for the organisation.

Revenue sharing table:

Total net revenue	Creator/Inventor	UCY Fund	Creator's/Inventor's UCY research account	UCY RIRS
Up to 400K Euro	30%	10%	20%	20%
400K+1 Euro	30%	20%	30%	0%

Spin-offs

No provisions

6.4.4 The commercialisation policy of the Cyprus University of Technology

Commitment to commercialisation

The university encourages the commercial development of creative works and inventions intended for public use and benefit.

Governance of IPs

Any IP governed by the present policy and/or is subject to the terms of the present policy must be disclosed to INTENT.

Any decisions relating to the application for the registration of any IPRs, such as a patent or trademark or design (including any decisions to continue or discontinue any such application) should be made by INTENT.

Applications for patents for discoveries and inventions owned by the university are submitted/coordinated through INTENT.

Decisions for providing licensing for commercialisation to creators is subject to INTENT's approval.

Disclosure of IPs

All ideas, which can potentially be developed as an IP or have commercial potential, and have been invented wholly or partly by members of the University Community, in the framework of their responsibilities, through CUT resources being used or through more than incidental use of CUT resources, should be reported promptly to the CUT.

Each member of the University Community who may be involved or engaged in internally or externally funded research projects or having the opportunity to make significant use of university resources, must sign an Intellectual Property and Confidential Information Agreement (IPCIA).

Ownership of IPs

The university has ownership of all IPs.

Routes for exploitation

Commercial development is encouraged through licensing to third parties or to creators of the IP in the event that they want to establish a spin-off company. The university may accept shares instead of royalties in the case of spin-off companies.

Responsibility and cost of protection

The expenses associated with commercialisation, such as securing a patent or protecting a copyright, fall under the exclusive responsibility of the CUT.

In the case of licensed IPs, the university will require that licence holders pay the costs for obtaining patents or other IPRs and other customary costs incurred by the university.

Responsibility for exploitation

The university is entitled to commercially exploit any result obtained by any member of the University Community (unless this entitlement is relinquished).

Allocation of benefits

Net income per year from commercialisation of IP	Beneficiaries	Percentage share
First €25 000	Creators	70%
	INTENT	30%
Next €25 000 - €350 000	Creators	50%
	Intent	25%

Net income per year from commercialisation of IP	Beneficiaries	Percentage share
	University central fund	5%
	Creator Laboratory fund	20%
Above €350 000	Creators	45%
	InNTENT	25%
	University central fund	10%
	Creator Laboratory fund	20%

Spin-offs

The university prefers to license the IP to a spin-off company although it might also accept equity.

For the establishment of a spin-off, creators should request a licence for commercial exploitation of the university's IPs, which have been developed by them, if such licensing:

- will strengthen technology transfer,
- is consistent with the obligations of the university towards third parties,
- does not imply a conflict of interest.

The licence will include the payment of appropriate royalties and the required diligence for the development and dissemination of the technology. These arrangements will be subject to audit in accordance with university policies on conflict of commitment and interest.

If the creator of the IP owns or will soon acquire shares or founder shares and/or options for shares in a small, closely controlled company which has taken a licence for their invention from the university, the university may accept shares instead of royalties only with the prior approval of the University Council in consultation with INTENT. If the creator will remain an employee of the university after the formation of the company in which he/she acquires a stake, he/she will be asked to sign an Avoidance of Conflict of Interest Declaration.

6.4.5 The commercialisation policy of the Open University of Cyprus

Commitment to commercialisation

The university encourages the provision of services to the private sector and the commercialisation of research results.

Governance of IPs

Decisions are taken by the Rectorate Council.

Disclosure of IPs

The disclosure is mentioned implicitly without any details about the procedures.

Ownership of IPs

The university claims ownership of all intellectual property provided that it will express its interest in commercialising the IP within three months of the disclosure. If it fails to express an interest, the IP belongs to the creator.

Routes for exploitation

No prioritisation of a specific route.

Responsibility and cost of protection

No provisions.

Responsibility for exploitation

No provisions.

Compliance with competition rules

No provisions.

Allocation of benefits

The university shares with the creator(s) the net income arising from the IP assignment/licensing agreement as follows: 50% of the net income is given to the creator and 30% to the creator's institutional research account and 20% to the general budget.

If university personnel or students have contributed directly to the production of the IP, a small portion of the creator's share, which will not exceed the rate of 10%, can be distributed among them.

Spin-offs

The creator of the IPs and the university can establish a new company or can participate in an existing company for the exploitation of research results provided that the Rectorate Council provides its approval.

The creator receives shares in the company as remuneration. The number of shares is under negotiation with the company.

6.4.6 The commercialisation policy of the Cyprus Institute of Neurology and Genetics

Commitment to commercialisation

The institute encourages its researchers to carry out research and development and exploit new ideas within the scope of the institute. The institute offers incentives for the development and protection of any IP that arises in the institute as well as progression and career development. The institute aims to maximise the benefits that may arise through the dissemination and exploitation of IP.

Governance of IPs

The organisation of the commercialisation is the responsibility of the Research Office (RO) while the decisions are made by the Financial and Administrative Director (FAD) and the Chief Executive Medical Director (CEMD) of the institute. The CING Innovations Ltd participate in the search for partners and investors in the case of spin-off companies.

Disclosure of IPs

The creator must, immediately upon completion of work that may result in IP, inform the CEMD of the institute in writing that he/she has made an invention before announcing it to any third party outside the institute. The creator, with the assistance of the RO, must provide all relevant information to the CEMD through the FAD.

Ownership of IPs

The institute claims ownership of all intellectual property.

Routes for exploitation

No prioritisation of a specific route.

Responsibility and cost of protection

The protection of IP, either through a patent, copyright, trade secret, trademark, etc, or through any other legal agreement will be carried out through the RO of the institute in collaboration with the creator.

All expenses related to the protection of IP and exploitation of the IP (e.g. for the preparation of an assignment or licensing agreement or the preparation of a business plan) will be covered by the institute.

Responsibility for exploitation

In the case of exploitation of the IP through an assignment or licensing agreement with an existing company, the creator, the FAD and the CEMD will decide by consensus on the details of the agreement.

Compliance with competition rules

IP transfer through the sale or licensing of IP or share allocation to external investors (in the case of spin-off creation) will be based on market terms. The method that they use for selecting a buyer or licensee is a public, transparent and non-discriminatory call for tenders/offers.

Allocation of benefits

The institute allows the sharing with the creator(s) of the net income arising from the IP assignment/licensing agreement as follows: 50% of the net income is given to the creator and 50% is kept by the institute (30% to the creator's department/clinic and 20% to the general budget).

For laboratory personnel directly related with research done during the conception stage, a small portion of the department's/clinic's share, which will

not exceed the rate of 6%, can be distributed among them in equal shares at the decision of the department/clinic head.

Spin-offs

In case of exploitation of the IP through a spin-off/start-up company, the creator and the institute will be responsible for the preparation of a business plan. Then the creator and the institute will seek funding for the new company according to the business plan. The Board of Directors of CING Innovations Ltd and the creator will agree on potential partners, external investors or other players and any issues that may arise until the establishment of the new company. The share distribution in the spin-off company will be distributed between the institute and the creator as follows: The development costs of the project (in case the project is not funded by an external research grant) and expenses directly related to obtaining patent rights will be translated into shares for the institute and the remaining share capital will be further distributed as follows: 50% of the company's share capital to the creator and 50% of the company's share capital to the institute. For laboratory personnel directly related with research done during the conception stage, a small portion of the company's share capital from the institute's share, which will not exceed the rate of 6%, can be distributed among them in equal shares at the decision of the department/clinic head.

This allocation concerns the shares in the company before any investment in the company by the institute, the creator or third parties. Such an investment will result in a dilution of the initial shareholdings. If, in exchange for assigning/licensing the IP to the spin-off company, the institute wishes to receive income from the spin-off company instead of shares, the institute's share in the spin-off company's share capital will be reduced accordingly.

The new company must have its own premises outside the institute.

6.4.7 Laboratories of the Ministry of Agriculture

There is no regulatory framework for the commercialisation of the research results.

7 THE GOVERNANCE OF THE R&I SYSTEM AND THE POLICY MIX FOR TECHNOLOGY TRANSFER

7.1 The governance structure of the R&I system in Cyprus

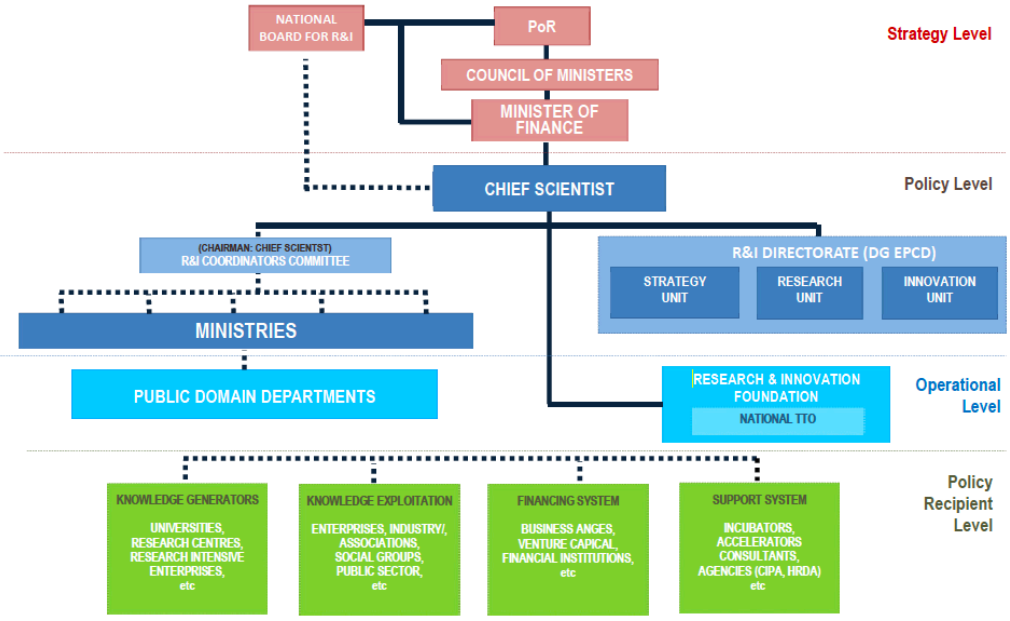
The governance structure of the R&I system of Cyprus changed in 2018 (see Figure 23).

In the new structure, responsibility for the R&I policy is assigned to the Ministry of Finance.

A newly established **National Board for Research and Innovation** (October 2018) of 10 members has been established, which provides advice to the Minister of Finance and to the President of the Republic.

The coordination and promotion of the research and innovation policy is under the responsibility of the **Chief Scientist**, who is appointed by the President of the Republic.

Figure 23: The governance structure of the R&I system in Cyprus



Source: Directorate General for European Programmes, Coordination and Development

Every Ministry appoints a **coordinator for R&I**. The coordinators together compose the **R&I Coordination Committee**, which is chaired by the Chief Scientist.

The **Directorate for Research and Innovation** of the Directorate General for European Programmes, Coordination and Development (DG EPCD) is responsible for the coordination and monitoring of the National Strategy on Research and Innovation and the design and coordination of relevant policies. It also acts as Secretariat to the National Research and Innovation Council and provides administrative support to the Chief Scientist.

The **Research and Innovation Foundation** is the executive arm of the government and is responsible for the funding of research activities. The Chief Scientist is *ex officio* President of the RIF.

7.2 Cyprus's R&I strategy

Cyprus's current strategy for research and innovation of is described in the Smart Specialisation Strategy (S^3CY), which was approved by the Council of Ministers on 26 March 2015.

