

Supporting Entrepreneurship and Innovation in Higher Education in Romania

This work is published under the responsibility of the Secretary-General of the OECD. The opinions expressed and arguments employed herein do not necessarily reflect the official views of the OECD member countries or the European Union.

This document, as well as any data and map included herein, are without prejudice to the status of or sovereignty over any territory, to the delimitation of international frontiers and boundaries and to the name of any territory, city or area.

Photo credits: Original cover illustration by FKT © Anna leni/Shutterstock for the circle of pictos. Square graduation cap: original creation by Freepik.

© OECD/EUROPEAN UNION, 2019.

You can copy, download or print OECD content for your own use, and you can include excerpts from OECD publications, databases and multimedia products in your own documents, presentations, blogs, websites and teaching materials, provided that suitable acknowledgment of the source and copyright owner is given. All requests for public or commercial use and translation rights should be submitted to rights@oecd.org. Requests for permission to photocopy portions of this material for public or commercial use shall be addressed directly to the Copyright Clearance Center (CCC) at info@copyright.com or the Centre français d'exploitation du droit de copie (CFC) at contact@cfcopies.com.

Foreword

This publication presents the findings and recommendations of the HEInnovate review of the impact of higher education institutions (HEIs) on entrepreneurship and innovation in Romania. The review assesses the strategies and practices of HEIs in Romania in supporting entrepreneurship and innovation and the government policy context. It stresses the potential of the country to capitalise on the academic tradition, a talented workforce and collective determination to improve its entrepreneurship ecosystem and innovation capacity.

The review was undertaken by the OECD in partnership with the European Commission, as part of the programme of work of the OECD Local Economic and Employment Development (LEED) Committee. The review is part of the HEInnovate collaboration between the European Commission's Directorate-General for Education, Youth, Sport and Culture and the OECD Centre for Entrepreneurship, SMEs, Regions and Cities.

Investing in the innovative and entrepreneurial HEI is one of the highest return investments that we can make. Innovators and entrepreneurs are not born with all the competencies involved. Rather, the underlying attitudes, knowledge and skills are developed over time in society and through education. More needs to be done to ensure that these competencies are developed through education, and to ensure that there are the right incentives and support structures to encourage staff and students in HEIs to get involved in entrepreneurial ventures and engagement with business and society.

HEInnovate is a starting point for governments and HEIs to identify areas for action. It is a guiding framework for supporting innovation and entrepreneurship in higher education. HEInnovate offers an online self-assessment tool for higher education institutions (www.heinnovate.eu), available in 24 languages, a series of country review assessments including this report on Romania, and a Policy Learning Network that facilitates cross-country exchange and peer-learning amongst the countries participating in the country reviews.

Acknowledgements

This review was a collaborative effort between the OECD Centre for Entrepreneurship, SMEs, Local Development and Tourism, the Directorate General for Education and Culture of the European Commission and the Romanian Ministry of National Education.

This report was co-ordinated and co-drafted by Giulia Ajmone Marsan, Economist, under the supervision of Lucia Cusmano, Acting Head of the SMEs and Entrepreneurship division in the OECD Centre for Entrepreneurship, SMEs, Regions and Cities. HEInnovate is part of the programme of work of the OECD Local Economic and Employment Development (LEED) Programme, under the leadership of Karen Maguire, Acting Head of the LEED Division.

A group of international experts drafted sections and chapters of this report: Slavica Singer, Professor Emeritus at the J.J. Strossmayer University in Osijek, Croatia; Kevin Richardson, Local Growth Consultant, Higher Education Funding Council for England; Alessandro Rosiello, Senior Lecturer in Entrepreneurship and Innovation, University of Edinburgh Business School and Matjaz Vidmar, PhD Candidate, University of Edinburgh Business School; Adina Fodor, Head of the Office for Inter-university Agreements Centre for International Cooperation Babes-Bolyai University; and Stephany Scotto, independent consultant.

Peter Baur and Alexandra Tamasan from the Directorate General for Education and Culture of the European Commission participated in various review activities and provided valuable comments and input.

Special thanks are extended to Daniela Vasilica Burghila, Director General for Higher Education, General Directorate for Higher Education, Ministry of National Education, upon whose initiative the 2018 HEInnovate exercise for the Romanian country review took place. This report benefited greatly from knowledge and comments shared by those who joined the steering group of this review. They include: Marioara Grebenisan, Advisor, General Directorate for University Education, Ministry of National Education (MEN); Georgeta Pelcea, Superior Counsellor, Directorate for Employment, Competencies and Vocational Mobility, Ministry of Labour and Social Justice (MMJS); Florin-Ioan Roşu, Head of Service, Directorate for Business, Ministry for Business, Commercials and Entrepreneurship (MMACA); Mrs. Marilena DIN, Counsellor, General Directorate for Higher Education, Ministry of National Education; Alina Mirea, Expert, Analysis and Programming Directorate – DG Programming, SMIS, System Coordination and European and International Cooperation, Ministry of the European Funds (MFE); Eugen Scarlat, Ministry of Research and Innovation (MCI); George Darie, Prorector, Polytechnic University of Bucharest, National Council of Rectors (CNR); Prof Ion Popa, The Romanian Agency for Quality Assurance in Higher Education (ARACIS); Ştefania Popp, Executive Director, Junior Achievement Romania (JAR); Gabriela Jitaru, Director, Department for Higher Education Financing, Executive Unit for Financing Higher Education, Research, Development and Innovation (UEFISCDI); Horia Şerban Ōniţa, Educational Vice-President, National Alliance of Student Organizations in Romania (ANOSR). Instrumental for the implementation of the review process was Marioara Grebenisan, Advisor, Romanian Ministry of National Education.

The authors are also grateful to Barbara Cachova and Sarah Zaft from the OECD Centre for Entrepreneurship, SMEs, Local Development and Tourism for providing administrative support. Eleonore Morena edited and formatted the report.

Table of contents

Foreword	3
Acknowledgements	5
Executive summary	11
Chapter 1. Higher education and innovation in Romania	13
Main macroeconomic trends.....	14
Ease of doing business and entrepreneurship behaviour.....	15
Education and skills.....	18
Innovation performance.....	22
An introduction to the higher education system of Romania.....	28
Romanian governmental actors related to the higher education and innovation system.....	31
Recent developments in research and innovation.....	36
Notes.....	37
References.....	39
Chapter 2. Applying the HEInnovate guiding framework to the Romanian higher education and innovation system	41
The HEInnovate guiding framework.....	42
The eight HEInnovate dimensions in the Romanian context.....	44
Leadership and governance.....	44
Organisational capacity, funding, people and incentives.....	47
Entrepreneurial teaching and learning.....	49
Preparing and supporting entrepreneurs.....	51
Digital transformation and capability.....	54
Knowledge exchange and collaboration.....	55
The internationalised institution.....	58
Measuring impact.....	59
Notes.....	61
References.....	62
Chapter 3. Building entrepreneurial capacity in Romania through teaching and learning	65
Quality of life, innovation and education, a general overview.....	66
Regional development imbalances and higher education in Romania.....	68
Strategic and policy framework for building entrepreneurial capacity through teaching and learning.....	69
Entrepreneurial teaching and learning matter.....	73
The positioning of Romanian HEIs with respect to entrepreneurship education and vice versa.....	74
Relevance of entrepreneurship education in the Romanian context.....	80
Conclusions and policy recommendations.....	83
Notes.....	85
References.....	87

Annex 3.A. EU policy documents on education, entrepreneurship education, entrepreneurship competency, background papers.....	91
Note.....	93
Chapter 4. Preparing and supporting entrepreneurs	95
The start-up ecosystem in Romania.....	96
The regulatory and legal framework.....	99
Unlocking the entrepreneurial potential of Romanian HEIs.....	104
Conclusions and policy recommendations.....	117
Notes.....	119
References.....	120
Chapter 5. Knowledge exchange and collaboration: Interactions between Romanian HEIs and the surrounding ecosystem.....	123
Knowledge exchange and Romanian higher education institutions, an overview.....	124
Knowledge exchange and Romanian HEIs.....	128
Place does matter for knowledge exchange.....	135
Smart Specialisation and Romanian HEIs.....	141
Conclusions and policy recommendations.....	143
Notes.....	144
References.....	144