In 2019, the National Board for Research and Innovation (NBRI) developed the "Cyprus Research and Innovation Strategy Framework 2019-2023" which was presented in public by the NBRI and submitted to the President of the Republic, in May 2019.

Both documents are presented in the following sections.

7.2.1 The Smart Specialisation Strategy

The main goals of the strategy are:

- to improve the effectiveness of the R&I system;
- to improve the competitiveness of the economy and quality of life in Cyprus;
- to contribute to the restructuring of the priority sectors by supporting their modernisation, technological diversification, adoption of new methods for innovation and penetration of new markets.

The strategy directs the resources and activities on the following priority sectors and specific niches:

- **Tourism:** Sustainable tourism, alternative forms of tourism, digital tourism applications, management and promotion of tourism products.
- **Energy:** Renewable forms of energy, solar energy, solar-thermal technology, solar photovoltaic, technologies for solar heating and cooling, energy storage and transfer.
- **Agriculture and Food Industry:** Agricultural and livestock production, agriculture, food security and climate change.
- **Construction industry:** Sustainable urban development, sustainable construction, existing building stock, innovative and intelligent materials and reuse of building materials, cultural heritage.
- **Transportation:** Marine, shipping, intelligent transport systems, road freight.

- **Health:** E-health, prognosis - prevention and treatment of diseases, health pharmaceutical industry.
- **Environment:** Climate change, pollution, ecosystems, eco-innovation, water resources.
- **ICT:** ICT applications, future technologies.

The priority areas will be supported by activities organised under three pillars:

- **I. Smart Growth:** This is at the heart of the strategy and targets the main development challenges in the priority areas. The main types of activities that are supported include multidisciplinary, multi-actor, integrated research projects in the priority areas; development of new research infrastructure and upgrade of existing infrastructure in the priority areas; improvement of access to research infrastructure; support for research activities in companies; support for start-ups; integration of the local research system into the European Research Area and the cultivation of international research links.
- **II. Sustainable R&I System:** Emphasis on the excellence of research and business excellence and improvement in the quality of human resources.
- **III. Modernising the R&I System:** Updating the institutional framework; upgrading the mechanisms that support the RTDI systems; enrichment of the RTDI funding mechanisms.

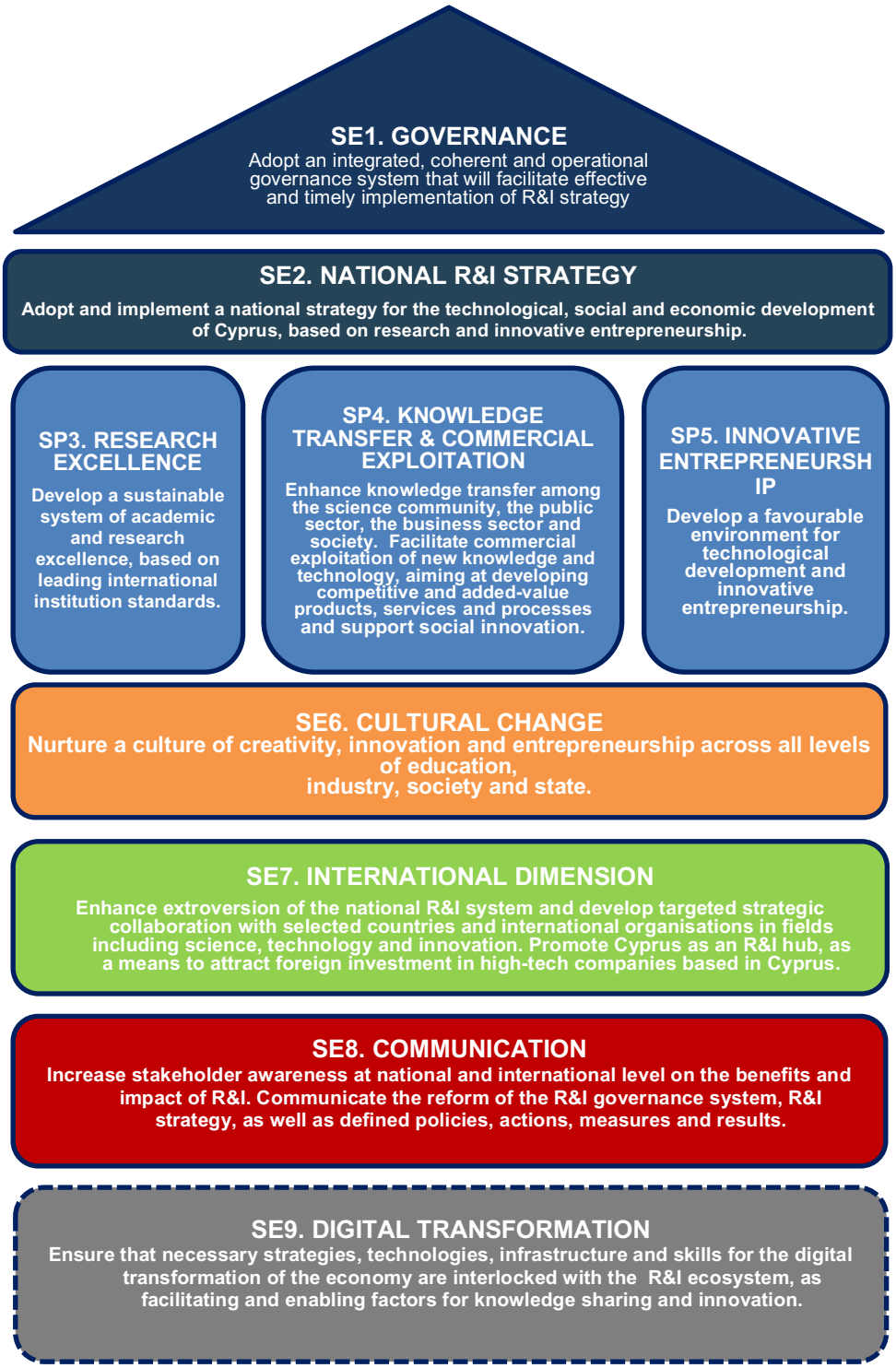
In total, the estimated budget for the strategy amounts to EUR 139.45 million. The main funding instrument for the implementation of the Smart Specialisation Strategy is the RESTART programme of the Research and Innovation Foundation. Additional funding is allocated by the Ministry of Agriculture, Rural Development and Environment and the University of Cyprus.

7.2.2 Cyprus's Research and Innovation Strategy Framework 2019-2023

The strategy sets the vision for "Cyprus to become a dynamic and competitive economy, driven by research, scientific excellence, innovation, technological development and entrepreneurship, and a regional hub in these fundamental areas".

To address this vision, the strategy introduces nine pillars and enablers of strategic importance, as presented in Figure 24.

Figure 24: The main elements of Cyprus's Research and Innovation Strategy Framework 2019-2023



The measures implementing the objectives of the nine pillars are presented in Table 13.

MEASURE	OBJECTIVES
MEASURE	OBJECTIVES
1. GOVERNANCE	
1.1. Operationalise the new governance system	Alignment of all key policies and execution stakeholders in a bottom-up (policy recipients) and top-down approach. Orchestration of all players for a united, uniform and well-balanced ecosystem.
1.2. Establish R&I Ministry Coordinators Committee	Alignment of sectoral / ministry policies and activities relating to R&I with national R&I strategy and enhancing collaboration between ministries and stakeholders of the R&I ecosystem.
1.3. Establish channels for contribution of stakeholders in policy design	Ensure effective contribution of stakeholders in the national R&I ecosystem in policy design.
1.4. Oversight Dashboard	Create a high-level strategy dashboard that will reflect progress towards goals and will capture strategy execution and progression toward its long-term goals. The dashboard will use quantitative and qualitative targets and interim milestones and will allow users to drill down several layers for more information.

Table 13: Measures and actions included in the R&I strategy framework implementation roadmap 2019-2021

2. NATIONAL R&I STRATEGY	
2.1. Define national R&I strategy framework	Adopt and implement a national R&I strategy and operational plan to guide Cyprus's technological, social and economic development.
2.2. Comprehensive national R&I strategy leveraging experience from leading countries, institutions and consultants.	Develop a comprehensive national R&I strategy leveraging the experience & resources of role model countries, leading institutions and consultants worldwide. Develop synergies and collaboration, aiming at gaining insight information of R&I ecosystems and obtaining targeted consultations. Key geographical areas to leverage and collaborate with include Israel, the UK, Greece, Estonia and Finland; others will also be considered as required.
2.3. National target for R&D investment (1.5% of GDP by 2023, 50% from the private sector)	Study the instruments and financial requirements to meet the national targets of R&D investment (1.5% of GDP by 2023 / 50% from the private sector) / Identify leverage points and areas of significant importance. Emphasis will be given on the return on investment (ROI) and economic and social impact of this investment increase, balancing investments vs Return on Investment (ROI) in a sensible and accountable manner.
2.4. Establish a data-based policymaking framework on R&I.	Establish a data-based policymaking framework on R&I. Develop a complete set of metrics (quantitative and qualitative) in R&I to measure performance and impact of national R&I strategy and policies.

2. NATIONAL R&I STRATEGY	
2.5. Update strategy for the smart specialisation of R&I investments	Define strategy and policy measures for increasing the added value of products and services in new and existing sectors through new technology, digital transformation and innovation. This can be promoted through an updated Strategy for Smart Specialisation for Cyprus.
3. RESEARCH EXCELLENCE	
3.1 Increase of the number of researchers and engineers	Develop a critical mass of high-quality personnel in science and engineering that will enable the development of cutting-edge technologies and leading research performance at institutional and national level. Talent in STE(A)M skills is a key prerequisite for sustainable growth, both in academic/research institutions and research-intensive/innovative enterprises.
3.2. Allocation of R&I funds to academic and research organisations receiving public / institutional funding on the basis of research excellence	Introduce a performance (or excellence)-based funding system in publicly funded universities and research institutions in order to provide incentives to increase the scientific performance of the R&I system and concentrate resources in well-performing organisations. This potential improvement in the design of the allocation system should take into account the national context (e.g. the limited number of organisations receiving public funding).
3.3. Create a coherent ecosystem of academic and research institutions built on synergies and collaboration	Promote collaboration and synergies among Cypriot academic and research institutions. Support the success and sustainability of centres of excellence in research to conduct breakthrough research and to liaise with industrial and other partners from Cyprus and abroad.
3.4. Promote R&I funding programmes supporting research excellence and the development of research infrastructure	Promote research excellence and the development of state-of-the-art research infrastructure.
4. KNOWLEDGE TRANSFER – COMMERCIAL EXPLOITATION	
4.1. Open research infrastructure (RI) to business and the public sector	Optimal use of public investment in Research Infrastructure (RI) by facilitating access to national RI from the whole spectrum of potential users ranging from the academia to the research community to the business and the public sector. To this end, it is necessary to proceed by mapping the existing national RI in Cyprus and with the adoption of measures aiming to simplify access procedures and remove any obstacles of a legal or technical nature for potential RI users. Identify RI that can play a central role in the innovation ecosystem, serving as links among the major innovation actors (universities, enterprises, incubators, accelerators, etc) and as a basis to develop clusters and collaboration networks.
4.2. National Knowledge Transfer Office (KTO)	Develop a publicly-funded, national KTO providing academic technology transfer support to the main universities and research organisations of the public and