Tables

Table 1.1. Entrepreneurial behaviour and attitude – The GEM Survey	17
Table 1.2. 2015 PISA results.....	20
Table 1.1. Indicators to support the EU 2020 strategy, Romania and EU targets.....	67
Table 1.2. Competitiveness, innovation and higher education in Romanian regions.....	68
Table 1.3. Entrepreneurial activity and educational attainment, 2015.....	74
Table 1.4. Entrepreneurial activity and educational attainment, 2017.....	74
Table 1.5. Entrepreneurship and business administration programmes for tertiary education.....	75
Table 4.1. Romanian Enterprises by Size.....	96

Figures

Figure 1.1. Gross domestic product per capita, PPP	14
Figure 1.2. Total unemployment rate, as a percentage of active population.....	15
Figure 1.3. Ease of Doing Business 2018.....	16
Figure 1.4. Economic Complexity Index	16
Figure 1.5. Expenditure on tertiary education as a percentage of GDP	18
Figure 1.6. Tertiary education attainment (ISCED 5-8), 2017, 25-54 year-olds.....	19
Figure 1.7. Graduates in tertiary education, in science, mathematics, computing, engineering, manufacturing, construction, per 1 000 of population, 20-29 year-olds	20
Figure 1.8. Participants in CVT courses as a percentage of persons employed in all enterprises.....	21
Figure 1.9. Individuals' level of digital skills.....	22
Figure 1.10. GERD as a percentage of GDP	23
Figure 1.11. HERD as a percentage of GDP	23
Figure 1.12. Public vs. private sector driven innovation systems	24

Figure 1.13. Total R&D personnel full-time equivalent (FTE) as a percentage of total employment ..	25
Figure 1.14. Percentage of enterprises co-operating with universities or other higher education institutions	25
Figure 1.15. EU success rated for FP7 calls concluded in 2007-13, by country	26
Figure 1.16. Success rates of Horizon 2020 applications per member state	26
Figure 1.17. Top scientific fields in terms of publication production, Romania.....	27
Figure 1.18. Resident patent applications per million population (by origin), total count by 2	28
Figure 1.19. Distribution by region of development of faculties and students enrolled in undergraduate higher education in the 2016/17 academic year.....	30
Figure 2.1. R&D expenditure in the OECD area, trends over time.....	42
Figure 2.2. R&D performed by HEIs and governmental bodies in the OECD	42
Figure 4.1. Companies' birth rate by size, %	97
Figure 4.2. Companies' survival rate, by size, %	97
Figure 4.3. Cities in Romania hosting companies formed after 1996	98
Figure 5.1. The traditional vs. the civic university	127
Figure 5.2. Total number of students at state universities 2017/18	132
Figure 5.3. Change in number of students at state universities	133
Figure 5.4. GDP in Romanian regions	137
Figure 5.5. Gross domestic expenditure on R & D (GERD), by region (NUTS 2).....	138

Boxes

Box 1.1. Entrepreneurship competency as a lifelong competency, EU Council Recommendation.....	70
Box 1.2. The EU Entrepreneurship Competence Framework - EntreComp	71
Box 1.3. From co-operation to integration – The case of the University of Strathclyde.....	76
Box 1.4. An example of experiential learning at the Dublin Institute of Technology (Ireland).....	79
Box 4.1. Student Entrepreneurial Societies (SES)	106
Box 4.2. The West University of Timișoara (UVT) – An emerging entrepreneurial ecosystem's epicentre	109
Box 4.3. Junior Achievement Romania (JAR).....	111
Box 4.4. The Innovation Labs	112
Box 4.5. The CLUSTERO network	113
Box 4.6. Start-Up Nation.....	114
Box 4.7. International best practice in business angel co-investment fund.....	115
Box 4.8. The Spherik Accelerator in Cluj-Napoca.....	116
Box 4.9. The Incubator of the University of Ljubljana, Slovenia	117
Box 5.1. The Higher Education-Business Community Interaction Survey (HE-BCI).....	128
Box 5.2. An introduction to the new economic geography	136
Box 5.3. Examples of Romanian universities that act as anchor institutions in their regions	138
Box 5.4. EU Guide to Connecting Universities to Regional Growth.....	140
Box 5.5. University-city co operation – EUniverCities.....	141

Executive summary

Since the late 1980s and the collapse of the Socialist regime and the subsequent economic turmoil of the 1990s, Romania has transitioned towards a market-based economy and exhibited strong economic growth. Over the recent past, Romania was affected by the global financial crisis but economic growth has recovered recently reaching its post-crisis highest values. Romania's labour market has evidenced signs of improvements fuelled by the country's economic growth. The employment rate has increased while the unemployment rate has decreased from 6.4% in 2007 to 4.9% in 2017. The unemployment rate was below the EU28 average of 7.6% in 2017 as well as below East European countries rates such as Hungary (4.2%), Bulgaria (6.2%), Slovenia (6.6%) and the Slovak Republic (8.1%) (Figure 1.2).

Despite the positive scenario, there are several challenges faced in the labour market, such as negative demographic trends as an ageing population in addition to very high numbers of Romanians leaving the country to seek opportunities abroad. The country's population has declined over the last decades and this trend is expected to continue. In addition, there are important factors that may hinder economic growth, such as skills shortages and socio-economic inequalities, and a high risk of poverty and social exclusion reaching almost 39% of the population. This makes innovation in the higher education system a pressing imperative to stop and invert these trends.

Entrepreneurship education cannot be looked upon without understanding the broader context: it is not just an issue of the content of study programmes, of how the content is delivered (embedded in all curricula, separate courses) or of the number of students enrolled in those programmes. The way entrepreneurship education relates to lifelong competencies and how it contributes to the quality of life through building human and social capital needed for promoting knowledge exchange and collaboration with relevant actors are key.

In Romania, entrepreneurship education does not cover the entire campus and its access is often limited to students studying economics or business, programmes in which entrepreneurship courses are most often offered. In developing the educational content and its delivery, the business sector's participation is generally low. There is no consistent evaluation of the relevance of entrepreneurship education, limiting the possibility of evidence-based interventions.

The Romanian institutional context does not create a favourable framework to encourage entrepreneurial attitudes. When it comes to shaping the business environment, national institutions present a number of problematic aspects such as a volatile fiscal framework, bureaucracy in starting a business, lack of good governance practices, corruption at the interface between public space with the private one, and uncertain rules regarding the establishment and management of intellectual property (IP). These issues persist throughout the HE system in Romania and are reflected in a lack of systemic capacity (within and outside of higher education institutions, HEIs), strategic fragmentation

(geographical, political, organisational) and, consequently, relatively low entrepreneurial motivation (of students, staff and managers) overall.

However, with an academic tradition, a talented workforce and collective determination, the entrepreneurship ecosystem in Romania could greatly improve. There is clearly strength in emerging programmes highlighting the value of entrepreneurship through information sharing and entrepreneurial education, though the reliance on multinational corporations for industry engagement and lack of attention to continuing professional development (CPD) for staff is concerning. Also noted are many national and local programmes attempting to support routes to business creation, though low market awareness, high administrative burden and instrumental use of support mechanisms are detrimental to the success of many start-up and spin-off businesses.

The assessment of the performance of the Romanian higher education system in delivering knowledge exchange using the HEInnovate model demonstrates that overall volumes and values remain low. Performance is limited by cultural and institutional issues both within the system and individual universities. Some demand for traditional forms of technology transfer is evident in places but low overall, with a focus currently only on large-scale incoming inward investors, often in the sectors of engineering, manufacturing and information and communications technology (ICT). The difficult economic geography of Romania, with widening disparities of performance at the regional level and differential but critical levels of depopulation, coupled with the growing dominance of an agglomerating capital-city region, all remain structural issues of fundamental importance.

Other changes can be considered. Universities are nominally independent but very heavily regulated by a bureaucratic central control system. Devolving new incentives, motivations and rewards to the local level, helping to build institutional capacities and partnerships, can only support real desires at that level to build upon current performance in knowledge exchange.

Chapter 1. Higher education and innovation in Romania

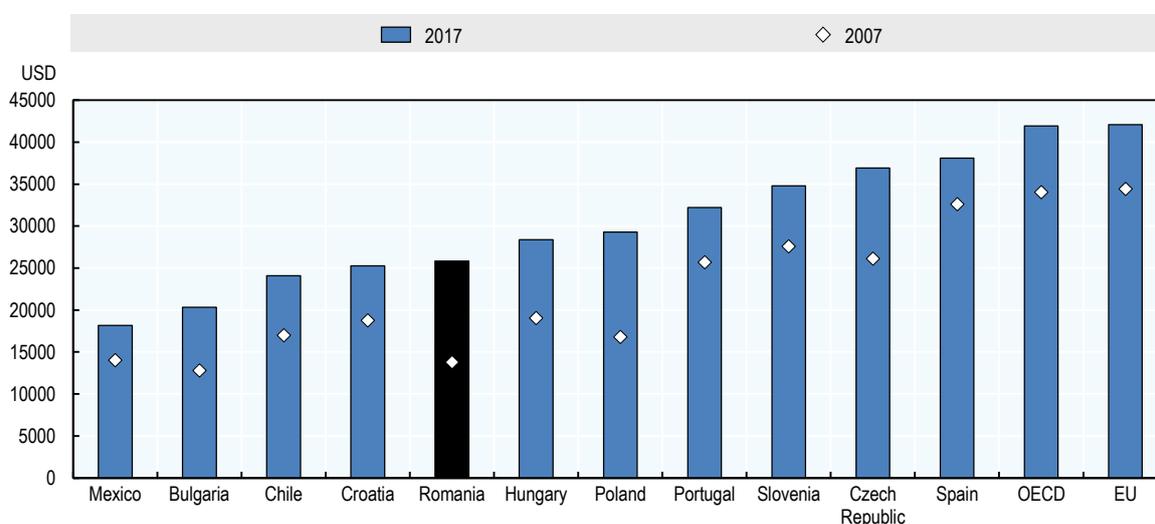
Romania has been growing fast since the 1990s and has weathered the financial crisis quite well. However, economic growth has been depending on private consumption and may lose momentum, in the near future. The country is still relatively poor, with very large regional imbalances. Within this context, the higher education system could represent an important driver to promote innovation and generate human capital. However, due to outmigration, the number of students enrolled in universities has been declining and private investment in R&D remains relatively low. This chapter discusses the organisation of the Romanian education system, the national innovation performance and lists the policies the government put in place to promote to improve the current situation.

Main macroeconomic trends

Since the late 1980s and the collapse of the socialist regime and the subsequent economic turmoil of the 1990s, Romania has transitioned towards a market-based economy and exhibited strong economic growth. Over the recent past, Romania was affected by the global financial crisis but economic growth has recovered recently, reaching its highest values post-crisis.

Real GDP growth has had an important increase over the last years, with an estimated growth of 6.9% in 2017 (Eurostat, 2017). GDP per capita has also evidenced a substantial and constant raise, reaching in 2017 its highest value in a decade (Figure 1.1).

Figure 1.1. Gross domestic product per capita, PPP



Source: World Bank (2018), *Doing Business 2018. Reforming to Create Jobs*, World Bank Group.

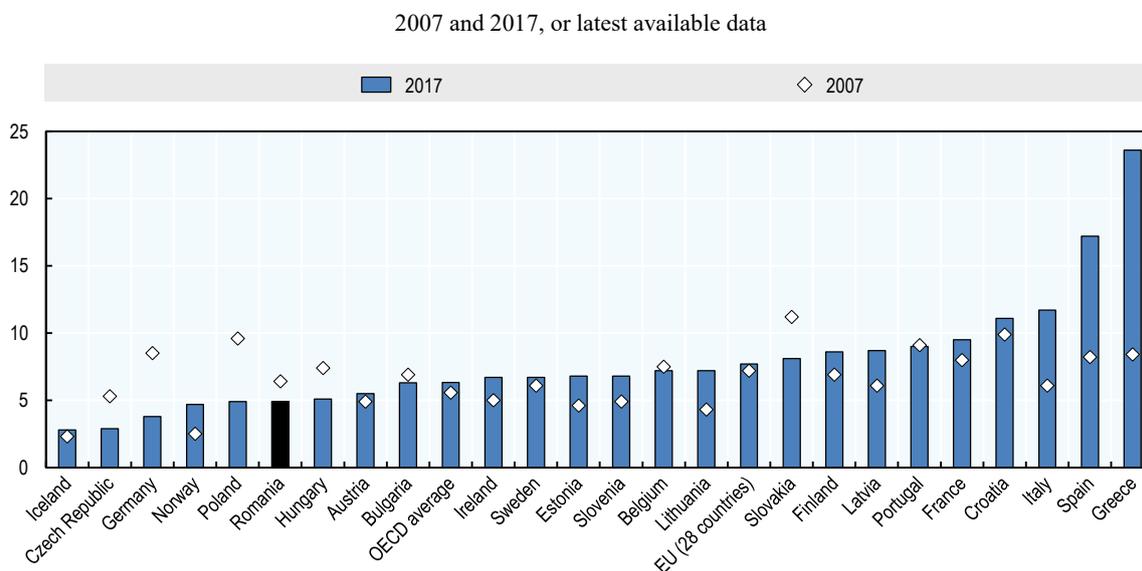
Nonetheless, there are important regional imbalances within the country. The capital region's GDP per capita has had a considerable increase, widening the economic gap with other regions. In spite of the country's recent economic growth, Romania still lags behind neighbour countries as well as European ones such as Austria, Portugal and Spain, and its GDP per capita is significantly behind the European Union average. In the near future, economic growth is expected to slow. Nonetheless, it is forecast to remain over its potential. However, Romania faces important challenges ahead, mainly concerning inflationary pressures as well as current account deficits due to the increase in imports (EC, 2018b).

The present economic expansion is mostly explained by private consumption, which has been encouraged by the increase in public and private sector wages, as well as by indirect tax cuts. Even though the country accounts for high investment ratios, it has decreased in 2016, although there are signs of resuming its pace since 2017. Regardless, public investment has decreased to 3% of GDP, the lowest value in the last decade (EC, 2018b).

Romania's labour market has evidenced signs of improvements fuelled by the country's economic growth. The employment rate has increased while the unemployment rate has decreased from 6.4% in 2007 to 4.9% in 2017. The unemployment rate was below the EU28 average of 7.6% in 2017 as well as below East European countries rates such as

Hungary (4.2%), Bulgaria (6.2%), Slovenia (6.6%) and the Slovak Republic (8.1%) (Figure 1.2).

Figure 1.2. Total unemployment rate, as a percentage of active population



Source: Eurostat (2018), *Tertiary Education Statistics*, https://ec.europa.eu/eurostat/statistics-explained/index.php/Tertiary_education_statistics.