	private sector in Cyprus. The national KTO will provide a cost-efficient solution for technology transfer in Cyprus, utilising economies of scale and ensuring the development of sustainable expertise based on a critical mass of commercialisation cases.
4.3. Development of vertical and horizontal collaboration networks	Promote the creation of clusters/platforms in five (5) sectors involving academia and enterprises. (First candidate sectors: **Climate** (solar energy, energy storage), **Agrotech** (marine biology, water management, soil tech), **Digital** (fintech, AI, cyber, DLT blockchain), **Health** (biomedical technologies) and **Maritime** / Other sectors may be defined based on the activity area of centres of excellence developed through TEAMING actions of the H2020 and Horizon Europe missions' agenda.
4.4. Evaluation of implementation of the national legislation for public university spin-offs	To adopt a national legislative framework encouraging the creation of spin-offs and start-ups by faculty, research personnel and students in public universities while ensuring transparency and avoidance of conflict of interest and conflict of commitment.
4.5. Promote 'knowledge transfer' as a fundamental mission of universities and research institutes	Enhance knowledge sharing and exploitation of research by promoting the adoption of 'knowledge transfer' as a fundamental mission of public and private universities and research institutes, along with the missions of education and research.
4.6. Adoption of effective institutional IPR policies by universities and research institutes	Promote the adoption of effective IPR policies within all universities and research institutes, facilitating knowledge transfer and research exploitation.
4.7. Enhance mobility of researchers between research centres and enterprises	Enhance mobility / interaction / integration of researchers among university, research centres and enterprises to support knowledge transfer and cross-fertilisation of ideas, use cases and projects.
4.8. Promote social innovation and entrepreneurship	Enhance social impact of R&D investment by promoting exploitation of knowledge through alternative forms of innovation, such as social innovation and entrepreneurship.
4.9. Promote funding programmes supporting participation of enterprises in R&D activities and collaboration between academia and industry	Promote participation of enterprises in R&D activities and R&I collaboration among stakeholders from academia, industry, NGOs and the public sector.
4.10. Promote funding programmes supporting exploitation of research results	Support research exploitation through the support of preparatory actions for the commercialisation of research results in research organisations and enterprises
4.11. Promote funding programmes supporting the protection of IPR	Promote the protection of IPR, patenting and copyright emerging from research activity, including identification, protection and managing stages of IPR.

5. INNOVATIVE ENTREPRENEURSHIP	
5.1. New financial instruments for promoting private investment in R&D, high-tech entrepreneurship and start-ups	Enhance funding sources for R&D investment, start-ups and entrepreneurial innovation through new financial instruments & tax incentives / Facilitate development of high-risk capital funds.
5.2. New funding programmes for start-ups and entrepreneurial innovation	Enhance funding sources for start-ups and entrepreneurial innovation through public funds, building on the experience of previous funding programmes.
5.3. Promote the exploitation of research results of EU and national funded grants by enterprises through creation of spin-off / spin-out companies.	Enhance exploitation of research results emerging from EU programmes, national grants and other funding sources through the creation of spin-off / spin-out companies.
5.4. Incentives for accelerators and incubators	Develop high quality and sustainable support structures (business incubators, accelerators, innovation hubs, co-working spaces) providing services to start-ups and high-technology innovative enterprises.
5.5. Evidence-based policy suggestion regarding the development of a Science Technology Park (STP)	Develop an evidence-based suggestion on the most successful and effective way to approach the development of an STP, exploring also other alternatives (such as innovation hubs, virtual STPs, etc).
5.6. Enhance innovation management capacity of enterprises	Enhance innovation management capacity of start-ups and enterprises through high quality consulting, coaching and mentoring.
6. CULTURAL CHANGE	
6.1. Promote innovation and entrepreneurship culture in universities/ research centres	Mobilise academia and research centres to introduce entrepreneurship measures in their institutions.
6.2 Promote creativity and entrepreneurship in elementary and secondary education	Promote entrepreneurial culture in the educational system through the cultivation of entrepreneurial skills and developing thinking among both students and teachers. To this end, close cooperation with the Ministry of Education and Culture and the Ministry of Energy, Commerce and Industry is needed.
6.3 Increase public awareness on R&I	Promote actions that will increase public awareness regarding the importance of science, research, innovation and entrepreneurship. This should be supported by a purposefully crafted promotion and communication plan that will facilitate the branding of the country as well as disseminate an R&I mindset throughout society.
6.4 Promote research and innovation culture to policy makers	Nurture research and innovation culture to public organisations and civil servants and promote flexibility, efficiency and effectiveness in working procedures, collaboration processes and managing models in the public sector.

6.5. Achieve cultural change in businesses	Procure services to develop an action plan for a change of culture in traditional industries.
7. INTERNATIONAL DIMENSION	
7.1. Update of the start-up visa scheme	Apply necessary changes to the current ''Cyprus Start-up Visa'' Programme to improve effectiveness and scope.
7.2. Incentives to attract foreign high-tech companies	Incentives (tax incentives, facilitation etc) can be provided in order to attract foreign high-tech companies to Cyprus. This will enable the transfer of R&D and high-tech production activities to Cyprus, having numerous positive effects for the Cypriot economy.
7.3 Implement practical collaboration initiatives with specific geographical areas	Promote targeted strategic collaboration in R&I with specific countries with successful innovation ecosystems, building on synergies and enhancing potential impact and mutual benefit. Leverage existing intergovernmental agreements and enrich as required. Start with Israel and the UK and then expand /scale up.
7.4. Promote funding programmes supporting extroversion and international collaboration in R&I	Promote extroversion of Cyprus's R&I system through the participation of Cypriot researchers, organisations and enterprises in R&I activities with an international dimension.
7.5. Enhance Cyprus's participation in European and international R&I programmes and initiatives	Enhance European and international collaboration of Cypriot researchers, organisations and enterprises in R&I activities.
8. COMMUNICATION	
8.1 Communication strategy	Develop an effective communication strategy that will increase public and R&I stakeholder awareness of the reform of the national R&I ecosystem and R&I strategy and policy
8.2 Science/ economic diplomacy	Promote the development of scientific collaboration with other countries (in particular strategic partners and neighbouring countries) to address common challenges and build international partnerships. To this end, close cooperation with MECI and the Economic Diplomacy Unit of MFA is needed. Regarding R&I (and science), which is one of the most important sectors/pillars, the Economic Diplomacy Unit's role, in cooperation with Cypriot embassies all over the world, is to facilitate events and coordinate visits etc.
9. DIGITAL TRANSFORMATION	
9.1 National strategies relating to digital transformation interlocked with R&I strategy and ecosystem	Interlock National Digital Strategy and e-Government Strategy with R&I and establish communication channels between the R&I ecosystem and stakeholders relating to the implementation of these strategies.

9.2 Address new requirements in skills and competencies for digital transformation	Contribute to the development of the skills and competencies required to support the fast pace of technology adoption and disruption in business models and the labour market.

7.3 The funding instrument for R&I

The main funding instrument for research and innovation in Cyprus for the period from 2016 to 2020 is the Framework Programme RESTART of the Research and Innovation Foundation.

The RESTART Programme consists of 25 Programmes and will run through the period 2016-2020. It has a total budget of around EUR 117 million and is co-funded by the European Regional Development Fund (ERDF).

The structure of RESTART and the relevant budget per measure is presented in Table 14.

Several of the measures under RESTART contribute directly or indirectly to support for science-industry collaboration. An analysis of the policy mix is presented in the following section.

Table 14: Structure and budget of the Framework Programme RESTART 2016-2020

Pillar	Section	Programme	Budget (EUR)	Investment priority	Special objective
PILLAR I Smart Growth	R&I Partnerships	Integrated Projects	20.000.000	1b	1.b1
	Infrastructures	New Strategic Infrastructure Units - Young Scientists	11.000.000	1a	1.a1
	Participation of Enterprises	Research in Enterprises	9.300.000	1b	1.b1
		Research in STARTUPs	1.000.000	1b	1.b1
		Proof of Concept for Technology/Knowhow Applications	1.000.000	1b	1.b1
	Extroversion - Open Horizons	Bilateral Collaborations	1.600.000	N/A	N/A
		International Collaboration - Dual Targeting	1.200.000	N/A	N/A
		EUREKA Cyprus	1.200.000	N/A	N/A
		European Initiatives - National Development	8.000.000	N/A	N/A
PILLAR II Sustainable RTDI System	Excellence	Excellence Hubs	17.100.000	1a	1.a1
		EUROSTARS Cyprus	2.500.000	N/A	N/A
		Creation and Initial Development of STARTUPs with international Orientation (PRE-SEED)	4.000.000	1b	1.b1
		Developmentof Internationally Competitive Innovative Products and Services by STARTUPs (SEED))	4.000.000	1b	1.b1

Pillar	Section	Programme	Budget (EUR)	Investment priority	Special objective
		Development and Promotion of Internationally Competitive Innovative Products and Services by Existing Enterprices (INNOVATE)	10.000.000	1b	1.b1
	New Researchers, New Ideas, New Opportunities	DIDAKTOR (Post-Doctoral Researchers)	9.400.000	1a	1.a1
		Horizon 2020 - 2nd Opportunity	5.500.000	1a	1.a1
		Social Innovation	1.500.000	1b	1.b1
PILLAR III Transformation of RTDI system	Suppoprt Mechanisms	Innovation Vouchers	260.000	1b	1.b1
		Industrial Property	400.000	1b	1.b1
		Participation in international Brokerage Events	140.000	N/A	N/A
		Encouragement of Project Coordination in Horizon 2020	1.000.000	N/A	N/A
	Alternative Forms of Funding	Commercial Exploitation of Research Results	Stage A: 270.000 Stage B:1.000.000	N/A	N/A
		Commercial Exploitation of Research Results by Enterprises	Stage A: 270.000 Stage B:1.000.000	1b	1.b1
		Complementary Funding	4.000.000	N/A	N/A
	Culture	Nurturing an RTDI Culture	500.000	N/A	N/A

7.4 The policy mix for technology transfer

The collaboration of businesses with the research sector is among the national priorities of R&I policy. The Smart Specialisation Strategy has suggested several measures, which have been included in RESTART for financing, that could directly or indirectly encourage and support the collaboration. In addition to the funding, the government implemented changes in the regulatory framework and took initiatives to lift some of the existing barriers to collaboration.

The existing policy mix includes institutional changes, policy measures and funding instruments across the following dimensions (Table 15):

- Management of intellectual property rights in public research and the commercialisation of research results
- Support for collaborative research
- Improvement of the intersectoral mobility of human resources

- Support for industrial research and innovation with the possibility of collaborating with public research organisations
- Infrastructure supporting innovation and science-industry collaboration.

Table 15: Overview of the policy mix for support for science-industry collaboration

Policy dimension	Policy/measure	Type	Budget (EUR 000)
Management of the intellectual property rights and commercialisation	Change the laws of universities to allow them to commercialise IPs and set up spin-offs	Legislation	
	New IP box regime adapted to OECD-EU standards	Legislation	
	Industrial property	Grants	400
	Proof of concept for technology and knowhow applications	Grants	1 000
	Commercial exploitation of research results by enterprises	Grants	1 270
	Commercial exploitation of research results by research organisations	Grants	1 270
	Participation in international brokerage events	Grants	140
Support for collaborative research	Integrated projects	Grants	20 000
	Innovation vouchers	Vouchers	260
Intersectoral mobility	University-Industry Liaison Offices	Infrastructure	
	Didactor	Grants	9 400
Industrial research with possibility of collaborative research	EUROSTARS Cyprus	Grants	2 500
	EUREKA Cyprus	Grants	1 200
	Research in enterprises	Grants	9 300
	Research in start-ups	Grants	1 000
	Social innovation	Grants	1 500
Infrastructure supporting research and science-industry collaboration	Set-up of three centres of excellence	Infrastructure	National: 15 000 EU: 15 000

7.4.1 Management of intellectual property rights in public research and commercialisation of research results

The details of the regulatory changes in this area have already been discussed in chapter 6.