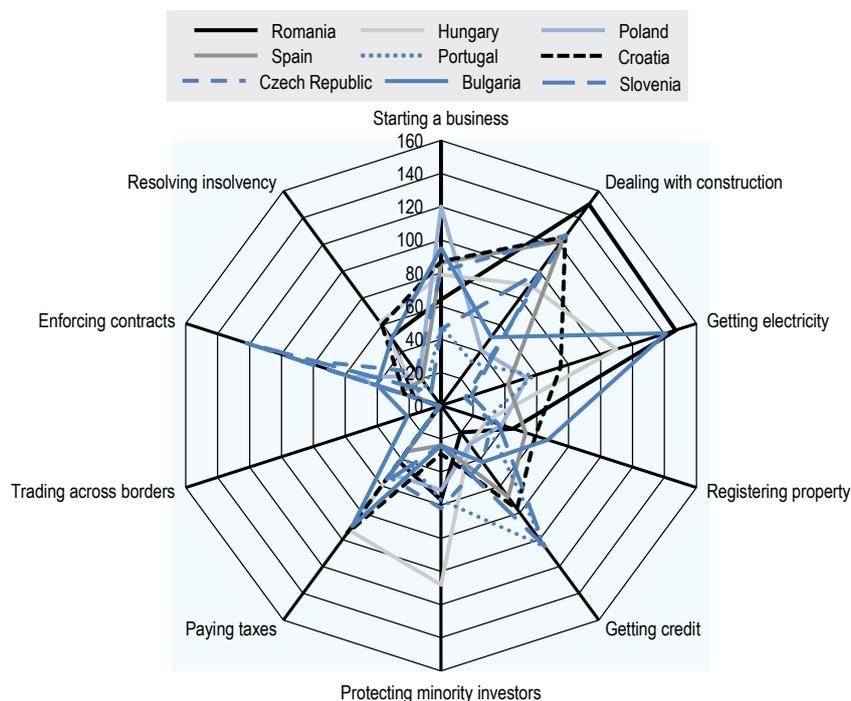
Despite the positive scenario, there are several challenges faced in the labour market, such as negative demographic trends as an ageing population in addition to very high numbers of Romanians leaving the country to seek opportunities abroad. The country's population has declined over the last decades and this trend is expected to continue. In addition, there are important factors that may hinder economic growth, such as skills shortages and socio-economic inequalities, a high risk of poverty and social exclusion reaching almost 39% of the population (EC, 2018b; Chioncel and Del Rio, 2018).

Ease of doing business and entrepreneurship behaviour

According to the World Bank Doing Business report (2018), Romania ranks 45th out of 190 countries in the ease of doing business ranking. It shows poor performance in areas such as “ease of getting electricity”, “construction permits” and, on a lesser scale, “protecting investments” and “resolving insolvency”. Conversely, being part of the European Union, the country has a good performance in trading across borders, as well as enforcing contracts and getting credit (Figure 1.3).

The Economic Complexity Index (Country Complexity Rankings, ECI) measures the knowledge intensity of an economy's export products. Romania has increased its score in the ECI in 2016 in comparison to 2006, showing a transition towards a more complex economy (Figure 1.4). Furthermore, it presents a better performance than European countries, such as Bulgaria, Croatia and Portugal, as well as Latin American ones, such as Chile and Mexico. Nonetheless, it underperforms in comparison to more diversified economies such as Austria, the Czech Republic and Korea.

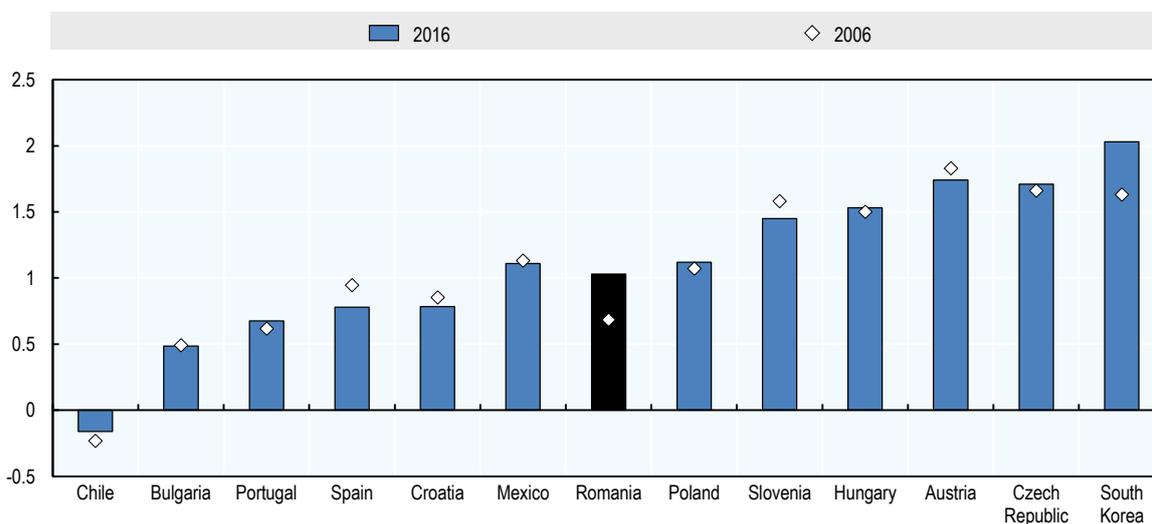
Figure 1.3. Ease of Doing Business 2018



Source: World Bank (2018), *Doing Business 2018. Reforming to Create Jobs*, World Bank Group.

Figure 1.4. Economic Complexity Index

2006 and 2016, or latest available data



Source: Growth Lab (2016), *Country Complexity Rankings (ECI)*, <http://atlas.cid.harvard.edu/rankings>.

The Global Entrepreneurship Monitor (GEM) survey data shows how Romanians perceive weak opportunities for becoming entrepreneurs. Variables associated with entrepreneurial activity also show values lower than the global average. Interestingly, variables attempting to capture the perception of the entrepreneurial impact, though, are higher than the global average, as are the ones related to the status of being an entrepreneur (Table 1.1). During

study visits to Romania, a considerable gap in terms of attitude and perception between older and newer generations emerged, which may result in more positive trends, in the future.

Table 1.1. Entrepreneurial behaviour and attitude – The GEM Survey

GEM variable	Romania 2015	Global average
Self-perceptions		
Perceived opportunity rate <i>(% of 18-64 population – individuals involved in any stage of entrepreneurial activity excluded – who see good opportunities to start a firm in the area in which they live)</i>	33.31	42.43
Perceived capability rate <i>(% of 18-64 population – individuals involved in any stage of entrepreneurial activity excluded – who believe they have the required skills and knowledge to start a business)</i>	46.33	50.50
Fear of failure rate <i>(% of 18-64 population – individuals involved in any stage of entrepreneurial activity excluded – who indicate that fear of failure would prevent them from setting up a business)</i>	40.49	36.67
Entrepreneurial intentions rate <i>(% of 18-64 population – individuals involved in any stage of entrepreneurial activity excluded – who are latent entrepreneurs and who intend to start a business within 3 years)</i>	29.01	21.78
Activity		
Total early stage entrepreneurial activity <i>(% of 18-64 population who are either a nascent entrepreneur or owner-manager of a new business)</i>	10.83	13.22
Established business ownership rate <i>(% of 18-64 population who are currently an owner-manager of an established business, i.e. owning and managing a running business that has paid salaries, wages or any other payments to the owners for more than 42 months)</i>	7.47	8.40
Entrepreneurial employee activity rate <i>(Rate of involvement of employees in entrepreneurial activities, such as developing or launching new goods or services, or setting up a new business unit, a new establishment or subsidiary)</i>	4.61	3.07
Motivations		
Motivation index <i>(% of those involved in TEA that are improvement-driven opportunity motivated, divided by the percentage of TEA that is necessity motivated)</i>	1.21	2.48
Impact		
High job creation expectation rate <i>(% of those involved in TEA who expect to create 6 or more jobs in 5 years)</i>	39.80	20.11
Innovation rate		
<i>(% of those involved in TEA who indicate that their product or service is new to at least some customers and that few/no business offer the same product)</i>	30.00	26.03
Business service sector rate <i>(% of those involved in TEA in the “Business Service” sector – Information and Communication, Financial Intermediation and Real Estate, Professional Services or Administrative Services, as defined by the ISIC 4.0 Business Type Codebook)</i>	17.60	16.35
Societal values		
High status to successful entrepreneurs rate <i>(% of 18-64 population who agree with the statement that in their country, successful entrepreneurs receive high status)</i>	75.07	67.73
Entrepreneurship as a good career choice rate <i>(% of 18-63 population who agree with the statement that in their country, successful entrepreneurs receive high status)</i>	72.42	60.92

Source: GEM (2017), *Global Entrepreneurship Monitor, Romania Country Page*.

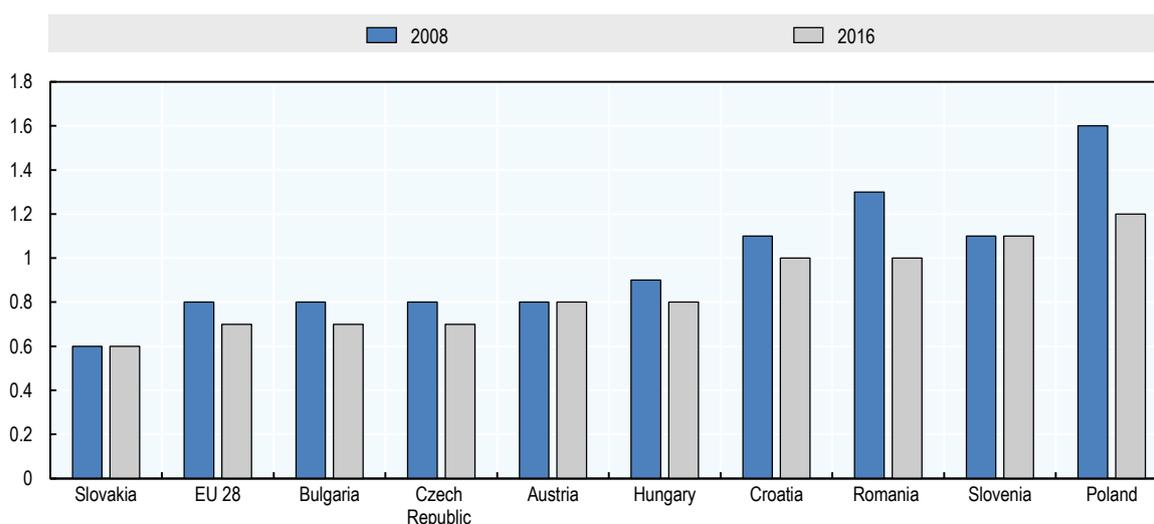
Education and skills

In today's knowledge economies, skilled human resources play a key role in fostering economic and social development. In addition, education can promote social mobility and inclusiveness. Higher education institutions (HEIs) have a vital role in providing the skills needed to enable innovation and knowledge sharing. This section presents an array of indicators capturing different elements of a country's performance in education and skills, such as government expenditure on education, specifically in tertiary education, and the Programme for International Student Assessment (PISA) results.

Romania's government expenditure on education as a percentage of GDP was of 3.7% in 2016 (Eurostat), representing, in relative terms, a decrease from its 2008 government expenditure of 4.4% of GDP. The country's expenditure in 2016 was below the European average of 4.7%.

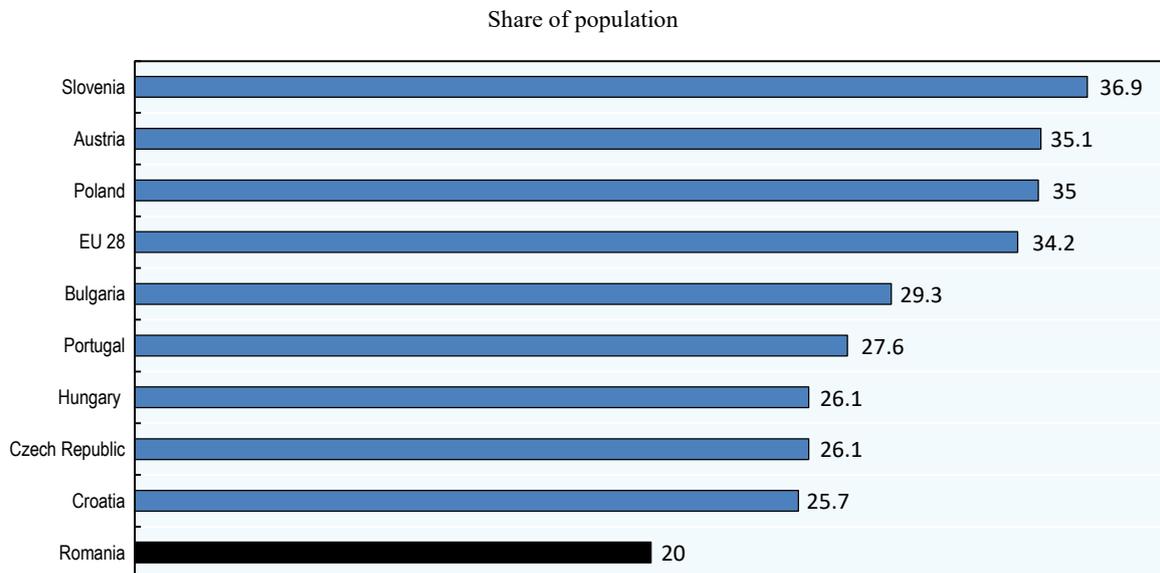
The country's expenditure on tertiary education as a percentage of GDP is above the European average (Figure 1.5). Even though Romania's expenditure has not yet reached its pre-crisis expenditure, as a share of GDP, the resource allocation is above the expenditure of neighbouring European countries.

Figure 1.5. Expenditure on tertiary education as a percentage of GDP



Source: Eurostat (2018), *Tertiary Education Statistics*, https://ec.europa.eu/eurostat/statistics-explained/index.php/Tertiary_education_statistics.

In addition to the expenditure on tertiary education, the number of graduates in tertiary education provides an indication of a country's ability to accumulate human capital. In 2017, Romania had only 20% of people 25-54 years-old with tertiary education, a share much lower than the European average and amongst the lowest in the European Union (EU).

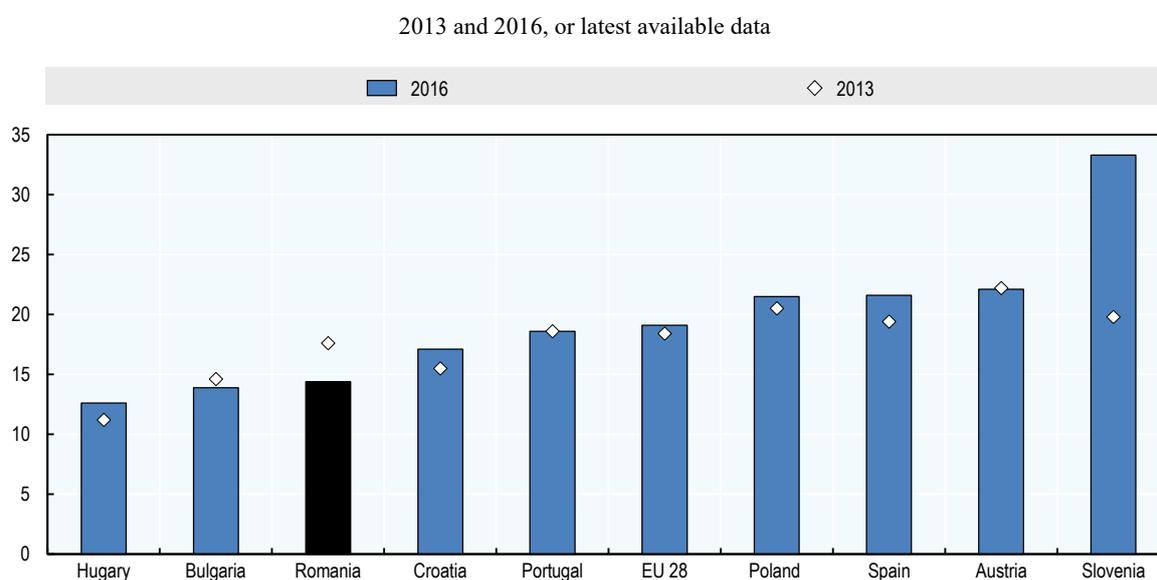
Figure 1.6. Tertiary education attainment (ISCED 5-8), 2017, 25-54 year-olds

Source: Eurostat (2018), *Tertiary Education Statistics*, https://ec.europa.eu/eurostat/statistics-explained/index.php/Tertiary_education_statistics.