The main changes in the **regulatory framework** in this area are the changes of the regulation for the public universities, which now allow them to commercialise their research results and establish spin-off companies (see details in sections 6.3 and 6.4). The existing framework is quite generic and allows the universities to create their own institutional regulations for the management and exploitation of their IPs. In addition, the government encouraged universities to provide incentives to the university staff for collaborating with industry.

In 2016, the government changed the **IP box regime**, which provides financial incentives for companies for filing patents in Cyprus that had been introduced back in 2012.

The old regime covered a very long list of IP types, in addition to those protected by patents, copyrights and trademarks, and very favourable incentives. Under the regime, a notional deduction of 80% was applied to the net income and gains derived from the IP. The remaining 20% was subject to 12.5% income tax, which resulted in an overall tax of only 2.5% on the profits from IPs. In practice, the rate could be even lower if other deductions were applied.[11]

The regime changed in October 2016 in order to align with the recommendations of OECD Action 5 of the Base Erosion and Profit Shifting (BEPS) plan on Countering Harmful Tax Practices More Effectively, Taking into Account Transparency and Substance, and the practices of the other Member States. The new legislation adopted the 'nexus approach' recommended by the OECD. As per this approach, the benefits of the regime are linked to the R&D expenditure incurred by the applicant and thus it limits the application of the regime if the R&D is outsourced to related parties. With this approach, holding companies established in Cyprus cannot benefit from the IP box regime for research results that have been produced in other countries.

According to the new IP box regime, qualifying taxpayers will be eligible to claim a tax deduction equal to 80% of the gross income from the use of the IP (the qualifying assets).[12] Contrary to the old regime, the new IP box applies only to patents and patent equivalents, copyrighted software, utility models and other IP assets that are non-obvious, useful and novel. Business names (including brands), trademarks, image rights and other intellectual property rights used to market products and services are not considered as qualifying assets.

In order to be regarded as qualified, all assets should be certified by a relevant authority either in Cyprus or abroad.

In addition to the regulatory changes and the improvement of the financial incentives, RESTART supports the patenting and commercial exploitation of research results with three measures:

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[11] https://www.ey.com/gl/en/services/tax/international-tax/alert--cyprus-introduces-new-rules-for-application-of-ip-box-regime

[12] http://www.mondaq.com/cyprus/x/714226/Trademark/The+Cyprus+IPBox+Regime

- **Industrial property**: The measure provides grants for patenting IPs resulting from research funded by the applicant's own means or through programmes launched by the RIF, the EU or other research funding agencies. The main beneficiaries of this programme are research organisations or companies. The budget is EUR 400 000. The funding covers 50% of the eligible cost up to EUR 10 000 per project.
- **Proof of Concept for Technology/Knowhow Applications:** It supports the investigation of possible industrial applications of a technology or knowhow. The measure supports technologies/knowhow in the priority areas of the Smart Specialisation Strategy. Beneficiaries are enterprises. The budget is EUR 1 000 000 . The funding covers 70% of eligible expenses, up to EUR 25 000.
- **Commercial Exploitation of Research Results by Enterprises**: The measure supports Cypriot enterprises to commercialise their research results generated by research projects which were funded by the RIF. The measure has two stages:
  - **Stage A**: Supports the development of a business plan for the commercial exploitation of results. The projects may include a feasibility study and/or the following activities:
    - Protection of IPRs and licensing agreements
    - Technology and knowhow transfer activities
    - Measurements, tests and analyses
    - Access to research infrastructure and databases.
  - **Stage B:** Provides funding for activities for the commercial exploitation of research results by a high-tech start-up company established by a private, independent investor. The funding supports all the activities of the start-up.

  Budget for Stage A: EUR 270 000. Budget for Stage B: EUR 1 000 000. The funding for stage A covers up to 50% of the eligible costs, up to EUR 30 000.
- **Commercial Exploitation of Research Results by Public Research Organisations**: The measure supports Cypriot public research organisations in commercialising their research results generated by research projects which were funded by the RIF. The measure has two stages:
  - **Stage A**: Supports the development of a business plan for the commercial exploitation of results. The projects may include a feasibility study and/or the following activities:
    - Protection of IPRs and licensing agreements,
    - Technology and knowhow transfer activities,
    - Measurements, tests and analyses,
    - Access to research infrastructure and databases.
  - **Stage B:** Supports the setting up of a new company which will exploit the IPs according to a business plan. Stage B could be a continuation of a project supported in Stage A or new entry projects. The funding supports all activities of the start-up.

  Budget for Stage A: EUR 270 000 . Budget for Stage B: EUR 1 000 000. The financial support covers 80% of the eligible expenses, up to EUR 30 000 per project. Funding for Stage B is equal to the amount invested by a private investor, up to EUR 250 000.

- **Participation in international brokerage events:** Cypriot entities will be supported in participating in brokerage events in order to explore opportunities for commercialising research results of Cypriot origin that cannot be commercialised in the local market as well as identifying technologies and technical knowhow which are not available in Cyprus. Beneficiaries are companies and any type of research organisation. The budget is EUR 140 000. The funding is EUR 900 per participant.

7.4.2 Support for collaborative research

This policy area includes the following measures in a total budget of EUR 20.26 million:

- **Integrated projects**: The measure provide grants for the implementation of large, interdisciplinary multi-actor projects aiming at addressing major challenges in the priority areas of the Smart Specialisation Strategy. The main beneficiaries are research organisations and enterprises. The projects must necessarily include industrial research and/or experimental development activities. They may also include fundamental research activities. The budget is EUR 20 000 000. The grants cover up to 70% of the eligible costs, up to EUR 1 000 000 per project.
- **Innovation vouchers**: The measure aims to introduce SMEs to the concept of innovation and to encourage cooperation between enterprises and knowledge intensive organisations. The main beneficiaries are enterprises. There are two types of vouchers:
  - Voucher A – (EUR 2 500) supports:
    - Consulting services for the development of technological applications
    - Consulting services for technology transfer and technical knowhow
    - Techno-economic studies for innovative products and services.
  - Voucher B – (EUR 5 000) supports:
    - Measurements, tests and analyses
    - Access to research infrastructure and databases
    - Secondment of highly qualified research personnel from research/academic organisations to carry out innovation projects
    - Prototype design and construction.

  The budget is EUR 260 000.

7.4.3 Improvement of the intersectoral mobility of human resources

Intersectoral mobility of human resources is a crucial enabler of the knowledge transfer from research organisation to industry and vice versa. Currently, the possibilities for mobility are restricted to internships of students in companies. The placement of students in companies is supported by the liaison offices and is a measure supporting post-doctoral students:

- **University-Industry Liaison Offices**. The measure provides support to existing liaison offices established in all public and private universities to continue their operation until 2020.
- **Didactor**: This is a post-doctoral researchers' programme aiming at integrating young, post-doctoral scientists in the Cypriot research system and addresses the brain drain challenge which has increased in recent years due to the weak financial situation of the country. Under the scheme, PhD holders from industry or academia can undertake post-doctoral research in research organisations. The proposed projects must fall within one of the below three scientific fields: Life Sciences, Physical Sciences and Engineering, and Social Sciences and Humanities. The main beneficiaries are research organisations, enterprises and other organisations. Project activities may include fundamental and/or industrial research or experimental development. The budget is EUR 9 400 000. Maximum funding per project comes to EUR 160 000 for life sciences and physical sciences and engineering projects, and EUR 120 000 for social sciences and humanities projects.

7.4.4 Support for industrial research and innovation with the possibility of collaborating with public research organisations

Several of the measures included in RESTART, amounting to a budget of EUR 13 million, support research in enterprises and, despite the fact that collaboration with research organisations is not among their goals, they provide the opportunity for such collaboration:

- **EUROSTARS Cyprus and EUREKA Cyprus**: Cypriot companies and research organisations are provided with support to participate in transnational projects of the EUROSTARS and EUREKA Joint European Programme. The programme, which has 34 European participating countries, is an initiative of EUREKA, under Article 185. EUROSTARS supports:
  - top level technology projects which aim at the commercial exploitation of the research results,
  - aiming at the development of innovative products, processes or services.

  The projects must include industrial research and/or experimental development activities. The main beneficiaries are research organisations and enterprises. The budget for both instruments is EUR 3 700 000, with a maximum funding of the Cypriot participants of EUR 175 000 per project. The maximum aid intensity cannot exceed 70%.

- **Research in Enterprises**: The measure provides grants for research in enterprises for the development of process or product innovations. The programme covers a wide range of industrial research and experimental development activities such as the production of prototypes, demonstration, pilot operation, testing and validation of new or significantly improved products and production methods. The projects must be applicable in one of the priority sectors of smart specialisation. The main beneficiaries are enterprises and research organisations. The budget is EUR 9 300 000, with maximum funding per project of EUR 200 000. The maximum aid intensity for this cannot exceed 70%.

- **Research in Start-ups**: The measure aims at enhancing the capacity of the research and innovation capacity of start-ups. The supported activities include experimental development, the production of prototypes, demonstration, piloting, testing and validation of innovative processes and products. The projects must be applicable in one of the priority areas of the Smart Specialisation Strategy. The main beneficiaries are start-ups and research organisations. The budget is EUR 1 000 000, with maximum funding per project of EUR 50 000. The aid intensity for the start-up acting as a host organisation is 85%. The maximum aid intensity for enterprises and other private sector organisations cannot exceed 70%.
- **Social Innovation**: The measure supports research projects aiming at developing products, services, technologies, models and strategies addressing social challenges and contributing to the establishment of relationships and collaboration between social organisations and other stakeholders. The main beneficiaries are research organisations, enterprises and other entities. The budget comes to EUR 1 500 000, with maximum funding per project of EUR 100 000.

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ANNEX 1: RESEARCH INFRASTRUCTURE IN CYPRUS

Public universities

University of Cyprus[13,14]

The University of Cyprus was established in 1989. It is governed by the University Council, which comprises both members appointed by government and university-elected members, and the Senate, where members are senior academic staff. The official languages are Greek and Turkish. Teaching is mainly in Greek.

It offers a range of undergraduate, postgraduate and professional study programmes. It has 8 faculties, 22 departments, a centre of excellence, 11 research units, 2 institutes and 15 organisational entities. It also offers training and lifelong learning programmes.

In the academic year 2016-17 the total number of students was close to 6636 (4847 undergraduates and 1789 graduate students). During the same academic year, 1199 undergraduates and 472 postgraduate students were admitted, while 1200 undergraduate and 600 postgraduate students were expected to graduate.

It is staffed by 356 academic staff members, 57 specialised education staff members, 190 special scientists and 465 administrative staff.

The financial support from the annual state budget amounts to 57% while the remaining 43% is financed by its own revenues. Undergraduate studies are offered free of tuition fees while fees for graduate studies (master's and PhD levels) are supported by a grant-aided system.

Among the **strategic goals** of the university, according to the university's 2016-2025 strategy, is to develop links with the business community and to contribute to the economy. More specifically:

- Connecting with industry:
  - Interconnect research activities and innovation with entrepreneurship and the needs of society.
  - Develop strategic partnerships with universities, research centres, museums, institutes, cultural institutions and businesses.
  - Optimal use of copyright and patents (cooperatives, spin-offs and start-up companies).
- Developing entrepreneurship.

[13] University of Cyprus: Strategic Plan 2016-2025

[14] http://www.ucy.ac.cy/en/

- Attracting international investment in Cyprus and engaging in strategic partnerships with local and international companies.
- Supporting the business efforts of students and graduates.

The university has **eight faculties**:

- Faculty of Humanities: three departments and the Language Centre
- Faculty of Pure and Applied Sciences: five departments and the Oceanography Centre
- Faculty of Social Sciences and Education: four departments and the Centre for Gender Studies
- Faculty of Economics and Management: two departments, the Economic Research Centre and the Centre for Banking and Financial Research
- Faculty of Engineering: four departments, the Nanotechnology Research Centre, the KIOS Research and Innovation Centre of Excellence (see section on Teaming infrastructure) and the NIREAS International Water Research Centre
- Faculty of Letters: three departments and the Archaeological Research Unit
- Faculty of Graduate Studies
- The Medicine School.