Romania faces important challenges regarding the decreasing number of students in tertiary education. The number of students enrolled in bachelor's degree has sharply decreased by more than half in the 2009-16 period. This is due to fertility and birth trends over the last decades and the migration of Romanians to other European countries and beyond. In addition, almost 3 600 students less were enrolled in the 2016/17 academic year compared to the preceding one (Background report Romania). These trends can be explained by several factors including demographic trends, emigration of students and stricter criteria of admission to higher education.

The number of graduates in fields related to science, technology, engineering and mathematics (STEM) is an important measure of a country's science and technology personnel and its technological and industrial capacities. In Romania graduates in tertiary education per 1 000 population, aged 20-29 in STEM-related fields have decreased, from 17.6% to 14.4% in a short period of time (2013-16)¹ (Figure 1.7). This trend is consistent with the overall trend of declining students in tertiary education in Romania more generally. In spite of the decrease, Romania still presents more STEM graduates than neighbouring countries such as Bulgaria and Hungary, although it falls behind countries such as Austria, Croatia, Slovenia and the EU28 average of 19.1% of graduates in 2016.

Figure 1.7. Graduates in tertiary education, in science, mathematics, computing, engineering, manufacturing, construction, per 1 000 of population, 20-29 year-olds



Note: Data for Portugal and EU28 is from 2015; data for Poland is from 2014.

Source: Eurostat (2018), *Tertiary Education Statistics*, https://ec.europa.eu/eurostat/statistics-explained/index.php/Tertiary_education_statistics.

In addition to the expenditure on education and the number of graduates in tertiary education, the quality of education is an important element to approach the performance of human resources in the labour market. The OECD Programme for International Student Assessment (PISA) seeks to evaluate education systems through the examination of skills and knowledge of 15-year-old students. In this regard, PISA evaluates student performance in three key areas: reading, science and mathematics. When comparing Romania's results of the 2009 OECD PISA survey with the 2015 ones, modest improvements are observed, although the country has increased its score in all three areas. Reading scores increased from 424 to 434, mathematics scores from 427 to 444 and science scores 428 from to 435. Nonetheless, overall, in all three PISA surveys (2009, 2012 and 2015), the country has performed under the OECD average in all three areas (reading, mathematics and science) (Table 1.2).

Table 1.2. 2015 PISA results

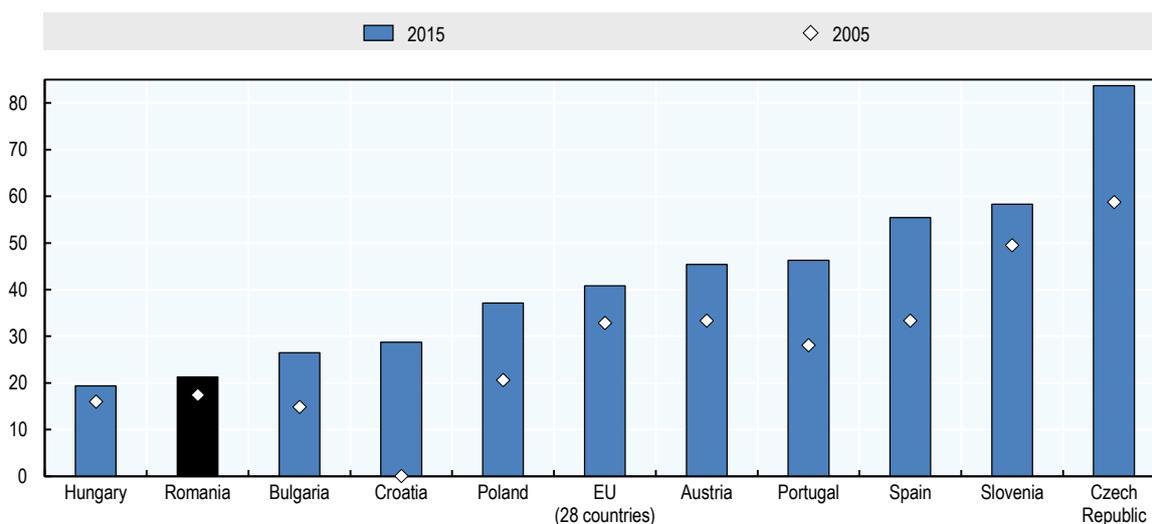
Country	On the overall reading scale	On the mathematics scale	On the science scale
OECD average	493	490	493
Poland	506	504	501
Hungary	470	477	477
Portugal	498	492	501
Spain	496	486	493
Czech Republic	487	492	493
Croatia	487	464	475
Austria	485	497	495
Romania	434	444	435
Korea	517	524	516
Chile	459	423	447

Country	On the overall reading scale	On the mathematics scale	On the science scale
Mexico	423	408	416
Bulgaria	432	441	446
Slovenia	505	510	513

Source: OECD (2018) *PISA 2015 Results in Focus*, PISA in Focus, No. 67, OECD Publishing, Paris, <https://doi.org/10.1787/aa9237e6-en>.

Learning goes beyond traditional education systems; in this regard, lifelong learning is an important tool that offers a significant source of knowledge and is essential for developing new skills and bridge knowledge and competency gaps in the workplace. Romania's participation in continuing vocational training (CVT) courses as a percentage of persons employed in all companies is of 21%, below the EU28 average of 41% and behind East European countries such Croatia, Bulgaria, the Czech Republic and Slovenia. However, the country has increased its participants in CVT courses in the 2005-15 period, from 17% to 21% (Figure 1.8). When observing CVT participants by gender in Romania, the percentage of male and female engagement in CVT courses is similar: 21.1% of males attend these training courses versus 21.5% of women.

Figure 1.8. Participants in CVT courses as a percentage of persons employed in all enterprises

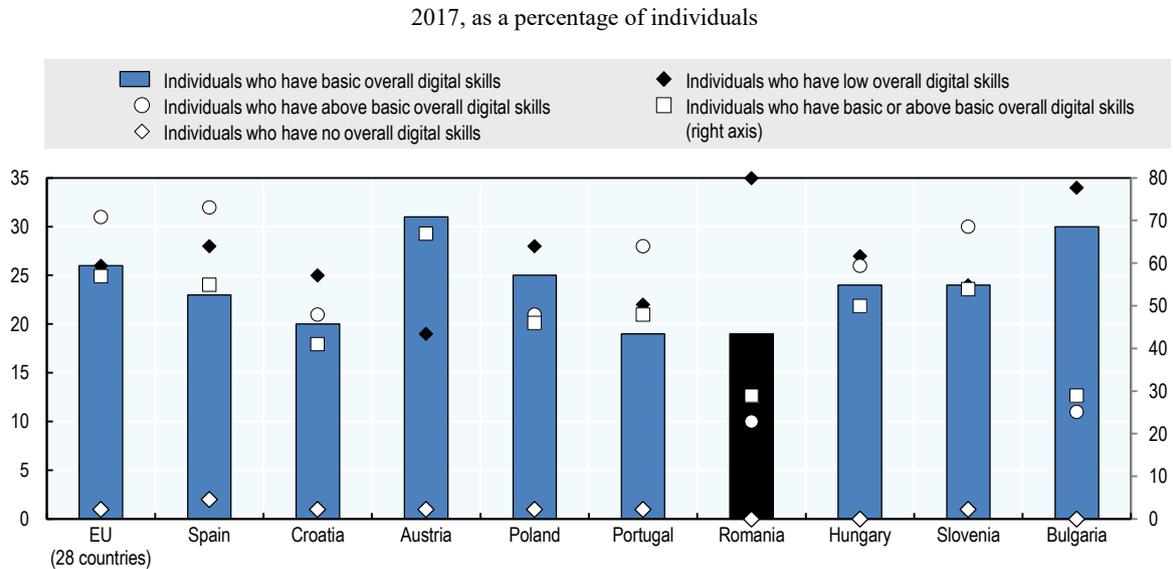


Note: No available data for Croatia in 2005.

Source: Eurostat (2018), *Tertiary Education Statistics*, https://ec.europa.eu/eurostat/statistics-explained/index.php/Tertiary_education_statistics.

Information and communication technology (ICT) skills and competencies play an important role in modern globalised economies. Digital skills are fundamental to the workforce to meet the new demands in the labour market. In 2017, 35% of individuals in Romania had low digital skills, below the EU28 average of 26%. Individuals with basic digital skills rose to 19%, while individuals with higher digital skills were of 10%, both below the EU28 average of 26% and 31% respectively. On the other hand, when taking into consideration individuals with no overall digital skills, the country ranked below the EU28 average (Figure 1.9).

Figure 1.9. Individuals' level of digital skills



Source: Eurostat (2018), *Tertiary Education Statistics*, https://ec.europa.eu/eurostat/statistics-explained/index.php/Tertiary_education_statistics.

Innovation performance

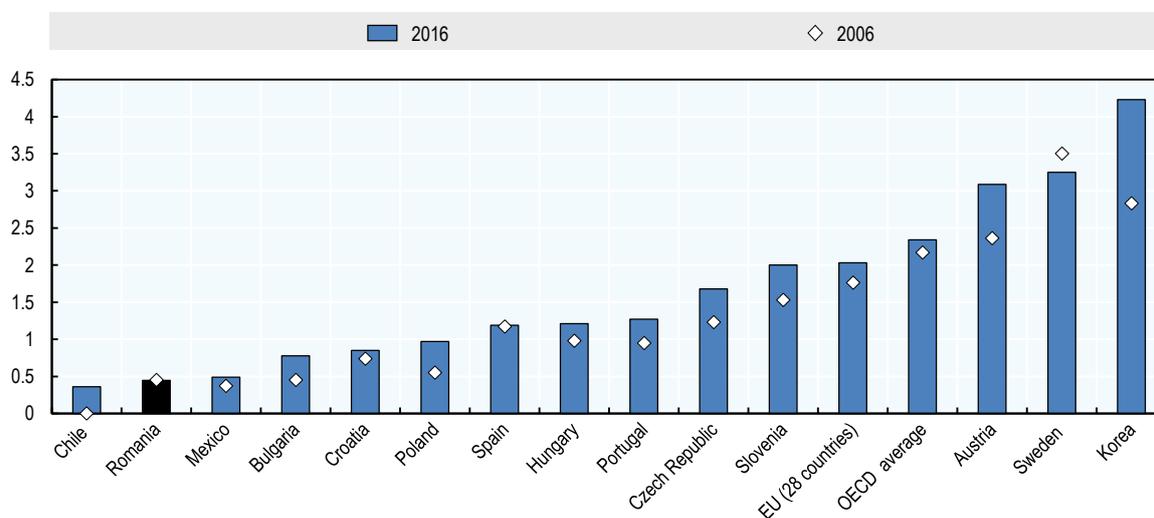
There are different sets of indicators that provide a scope of the diverse innovation inputs and outputs, offering relevant information related to a country's innovation performance. Overall, Romania has a modest performance in key innovation indicators, evidencing weak signs of improvement in innovation intensity. This section highlights trends regarding research and development (R&D) expenditure, technology transfer and human capital and skills related to science, technology and innovation in the country.

The gross domestic expenditure on research and development (GERD) as a percentage of GDP measures the level of investments in research and development in a country. Romania has slightly increased its expenditure in the 2006-16 period, from 0.45% of GDP to 0.48% (Figure 1.10). However, the country has not been able to reduce the gap with EU and OECD countries. Romania's expenditure on R&D is well below the 2016 EU28 and OECD average of 2% and 2.3% respectively. It also lags behind East European countries such as Bulgaria (0.78%) and Hungary (1.21%).

When comparing Romania's GERD composition by source of funding and sector of performance to EU28 and OECD averages, it can be observed that the country's business enterprise sector lags behind other countries, revealing the weak innovation activities of Romanian firms. The government sector emerges as the main stakeholder that funds R&D in the country, in opposition to EU28 and OECD countries where, on average, the business sector is the primary funding stakeholder.

Figure 1.10. GERD as a percentage of GDP

2006 and 2016, or latest available data



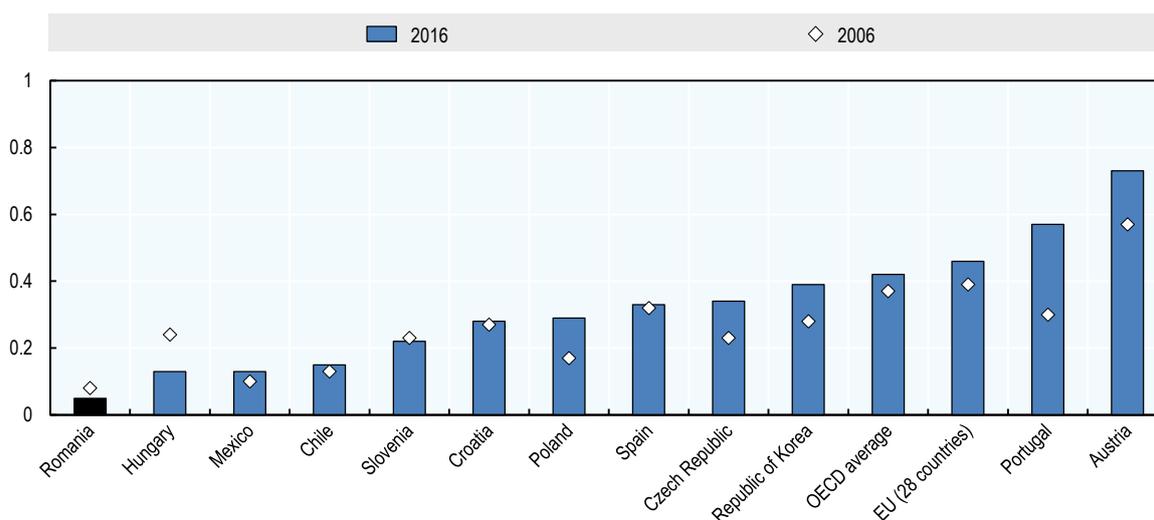
Note: Data for Chile 2006 is from 2007.

Source: Eurostat (2018), *Tertiary Education Statistics*, https://ec.europa.eu/eurostat/statistics-explained/index.php/Tertiary_education_statistics; OECD Main Science and Technology Indicators database, <https://www.oecd.org/sti/msti.htm>.

Higher education expenditure on R&D (HERD) as a percentage of GDP in Romania evidences the country's underinvestment in this area. The expenditure has decreased in the 2006-16 period (0.08% and 0.05%), significantly below the OECD (0.42%) and EU28 average (0.47%) in 2016 (Figure 1.11).