A number of **research centres and research units** operate at the University of Cyprus as independent, non-profit organisations:

- The Archaeological Research Unit (ARU) of the University of Cyprus was founded in 1991. Its primary aims were to conduct active research and to teach the ancient culture of Cyprus and neighbouring civilisations in the Mediterranean.
- The Neo-Hellenic Petronas School has been operating since 2010 as a centre of study and research in modern Greek literature.
- The Research Centre for Sustainable Energy (FOSS) focuses on the research and technological development activities in the field of sustainable energy within Cyprus and at international level, with the aim of contributing to the achievement of the relevant energy and environment objectives set out by Europe.
- Nireas-IWRC was founded in 2010 and is focusing on the development of cutting-edge water technologies and the dissemination of water-related technologies to the public, accessible to citizens and practitioners alike.
- The EMPHASIS Research Centre is focussed on encompassing the Key Enabling Technologies (KETs) of ICT, namely electronics, sensors, nanotechnology, microwaves and photonics and thus enabling the development of a substantial high-technology sector in the Cypriot economy.
- The Centre for Applied Neuroscience is a premier research centre for applied neuroscience and the study of human behaviour in Cyprus.

- The Research Centre for Gender Studies at the University of Cyprus is an Interdisciplinary Research Centre for Gender Studies.
- The Economics Research Centre of the University of Cyprus (CypERC) is an independent non-profit research institution aiming at high quality policy-oriented research in economics.
- The Centre for Banking and Finance was established in 1993 as an independent research institution within the School of Economics and Management.

Cyprus University of Technology[15]

The Cyprus University of Technology (CUT) was established in 2004. It is based in Limassol, the second largest city in Cyprus.

Master's tuition and fees: EUR 4100 and International tuition: EUR 7200. The university also provides PhD programmes with training and tuition and fees which range from EUR 3234 to EUR 5200.

The **exploitation and dissemination** of the results and the support of entrepreneurial activities are among the main objectives of the CUT. More specifically, the relevant strategic dimensions described in its 2016-2020 Strategic Planning are as follows:

- Exploitation and dissemination of research results
  - Publications in international high-ranking journals
  - Exploitation of research results in collaboration with businesses
  - Patenting of research results
  - Set up of spin-offs
- Linking research with innovation, entrepreneurship and societal needs
  - Development of strategic collaboration with other universities, research centres and companies
  - Provision of consulting services to the public and private sectors
  - Utilisation of the research infrastructure by public and private entities to perform experiments and analyses.

In order to meet the above strategic goals, the CUT has created the necessary regulatory framework and rules for protecting and licensing IPs and collaborating with companies[16]. Support for the patenting and commercialisation of research results is provided by the Innovation and Technology Transfer Office (INTENT), which is responsible for the implementation of the CUT policy on protection, ownership, transfer and commercial exploitation of IPs.

15 http://www.cut.ac.cy/

16 http://web.cut.ac.cy/ipcut/wp-content/uploads/sites/41/2015/09/INTENT-IP-Innovation-and-Technology-Transfer-Policy-Approved-by-Senate1.pdf

So far, eight patents have been registered by academics from the university.

At present, the university consists of **six faculties** and a Language Centre:

- Faculty of Geotechnical Sciences and Environmental Management, which includes:
  - Department of Agricultural Sciences, Biotechnology and Food Science
  - Chemical Engineering Programme in collaboration with the Department of Engineering and Technology.
- Faculty of Management and Economics has two departments and one programme:
  - Department of Hotel and Tourism Management
  - Department of Commerce, Finance and Shipping
  - Interdisciplinary Management Programme.
- Faculty of Communication and Media Studies
  - Department of Communication and Internet Studies
  - Department of Public Communication.
- Faculty of Health Sciences includes:
  - Department of Nursing
  - Department of Rehabilitation Sciences
  - Cyprus International Institute for Environmental and Public Health.
- Faculty of Fine and Applied Arts has two departments:
  - Department of Multimedia and Graphic Arts
  - Department of Fine Arts.
- Faculty of Engineering and Technology:
  - Department of Electrical Engineering, Computer Engineering and Informatics
  - Department of Mechanical Engineering and Materials Science and Engineering
  - Department of Civil Engineering and Geomatics.
- Language Centre.

A number of research centres, research units and laboratories operate at the CUT:

- The Eratosthenes Research Centre is the first established research Centre within the CUT and is specialised in earth observation and geo-information activities with a focus on Remote Sensing and the Geo-Environment. This centre was established in 2007.

- The RCDS Robotics Control and Decision Systems Laboratory researches and develops systems that sense, perceive and act autonomously. The lab is part of the Mechanical Engineering and Material Science and Engineering Department of the CUT. The lab has facilities for aerial and mobile robotics and facilities for underwater robotics.
- The Archimedes Solar Energy Laboratory (ASEL) is a research lab based in the CUT that deals with research in all areas related to the exploitation of solar energy.
- The Molecular Electronics and Photonics Research Unit of the CUT provides modern and well-occupied experimental facilities on material synthesis, advanced characterisation, interfaces and processing of solution processed electronic materials and devices.
- The Research Unit for Nanostructured Materials Systems focuses on materials related problems pertinent to the economically important local industries and targets spearheading the efforts at future growth through the development of innovative materials systems.
- The Nano/Micro Mechanics of Materials Laboratory is located in the Department of Mechanical Engineering and Materials Science and Engineering at the CUT. It utilises and develops advanced experimental and computational micro- and nano-mechanical tools for materials explorations.
- The Device Technology and Chemical Physics Laboratory focuses on cutting edge research projects in the field of nano-engineered organic electrophotonic devices by combining expertise in the study of physico-chemical properties of organic materials and the processing of nanostructured composites via solution-based processing protocols with advanced spectroscopic and electro-optical characterisation techniques and with the smart engineering of device architectures.
- The Cyprus Interaction Lab (CIL) of the Department of Multimedia and Graphic Arts of the CUT is an interdisciplinary research lab which specialises in Educational Technology and Human Computer Interaction. The lab was co-founded in 2011. Thematic areas of CIL research:
  - Embodied Play and Learning using Technology,
  - Interaction Design and Creative Collaboration Spaces,
  - Inclusive Design and Social Change using Technology.

Open University of Cyprus[17,18]

The Open University of Cyprus (OUC) is the only distance learning university in Cyprus. It is the first and only Higher Education Institution in Cyprus that provides open and distance education at undergraduate and postgraduate level. The Open University of Cyprus is the second state university of the Republic of Cyprus. The university was established in 2002.

The OUC's main educational tool is the eLearning Platform – eClass – that facilitates online teaching and learning through the establishment of virtual classrooms, supports, lecture capture, live and video on demand lectures and tutorials, and integrates real time and asynchronous collaboration tools.

Since 2018, 5800 students have graduated from the OUC. The total enrolment in the 2018-2019 academic year came to 4100 students. The enrolment of students per programme in 2018 was as follows:

- Bachelor's degree: 43.2%
- Master's degree: 55%
- PhD students: 1.6%
- Training programmes: 0.2%.

It is **staffed** by 25 faculty members, 350 adjunct tutors and 84 administrative personnel.

The **budget** of the OUC for 2018 was EUR 11.8 million, including a government grant of EUR 5.73 million.

The official teaching language is Greek. However, the university also offers five master's programmes in English. In total , the university offers four bachelor's degrees, 20 master's degrees and 12 PhD Programmes. The OUC offers programmes at both bachelor's and master's level, in Greek and in English, in its **three faculties**:

- Faculty of Humanities and Social Sciences
- Faculty of Pure and Applied Sciences
- Faculty of Economics and Management.

Despite its distance-learning character, the OUC's ambition is to establish itself as a growing player in basic and applied research and in securing national,

17 https://www.ouc.ac.cy/web/guest/university/news/versions?p_p_id=bs_documents&p_p_action=1&p_p_state=exclusive&p_p_mode=view&p_p_col_id=column-2&p_p_col_pos=1&p_p_col_count=2&doAsUserId=cozjtrta%3F_bs_bookmarks_azfilter%3DP*&_bs_documents_struts_action=%2Fext%2Fdocuments%2Fget_file&_bs_documents_mainid=19759&_bs_documents_loadaction=view

18 https://www.ouc.ac.cy/

European and international research funding. In doing so, it has established **five research laboratories**:

- The Lab for Educational Technology conducts research and publishes in the areas of open and distance learning and its methodologies, internet safety, mobile and adaptive learning, human machine interaction and ICT utilisation in school education.
- The Terrestrial Ecosystems Management (TemLab) Laboratory focuses on ecosystem management coupled with landscape ecology principles, namely the importance of spatial configuration of ecological processes and the emphasis on larger spatial extents.
- The Telecommunication Systems Research Laboratory (TSRL) investigates the state-of-the-art research areas in wireless communications and supports teaching activities at the OUC.
- The Computational Cognition Lab targets their research on cognitive processes which are often associated with individual or collective intelligence - such as learning, reasoning, sensing, communication, cooperation - and how these are employed by humans and other organisms in everyday life.
- The Laboratory of Chemical Engineering and Engineering Sustainability.

In order to support its research activities and strengthen its cooperation with businesses, the OUC has established a **Liaison Office** providing services in the following areas:

- technology transfer
- promotion of applied research responding to specific industrial problems
- collaboration in research programmes
- placement of students in industry.

Private Universities

Frederick University[19]

Frederick University is a private university in Cyprus. It offers undergraduate and graduate programmes on two campuses, one in the capital of the island Nicosia and the other in Limassol. Frederick University was established in 2007. The university offers a broad range of academic programmes of study in the areas of Science, Engineering, Business, Arts, Architecture, Media, Humanities, Health, and Education. The main focus of the university is academic research. Undergraduate tuition and fees come to around EUR 8160 and postgraduate tuition comes to around EUR 9000 while PhD programmes cost between EUR 9900 and EUR 13 500.

To facilitate the continuous expansion of research activities at the university and to promote the principle of equal opportunities in all faculties (equal access to information and resources) and independence of research work, Frederick

19 http://frederick.ac.cy/

University has developed the necessary policies, management services and structures.

The university has the following research institutes:

- **The Frederick Research Centre (FRC)** is a non-profit research organisation established in 1995 with a focus on the scientific research activities of Cypriot and foreign scientists. The main thematic areas of the FRC: Applied Sciences & Engineering, Materials Sciences & Applications, Energy, Sustainable Development & Environment, Medical Technology & Public Health, Social Sciences & Economics, Education.
- **The Frederick Institute of Technology (FIT)**[20] is one of the largest private institutions in the Republic of Cyprus. It offers a broad range of diploma, degree and master's courses in the areas of science, business, tourism, arts, media and education. The FIT was founded in 1965. The FIT has two campuses, one in Nicosia and the other in Limassol. Tuition fees at the Frederick Institute of Technology vary between EUR 5190 and EUR 6300.

The European University[21]

The European University Cyprus (EUC) evolved out of Cyprus College, which is the oldest higher education institution in Cyprus and was established in 1961. The institution has a student enrolment of more than 6000 and provides internationally recognised undergraduate, graduate and doctorate degrees. The European University Cyprus has five schools: The School of Humanities, Social and Education Sciences, the School of Business Administration, the School of Sciences, the School of Law and the School of Medicine. In addition, the European University Cyprus operates a Distance Education Unit.

The European University Cyprus has been awarded with the Investors in People Silver accreditation in the Investors in People Standard, demonstrating its commitment to high performance through good people management. The university currently engages more than 600 employees in its academic and administrative functions. The European University Cyprus was awarded with the Erasmus Charter for Higher Education for the whole period of the Erasmus + Programme (2014-2020). The EUC International Hub is responsible for the coordination of the Erasmus+ programme and works towards achieving the objectives of the programme.

The university has the Distance Education Unit, which offers programmes leading to master's degrees and other specialisation courses. The Distance Education Unit was established in 2013 with the aim of offering easy access to education opportunities to a wide number of people who are not able to attend a face-to-face programme/course.

The university has an impressive list of research centres:

20 http://www.fit.ac.cy/

21 https://www.euc.ac.cy/

- The Centre for Risk and Decision Sciences (CERIDES) is the first cross-disciplinary, cross-school centre of excellence of the European University Cyprus. The centre implements horizontal research activities in scientific areas related to the fields of Risk and Decision Sciences.
- CESMATSE is an interdisciplinary research centre serving the economy, society and the environment.
- The EUC-PEAK Innovation Centre aims to research, support and accelerate efforts relating to entrepreneurship, business innovation and knowledge transfer. The Innovation Centre works with local SMEs, the industrial and manufacturing community, students, stakeholders and public authorities to encourage the adoption of an entrepreneurial mindset, practices and skills and to foster high-level research and development in this area, as well as the adoption of research in the business community.
- The Assistive Technology Lab is a collaboration between the Department of Education Sciences and the Department of Health Sciences (Programme of Occupational Therapy). The lab focuses on the interdisciplinary nature of the Assistive Technology field and aims at the development and implementation of innovative and effective approaches to research, instruction, learning and rehabilitation with the use of assistive technology for people of all ages with disabilities.
- The Centre for the Study of Childhood and Adolescence facilitates, coordinates and conducts pioneering research on children and adolescents.
- The ICTEE is committed to promoting the best in educational technology by conducting high-quality research that can stimulate effective innovations and improved learning outcomes.
- The Cultural Studies and Contemporary Arts Laboratory is unique in its mission to engage in innovative and cutting-edge research in areas cutting across and combining various fields of study such as art history, museum and curatorial studies, media and cultural theory.
- The Inquiry in Science and Maths Education Research Group was established in 2010. Its main focus is to work with education stakeholders in Cyprus – public and private education, teacher communities and educational institutions and services – to contribute towards the building of the necessary foundations to encourage innovative approaches in research, teaching and learning in STEM education.
- The SMRC conducts basic and translational biomedical research on diseases prevalent in Cyprus and the surrounding regions (Eastern Mediterranean and Middle East). Specifically, the centre focuses on Cancer Biology, Cardiovascular Biology, Genetics and Genomics, Neurodegenerative diseases and Rehabilitation, Endocrinology, Obesity and Diabetes, Infectious Diseases, Environmental Diseases, and Stress and stress-related diseases.
- The AHPC group was established in 2012 and carries out pioneering work in Astrophysics and Parallel and Distributed Computing.
- The Centre for Game Studies carries out research on various aspects of games, from their impact on society to the creation of game design and evaluation principles and guidelines.

- The Cyprus Musculoskeletal and Sports Trauma Research Centre conducts high quality research in the domains of sports and musculoskeletal injuries with a particular focus on epidemiology, aetiology, rehabilitation (treatment) and prevention of these injuries.
- The Centre for Applied Research (CAR) was established in 1991 as an independent, non-governmental institution, providing market research, training, and consultancy services to public and private sector clients. The centre also emphasises the importance of accurate, ethical data collection, sharing the findings of CAR projects as widely as possible.

Neapolis University[22]

The Neapolis University Paphos (NUP) is a private university in Paphos, Cyprus, which offers graduate and undergraduate degrees in Economic and Business Studies, Law, Health Sciences, Architecture & Land and Environmental Sciences, Theology and Greek Civilisation. The university was founded in 2007.

The NUP also has a Distance Learning Unit (DLU). There are four master's programmes available through the DLU: A Master's in Public Administration (MPA), a Master's in Business Administration (MBA), an MSc in Educational Psychology and an MA in Modern and Contemporary Greek and European History.

- The university includes the following research centres:
- The Research Institute of Applied Communication (IMEE) is a non-profit and non-governmental organisation (NGO) with a research orientation. The IMEE was founded in 2006 with the participation of the Community Council Alambra. From 2012 onwards, it has been operating under the auspices of Neapolis University. Its main focus is on research into a multitude of issues relating to the media and wider communication studies.
- The Centre for Psychological Support and Assessment (SKEPSIS) is supervised by the University. The SKEPSIS provides assessment services, diagnosis and assistance to guests with personal, educational, academic, social, work and family difficulties, which hamper their adaptation to and functionality in the academic community and wider society.
- The university's Centre for Environmental Studies addresses environmental problems by conducting interdisciplinary research and teaching in areas related to improving the quality of life and protecting the natural environment, particularly in connection with the conditions of Cyprus and the wider Mediterranean area.
- The Centre for International Tourism Research (CITR) conducts interdisciplinary research and offers training related to tourism. It also acts as a vehicle for academic staff, students and partners of the university to conduct basic and applied research in the field of tourism.
- The Modern and Contemporary History Research Centre (MCHRC) was established in 2017. It mainly focused on conducting primary research in the

22 https://www.nup.ac.cy/

fields that are related with its purposes, to develop cooperation and synergies with similar research centres and other relevant bodies in Cyprus and abroad.

University of Central Lancashire[23]

The University of Central Lancashire, Cyprus (UCLan Cyprus), was established in Larnaka in 2012. UCLan Cyprus is the first Branch Campus of the University of Central Lancashire (UK). Undergraduate tuition fees come to around EUR 8500 and postgraduate tuition around EUR 8925. The university is made up of four schools: the School of Business & Management, the School of Law, the School of Sciences and the Institute of Professional Studies.

The following research centres, research units and laboratories operate at the UCLan Cyprus:

- The Centre for Entrepreneurial Development, Alliance and Research (CEDAR) is the first interdisciplinary and pioneering non-for-profit centre for entrepreneurship in Cyprus. Its mission is to act as a catalyst for entrepreneurial development by building synergies between different areas of expertise in education, training, research, outreach and policy.
- INSPIRE (Interdisciplinary Science Promotion & Innovative Research Exploration) was developed with the mission to support the advancement and development of scientific research by establishing a culture of innovative partnerships within different science disciplines (e.g. computing, engineering, mathematics, psychology and sports and exercise science) for the utilisation of state-of-the-art practices and for carrying out cutting-edge research and innovative programmes and activities. The main research clusters of the centre focus on Health and Society, Information Systems, Communication Networks and Mobile Technologies, Developmental Psychology and Educational Technologies.
- The Interdisciplinary Centre For Law, Alternative & Innovative Methods (ICLAIM) is an interdisciplinary not-for-profit centre, which closely works with UCLan Cyprus on law in the real world, socio-legal issues and disputes arising in a transnational and interdisciplinary context, at all levels of the legal order, and on multi-level governance (international, European and national), utilising alternative and innovative methods.
- Cluster of Innovative Education and Linguistics (CIEL) is a research group which aims to advance and promote research-based activities in the field of innovative education and linguistics, including technology-enhanced learning and leadership.

The University of Nicosia[24]

The University of Nicosia (UNIC) is the largest university in Cyprus, with its main campus located in Nicosia. It also runs study centres in Athens, Bucharest and New York City. The University of Nicosia has 11 500+ enrolled students from 70+

23 https://www.uclancyprus.ac.cy/

24 https://www.unic.ac.cy/

countries studying on its bachelor, master's and doctoral degree programmes. UNIC is composed of six schools, namely the School of Business, the School of Education, the School of Humanities and Social Sciences, the School of Law, the Medical School and the School of Sciences and Engineering. Undergraduate tuition and fees amount to around EUR 8000 to 30 000 depending on the school.

The university offers innovative distance learning programmes at bachelor and master's levels. Most of the programmes with a title in English are also offered in Greek, either wholly or partially. The university offers eight bachelor degrees and 34 master's degrees.

The Research & Innovation Office (R&IO) is at the core of the University Research Infrastructure and works in close collaboration with the URC, the SRCs and the REC. The R&IO provides specialist information, guidance and advice for the faculty staff and researchers at the University of Nicosia and its academically affiliated institutions, namely the University of Nicosia Research Foundation.

The University of Nicosia Foundation (UNRF) is an autonomous, non-for-profit research organisation based in Cyprus, which provides an independent platform for researchers across the island.

Non-profit colleges

Cyprus International Institute of Management (CIIM)[25]

The Cyprus International Institute of Management is a European business school with two campuses, one in Nicosia and the other in Limassol, Cyprus. The non-profit business school is accredited by the Cyprus Ministry of Education & Culture and the Association of MBAs (AMBA) and was established in 1990. The school is a member of the European Foundation for Management Development. The school offers seven accredited master's programmes in business (AMBA, EFMD/EPAS, DIPAE). The tuition and fees range between EUR 6000 and EUR 19 000 depending on the programme.

In addition to its educational activities, the CIIM has established an Entrepreneurship and Innovation Centre (ENTICE) to help individuals, companies and organisations create innovative new ventures and improve the competitiveness of existing ones. The CIIM is also a consultant to the Cyprus government on economic, financial and entrepreneurial issues.

The CIIM is involved in research activities in the following five broad research topics:

- Economics and Finance,
- Business Marketing and Strategy,
- Education and Human Resource Management,
- Entrepreneurship and Innovation,

25 https://www.ciim.ac.cy/

- Energy Economics and Environmental Management.

The ENTICE is the CIIM's Entrepreneurship and Innovation Centre and was launched in 2013.The main activity of this Centre is to provide specialised consulting services, education and mentoring, the creation of innovative new ventures (start-ups) and the improvement of the competitiveness of existing innovative enterprises. The ENTICE has three main pillars of activities, educational and training services, the ENTICE Accelerator and research in Innovation and Entrepreneurship.

Cyprus Institute of Marketing[26]

The Cyprus Institute of Marketing (CIMA) was established in 1978 and is situated in Nicosia, Limassol and the British Virgin Islands. It is registered with the Cyprus Ministry of Education and is the first business school to have been established in Cyprus and among the older tertiary education providers in Cyprus. In addition to marketing, the CIMA offers programmes in tourism, banking, insurance, computer & financial studies and European studies. It operates a membership association and awards its own recognised diplomas, advanced diplomas, bachelors, a postgraduate diploma and an MBA. Its MBA was ranked 16th in Europe according to www.findyourMBA.com. In 1984, a daughter school was opened in Limassol. Diplomas and degrees are also awarded through local centres around the world and through distance-learning by The Cyprus Institute of Marketing Ltd (Reg BVI). The tuition and fees range between 3,700 and 7,000 EUR depending on the programme.

The Cyprus Centre for Business Research at the CIM was set up in 2017 with the primary aim of advancing, promoting and facilitating research relating to the field of business. The centre has a global outlook and welcomes interdisciplinary research as well as research that bridges the gap between the business world and academia.

The Postgraduate Research Institute of Science, Technology, Environment and Medicine (PRI)[27]

The Postgraduate Research Institute of Science, Technology, Environment and Medicine is a non-profit, charitable organisation based in Limassol. The institute focuses on various areas of science, technology, environment and medicine. The laboratories of the PRI are equipped with scientific instruments such as an atomic absorption spectrophotometer, HPLC, UV-visible spectrophotometers etc for research into specialised areas involving the design of new pharmaceuticals, the detection of metal ions, pharmaceutical products and their metabolites, food and blood products etc. In addition to the undergraduate and postgraduate programmes, the PRI provides distance learning programmes for bachelor and master's levels. The tuition and fees range between EUR 3700 and EUR 7700 depending on the programme or EU/non-EU citizenship. The institute also

26 https://cima.ac.cy/

27 https://www.pri.ac.cy/

awards, annually, a series of full and partial scholarships to EU citizens in collaboration with local organisations and media groups.

Private non-profit research organisations

Cyprus Institute (CyI)[28]

CyI is a non-governmental, non-profit institution with a focus on Science, Technology and Innovation. It was established in 2005. The institute has 1626 connections with 1075 distinct partners in 70 countries (901 active). The institute offers three PhD programmes and two master's programmes. It started with a small team comprising about 10 members of faculty and staff. The CyI has been growing continuously in the last few years and is now engaged with more than 170 scientists and professionals from around the world (20 different nationalities). The institute has succeeded in securing over EUR 35 million in research funding from external sources, more than 800 scientific publications, 16 research laboratories and 53 active research projects. 50% of the CyI's budget comes from grants from the European Commission (mainly Horizon 2020). The Cyprus Institute has a success rate of 18% in Horizon 2020. The average success rate for Cyprus is 11.8% and the average for the EU-28 is 13.5%.[29] The Institute has teaming infrastructure with Centre of Excellence "Eastern Mediterranean and Middle East – Climate and Atmosphere Research Centre (EMME – CARE)" as well as other infrastructure like the Centre in Simulation and Data Science (SIMDAS. CyI has invested a significant amount of resources in setting up a process for identifying exploitable Intellectual Property and know-how and promoting its commercial exploitation through a variety of mechanisms.

The CyI has three research centres:

- Energy, Environment and Water (EEWRC) was launched in December 2007 as the first research centre of the Cyprus Institute, a non-profit research and educational institution with a scientific and technological focus. The centre focuses on Atmosphere and Climate, Energy and Renewables, Water and Marine Resources. This research centre has 26 active projects.
- Science and Technology in Archaeology (STARC) is devoted to the development, introduction and use of advanced science and technologies in the field of archaeology, cultural heritage and history of the region. The research centre has 17 active projects.
- Computation-based Science and Technology (CaSToRC) is focused on the introduction, development and employment of intense computational methods and data to advance scientific and technological disciplines. It was founded in 2009. CaSToRC's research team comprises more than 25 researchers and, since its creation, it has secured in excess of EUR 10 million in external funding, mostly from the European Commission. There are 10 active projects in which the research centre is involved.

28 https://www.cyi.ac.cy/

29 Statistics provided by the Cyprus Institute

The Cyprus Institute Graduate School is an accredited, degree-granting institution of higher education, which offers exclusively postgraduate education opportunities. The school has three doctoral programmes: in Computational Sciences, in Energy, Environment & Atmospheric Sciences and in Science & Technology in Cultural Heritage. The institute also has three MSc programmes: in Environmental Sciences, in Simulation and Data Sciences and in Digital Cultural Heritage.

The Cyprus Institute of Neurology and Genetics - CING[30]

The Cyprus Institute of Neurology & Genetics (CING) is a private, non-profit, bi-communal, medical, research and academic centre. The institute was launched in 1990. It specialises in neurology, molecular biology and all aspects of human genetics. In 2012, the CING established the Cyprus School of Molecular Medicine (CSMM), a postgraduate school with research and academic interests relevant to CING activities. The CSMM offers seven programmes of study leading to MSc and PhD degrees in the fields of Molecular Medicine, Medical Genetics, Neuroscience and Biomedical Research.

Centres of excellence: Teaming infrastructure

KIOS[31]

The KIOS Research and Innovation Centre of Excellence (KIOS CoE) operates within the University of Cyprus. The centre was established in 2008 and was subsequently selected by the EU to advance into a Research and Innovation Centre of Excellence in 2017. With the collaboration of Imperial College London, the KIOS has succeeded in securing funding in excess of EUR 40 million for the period from 2017 to 2022. The mission of the KIOS is to conduct multidisciplinary research and innovation in the area of Information and Communication Technologies (ICT), with an emphasis on the Monitoring, Control, Security and Management of Critical Infrastructures, which include large-scale, complex systems such as power and energy systems, water systems, transportation systems, telecommunication networks and emergency management and response systems. The centre promotes a comprehensive framework for open knowledge to support and encourage open access, open data and reproducible research for the purpose of supporting excellence in research.

The KIOS Innovation Hub spearheads the innovation and exploitation activities of the KIOS CoE and promotes the development of regional innovation clusters that serve as local innovation ecosystems capable of connecting to global value chains. The hub collaborates with industry, academia and research organisations in high-tech areas of global importance via an Industrial Membership Programme suitable for CIS operators and regulators, related commercial and governmental organisations and innovative SMEs. Participating organisations commercially exploit the research and technology outputs of the KIOS CoE.

30 https://www.cing.ac.cy/

31 http://www.kios.ucy.ac.cy/index.php

The main priority areas of the KIOS:

- Energy,
- Agriculture-Food Technology,
- Transportation and horizontal priorities,
- ICT.

Research centre on Interactive media, Smart systems and Emerging technologies (RISE)[32]

The RISE is the first research centre in Cyprus to focus on Interactive media, Smart systems and Emerging technologies and aims to become a centre of excellence empowering knowledge and technology transfer in the region. It is a joint venture between the three public universities of Cyprus (University of Cyprus, Cyprus University of Technology, Open University of Cyprus), the Municipality of Nicosia, and two renowned international partners, the Max Planck Institute for Informatics (Germany) and University College London (UK). The RISE was founded in 2018.

The RISE is designed to act as an integrator of academic research and industrial innovation, and towards the sustainable fuelling of the scientific, technological, and economic growth of Cyprus and Europe. It sets out to meet the challenge with a total potential funding of more than EUR 30 million for the first seven years from the Horizon 2020 Teaming Action and multiple other sources. The RISE's business plan is specifically tailored to long term sustainability and growth.

The main priority areas: Horizontal priorities: ICT (interconnected to all priorities of the S^3CY).

Marine and Maritime Research, Innovation, Technology Centre of Excellence (MARITEC-X)[33]

The vision of the MaRITeC-X project is to establish the Cyprus Marine and Maritime Institute (CMMI). MaRITeC-X acts as an enabler of scientific and business excellence in Marine and Maritime sectors, including the Offshore sector; and will be aligned to the overall Smart Specialisation Strategy for Cyprus (S^3Cy) and the European priorities on specific pillars with competitive advantages for the Cypriot economy.

The aim of MaRITeC-X is to contribute to research and innovation projects in selected cutting-edge technologies, which are expected to bring about drastic changes in the fields of marine and maritime research in the coming years up until 2030. The centre will align mature and emerging technologies with the competitive advantages of the country in order to extract gains from the societal spillover and commercialisation of research results.

[32] http://www.rise.org.cy/en-gb/
[33] https://www.maritec-x.eu/

The main priority areas:

- Transport-Marine
- Energy
- Tourism
- Agricultural-Food.

and horizontal priorities:

- ICT.

Eastern Mediterranean and Middle East – Climate and Atmosphere Research Centre (EMME-CARE)[34]

The EMME-CARE is a new research centre which is part of the CyI, CARE-C, and links environmental sciences (atmospheric composition and climate) with public health, policy development, economic sectors, education and innovation to address societal challenges.

The centre proposes a comprehensive and integrated programme to address climate challenges in the region through a combination of research, innovation and education. The programme focuses on greenhouse gases, the water cycle and extreme weather atmospheric dust and air pollution. The total number of staff comes to 37 employees from 10 different nationalities. The number of peer-review publications amounts to 200, of which 50% have been published in the top 10 journals.

The main priority areas: Environment (climate change, pollution, ecosystems, eco-innovation, social, economic and political sustainability and other horizontal applications) interconnected with the priorities of energy, ICT, agriculture, tourism, transportation and health.

Biobanking and the Cyprus Human Genome Project[35]

The project concerns the upgrading of the Molecular Medicine Research Centre (MMRC) that was launched four years ago into a Centre of Excellence. Biobanks are organised collections of medical records and biological material of all types, which aim to support biomedical research and serve as repositories and distribution centres. This project provided EUR 2 million, 0.4 million of which was for creating seed infrastructure for biobanking, with the rest used for research into inherited kidney diseases.

The main priority area: Health.

Excellence Research Centre for Earth Surveillance and Space-Based Monitoring of the Environment (EXCELSIOR)[36]

[34] http://emme-care.cyi.ac.cy/
[35] http://ucy.ac.cy/mmrc/en/
[36] https://www.excelsior2020.eu/

The EXCELSIOR is built on the existing ERATOSTHENES Research Centre capacities. The aim of the project is to further promote the existing ERATOSTHENES Research Centre (ERC), which has been established within the Cyprus University of Technology (CUT), and is a sustainable, viable and autonomous Centre of Excellence (CoE) for Earth Surveillance and Space-Based Monitoring of the Environment.

The aim of the project is to support research and innovation activities and systems in low performing countries as well as to establish long-term and strategic partnerships between the teaming partners, thus reducing internal research and innovation disparities within the European Research and Innovation landscape.

Main priority areas:

- Agriculture,
- Health,
- Transportation,
- Tourism.

and Horizontal priorities:

- Environment,
- ICT.

Government labs

Ministry of Agriculture Rural Development and Environment (MARDE)[37]

The Ministry was founded with the independence of Cyprus in 1960. The Ministry of Agriculture, Rural Development and Environment consists of 11 departments.

The Ministry has the capacity to perform research in the following laboratories and departments:

- **Agricultural Research Institute (ARI)**[38]

  The Agricultural Research Institute (ARI) is a department that comes under the Ministry of Agriculture, Rural Development and Environment (MARDE) of the Republic of Cyprus. The ARI was founded in 1962 and became the property of the government of Cyprus in 1967. The ARI conducts research aimed at creating and transferring knowledge for the development of the primary sector and at solving problems at the farmer's level. The research results are transferred to stakeholders through modern educational programmes and dissemination tools.

[37] http://www.moa.gov.cy/moa/agriculture.nsf/index_en/index_en?OpenDocument
[38] http://www.moa.gov.cy/moa/ari/ari.nsf/index_en/index_en?OpenDocument

Scientific domain / Category	Personnel	Funding (2018)
Biological & Medical Sciences/Agronomy, Forestry, Plant Breeding Centres/Animal Facilities/Collection of Biological Resources Earth & Environmental Sciences/Environmental Management Infrastructure/Geothermal Research Facilities/In Situ Earth Observatories	2 Researchers 2 Technical	National Funding Competitive Funding

- **Department of Meteorology (DoM)**[39]

  The Department of Meteorology (DoM) is the authority responsible for all the issues concerning the weather and climate. Its mission is to collect and provide information related to the weather and climate for all economic and social activities of the country in order to achieve high quality of services, the general welfare of the public and the protection of life and property of its citizens. The total number of staff for 2018 came to 54 employees.

Name of research infrastructure	Scientific domain / Category (MERIL)	Funding
Automatic Climatological Stations (AWS)	Earth & Environmental Sciences/Atmospheric Measurement Facilities/Earth, Ocean, Marine, Freshwater and Atmosphere Data Centres	National Funding Competitive Funding: Research programmes 20% Other sources: Aviation 10%
Climatological Stations (Clima)	Earth & Environmental Sciences/Atmospheric Measurement Facilities/Earth, Ocean, Marine, Freshwater and Atmosphere Data Centres	National Funding Competitive Funding: Research programmes
Meteorological Reporting System	Earth & Environmental Sciences/Atmospheric Measurement Facilities/Earth, Ocean, Marine, Freshwater and Atmosphere Data Centres	National Funding
Radar Network (MRN)	Earth & Environmental Sciences/Atmospheric Measurement Facilities/Earth, Ocean, Marine, Freshwater and Atmosphere Data Centres	National Funding Other sources: Aviation 80%

- **Department of Fisheries and Marine Research (DFMR)**[40]

  The mission of the Department of Fisheries and Marine Research (DFMR) is the sustainable management and development of fisheries and aquaculture

[39] http://www.moa.gov.cy/moa/ms/ms.nsf/DMLindex_en/DMLindex_en?opendocument
[40] http://www.moa.gov.cy/moa/dfmr/dfmr.nsf/index_en/index_en?OpenDocument

and the protection and conservation of the marine environment through an integrated scientific approach.

Name of research infrastructure	Scientific domain / Category (MERIL)	Personnel	Funding (2018)
Kalopanagiotis Fresh Water Aquaculture Research Station	Earth and Environmental Sciences/Earth, Ocean, Marine, Freshwater and Atmosphere Data Centres	0.5 Researcher 2.5 Technical 0.5. Administrative	National Funding
Cyprus Marine Aquaculture Research Centre	Earth and Environmental Sciences/Earth, Ocean, Marine, Freshwater and Atmosphere Data Centres	4.5	Annual State Budget

- **Department of Agriculture (DOA)**[41]

The mission of the Department of Agriculture is to develop the agricultural sector by providing training and guidance to farmers, planning and implementation of development programmes.

Name of research infrastructure	Name of research lab	Scientific domain / Category (MERIL)	Personnel	Funding (2018)
	Virgin Olive Oil Organoleptic Assessment	Biological & Medical Sciences/Agronomy, Forestry, Plant Breeding Centres (Food Science, sensory analysis)	3 Technical	National Funding: 100%
Section of Plant Protection and Apiculture	Section of Plant Protection and Agriculture	Biological & Medical Sciences/Agronomy, Forestry, Plant Breeding Centres	6 Researchers 4 Technical 10 Administrative 7 Workers	National Funding: 100%
	Analytical Laboratories	Biological & Medical Sciences/Agronomy, Forestry, Plant Breeding Centres	8	National Funding: 100%
	Oenological Laboratory	Biological & Medical Sciences/Agronomy, Forestry, Plant Breeding Centres	5	National Funding: 100%

- **Rural Development and Environment**[42]

The Department of Environment is the evolution of the Environmental Service, which was set up in 1986. The Department of Environment, as the regulatory authority, plays a key role in the environmental and developmental institutions of Cyprus. It has a coordinating role on issues involving other

[41] http://www.moa.gov.cy/moa/da/da.nsf/index_en/index_en?OpenDocument

[42] http://www.moa.gov.cy/moa/agriculture.nsf/index_en/index_en?OpenDocument

relevant services/departments. The Department of Environment is staffed by scientific and technical personnel with extensive professional training such as Environmentalists, Geographers, Biologists, Ecologists, Foresters, Agronomists, Meteorologists, Physicists, Naturalists, Landscape Designers, Civil Engineers, Surveying Engineers, Geologists, Chemists and Chemical Engineers.

- **Geological Survey Department (GSD)**[43]

  The Geological Survey Department is the national agency and state councillor for geological matters, which safeguards the public interest through the identification, exploitation and protection of mineral and groundwater resources, investigates and assesses the geological environment and geohazards, monitors and assesses seismicity and foundation conditions, and protects and promotes sites of geological and mining heritage. The Department employs a total of 68 persons: 18 professional scientists (17 Geoscientists, one Chemist and one Engineer), 15 Technicians of various specialisations, 28 employees as support staff and 6 Secretarial employees.

Name of Research Infrastructure	Scientific Domain /Category (MERIL)	Personnel	Funding (2018)
Geological Survey Department	Chemistry and Material Sciences/Analytical Facilties	Full time men to women ratio: 2/4 and Full time equivalent 1 Researcher 2 Scientific 2 Technical	Other sources

- **Veterinary Services Department (VSD)**[44]

  The mission of the VSD is to protect public health from animal diseases that exist in Cyprus and prevent the entry of other diseases into the country, as well as to protect public health by checking all food of animal origin and zoonoses.

Name of research lab	Scientific domain / Category (MERIL)	Personnel	Funding (2018)
Pathology Bacteriology & Parasitology Laboratory (PBPL)	Biological & Medical Sciences/Collections of Biological Resources/Biological –Biomedical Engineering and Biotechnology-Nanotechnology Research Facilities	3 Technical 1 Academic	National Funding EU Co-financing
Virology Laboratory (VLab)	Biological & Medical Sciences/Collections of Biological Resources/Biological –Biomedical Engineering and Biotechnology-Nanotechnology Research Facilities	2 Technical 1 Academic	National Funding EU Co-financing

43 http://www.moa.gov.cy/moa/gsd/gsd.nsf/dmlIndex_en/dmlIndex_en?opendocument

44 http://www.moa.gov.cy/moa/vs/vs.nsf/vs01_en/vs01_en?OpenDocument

Name of research lab	Scientific domain / Category (MERIL)	Personnel	Funding (2018)
Bacteriology Serology Laboratory (BSL)	Biological & Medical Sciences/Collections of Biological Resources/Biological –Biomedical Engineering and Biotechnology-Nanotechnology Research Facilities	4 Technical	National Funding EU Co-financing
Transmissible Spongiform Encepalopathies Laboratory (TSEs)	Biological & Medical Sciences/Collections of Biological Resources/Biological –Biomedical Engineering and Biotechnology-Nanotechnology Research Facilities	5 Technical 1 Academic	National Funding EU Co-financing
Histopathology Laboratory (EIST)	Biological & Medical Sciences/Collections of Biological Resources/Biological –Biomedical Engineering and Biotechnology-Nanotechnology Research Facilities	1 Technical 1 Academic	National Funding EU Co-financing
Laboratory for the Control of Food of Animal Origin (LSFAO)	Biological & Medical Sciences/Collections of Biological Resources/Biological –Biomedical Engineering and Biotechnology-Nanotechnology Research Facilities	11 Technical 3 Academics	National Funding EU Co-financing

Ministry of Health

Under the Ministry of Health, there is the State General Laboratory:

- **State General Laboratory**[45]

  The State General Laboratory (SGL) is a centre of official supervision, carrying out the monitoring, research and consultation used by the various State services, with national and European recognition. It is the Official Government Laboratory for chemical, biological/microbiological and toxicological control and is the national monitoring centre for foodstuffs, pharmaceuticals, other consumer products and for the examination of illegal drugs and other police exhibits. It is also the National Reference Laboratory in many food safety sectors. The SGL employs 157 people in various positions (permanent, temporary and on contract), including 13 belonging to the category of interchangeable personnel and 22 who are paid by the hour. The present structure of the SGL comprises 21 specialised laboratories which are distributed in eight sectors. Of its 116 scientists (Chemists, Biologists and Microbiologists, of whom 69% have at least one university degree), 21 have the position of Laboratory Technician and 50 have the position of temporary Laboratory Technician.

Technology and innovation support organisations

CYRIC[46]

45 https://www.moh.gov.cy/moh/sql/sql.nsf/index_en/index_en?OpenDocument

46 https://www.cyric.eu/

CYRIC offers research and innovation services in the fields of engineering design and prototyping, electronics and communications and software solutions. In addition, specialised consultancy and entrepreneurship services are offered to start-ups and SMEs.

CYRIC's department of Engineering, Design & Prototyping is specialised in developing innovative prototypes and technology. CYRIC offers R&D services directly to industry or through European and nationally funded projects in the fields of mechanical engineering, prototyping, electrical and electronics engineering, embedded systems, mechatronics, robotics, software design and development. It has been involved in more than 35 European and national R&D projects and completed numerous assignments from industry and the local start-up community. CYRIC is also the coordinator of the Cyprus Digital Innovation Hub (CyDi-Hub). It is a regional network hub of research, innovation, business and industry organisations, utilising state of the art infrastructure in order to bring about the fourth digital revolution in Cyprus by offering cutting-edge digital technology innovations and services to the manufacturing industry.

Microsoft Innovation Centre[47]

Microsoft Innovation Centres (MICs) are technology facilities for collaboration on innovative research, technology or software solutions involving a combination of government, academic and industry participants. MICs are facilities that provide world-class resources and support for students, entrepreneurs and start-ups, accelerating the creation of new companies, jobs and the growth of the local software ecosystem. The MIC was founded in 2015.

Incubators and start-ups to support infrastructure

ARIS Accelerator[48]

ARIS (A Really Inspiring Space) is a start-up accelerator, funded by the Bank of Cyprus and Deloitte, which aims to provide entrepreneurs, at their early stages, with an innovating workspace where they can turn their ideas into businesses. ARIS has been established with the purpose of supporting the successful development of emerging business ideas and intends to accelerate the efforts of young entrepreneurs through intensive support by providing: A co-working space, guidance and coaching, technical assistance through mentorship, consulting tailored to the needs of residents, peer-to-peer networking, monitoring of residents' progress. ARIS considers applications from all sorts of backgrounds, sectors and skills, prioritising applications involving fields of technological innovation such as: Big Data/Open Data, the Internet of Things, Artificial Intelligence, Blockchain, the cloud and cybersecurity in the following industries: renewables and storage solutions, financial services, maritime and shipping,

47 https://www.euc.ac.cy/en/university-facilities/microsoft-innovation-center

48 http://www.ariscy.com

health, fitness and sports, public sector (including local government), education and food.

The Advisory Board of ARIS consists of individuals with experience in technology, launching and managing companies and working with start-ups, from the two founders of ARIS, the Bank of Cyprus and Deloitte, as well as the business world and academics from Cyprus and abroad.

IDEA incubator-accelerator[49]

IDEA is an innovation centre and an incubator-accelerator for start-ups aspiring to promote innovation and entrepreneurship in Cyprus. It was founded in 2015. The focus of the centre is to host start-up companies, offering them the highest quality of training and services. For the period of three years, IDEA has hosted 33 start-ups with 90 entrepreneurs and more than 2300 applications. It was founded by the Bank of Cyprus and the Cyprus International Institute of Management (CIIM). IDEA hosts start-ups for a period of nine months, offering them the highest quality of training, workshops, mentorship, consultation and professional services so as to turn their innovative ideas into viable businesses. IDEA offers each start-up a total package of cash & services of over EUR 58 000, depending on their commitment and utilisation of services.

Diogenes Business Incubator[50]

The Diogenes Business Incubator is a high technology business incubator aiming to commercialise R&D results by creating business value. It is owned by the University of Cyprus. Diogenes was founded in 2003. Diogenes has created nine start-up companies through the Ministry of Commerce, Industry and Tourism's start-up programme. Diogenes holds equity stakes in all portfolio companies and aims to enhance the value of the start-ups.

Gravity Incubator[51]

Gravity is a venture building incubator that fosters and propels innovation. Gravity's approach is to focus on growing start-ups from their early stages into mature ventures by assisting them in all the necessary steps. This incubator was founded in 2016. Gravity provides state-of-the-art technology within a creative modern infrastructure that enables entrepreneurs to launch meaningful and enduring technology companies.

Limassol Grind Co-working Space[52]

Limassol Grind is the first incubation and co-working space in Limassol and was established in 2017.

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49 https://ideacy.net/

50 http://www.diogenes.com.cy/

51 http://gravity.ventures/

52 http://limassolgrind.zohosites.com/

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The Cypriot Government expressed its interest in a PSF Specific Support activity focused on the optimal use of public research infrastructure and laboratories by the business community.

This report aims to provide the main background information regarding the area of interest. The report starts with an overview of the economic performance of Cyprus and the structural characteristics of the economy. The economic overview is followed by an analysis of the performance of the research and innovation system. The analysis focuses on both the supply and demand sides and their interaction. The analysis of the governance system and the policy mix providing support for collaboration between science and business is examined. Emphasis is put on the regulatory framework and the institutional policies and rules that influence collaboration between public research organisations and companies.

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