Figure 1.11. HERD as a percentage of GDP

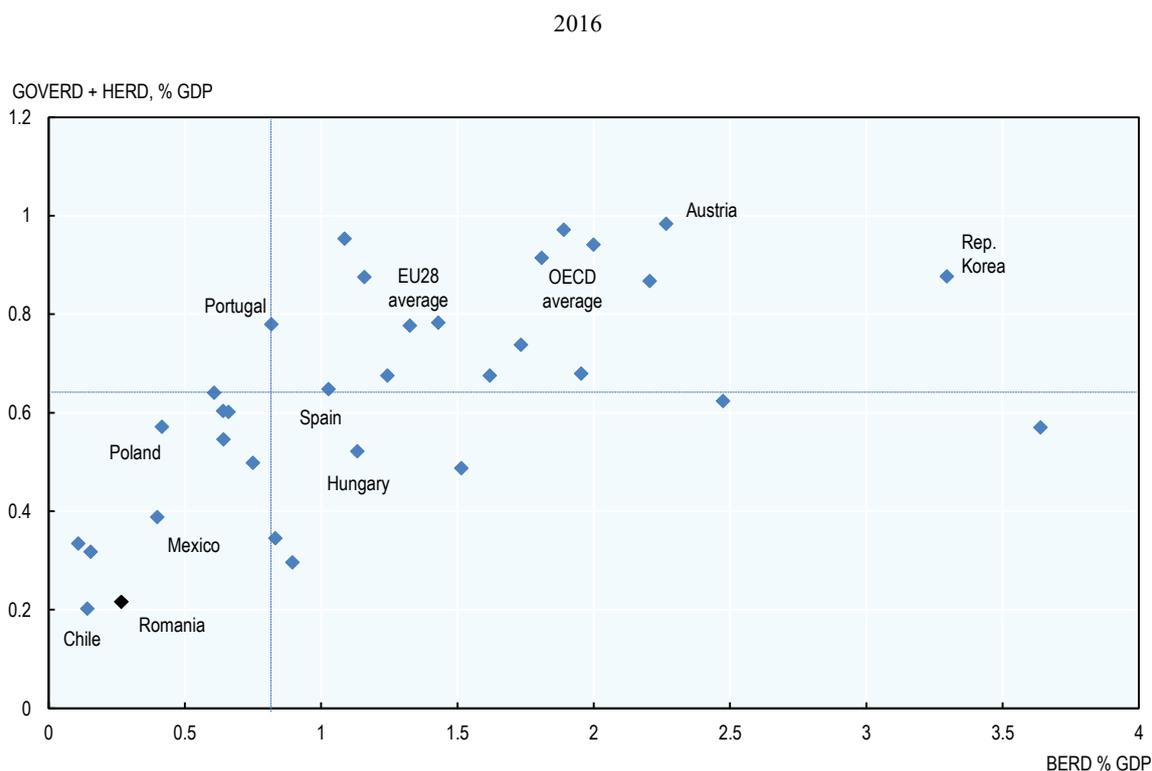
2006 and 2016, or latest available data



Source: Eurostat (2018), *Tertiary Education Statistics*, https://ec.europa.eu/eurostat/statistics-explained/index.php/Tertiary_education_statistics; OECD Main Science and Technology Indicators database, <https://www.oecd.org/sti/msti.htm>.

Furthermore, when taking into consideration the characterisation of national innovation systems (NIS) in OECD countries for the year 2016, Romania appears in the lower quadrant, presenting a low expenditure of business, government and higher education expenditure on R&D as a percentage of GDP, compared to most European economies. This evidences the country's modest funding, which may be hindering its innovation performance (Figure 1.12).

Figure 1.12. Public vs. private sector driven innovation systems



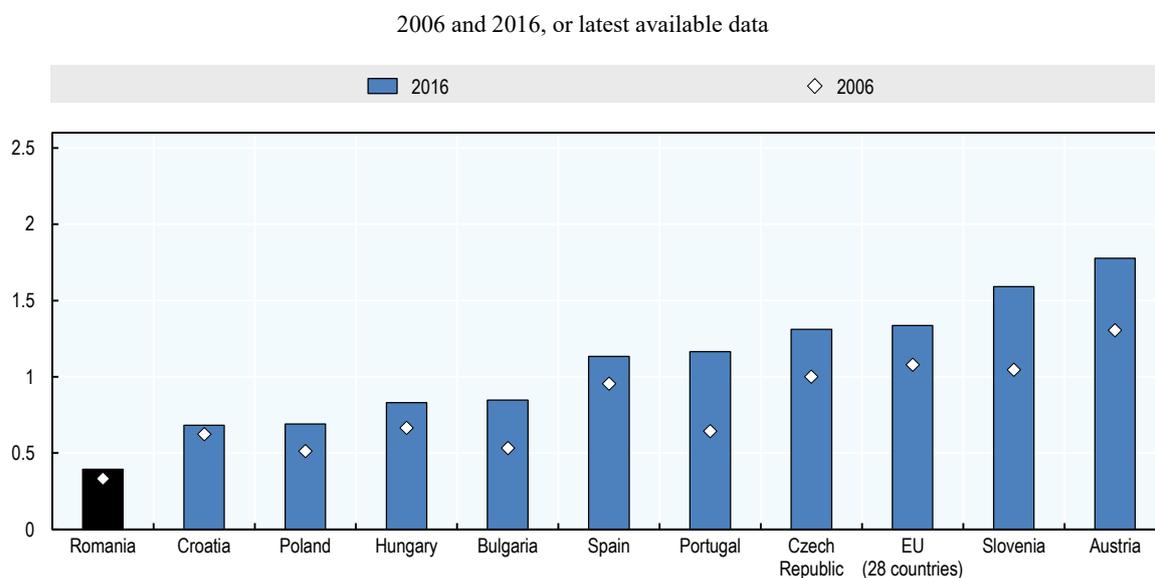
Note: Data for Poland 2016 is from 2015.

Source: OECD Main Science and Technology Indicators database <https://www.oecd.org/sti/msti.htm>.

Romania also presents weaknesses regarding R&D personnel statistics (Figure 1.13). Even though the country has increased its human resources on R&D activities in 2016 in comparison to 2006, it still remained well below the EU average of 1.3% in 2016. Furthermore, Romania lags behind neighbouring countries as well as East European ones.

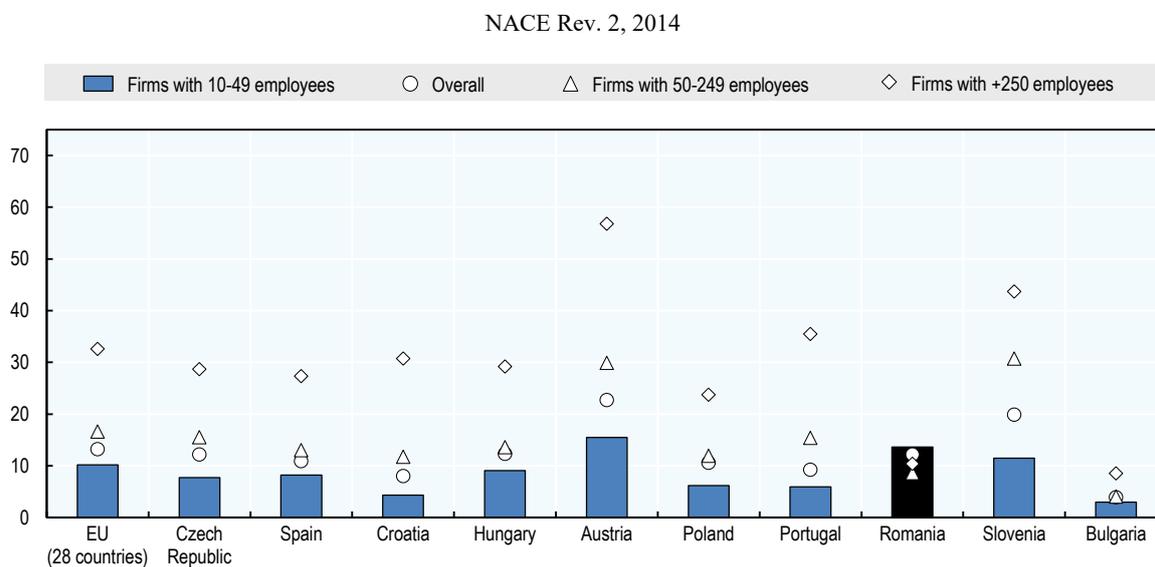
Expenditure and innovation activities within the business sector are highly influenced by firm size, as it plays an important role in a firm's ability to engage, absorb and disseminate knowledge. Small- and medium-sized enterprises (SMEs) often lack the means to co-operate and generate linkages with HEIs and universities and, in general, engage less in innovation activities. In general terms, 12% of Romanian firms engage in co-operation activities with HEIs and universities, below the EU28 average of 13% or advanced European economies such as Austria (23%) (Figure 1.14).

Figure 1.13. Total R&D personnel full-time equivalent (FTE) as a percentage of total employment



Source: Eurostat (2018), *Tertiary Education Statistics*, https://ec.europa.eu/eurostat/statistics-explained/index.php/Tertiary_education_statistics.

Figure 1.14. Percentage of enterprises co-operating with universities or other higher education institutions

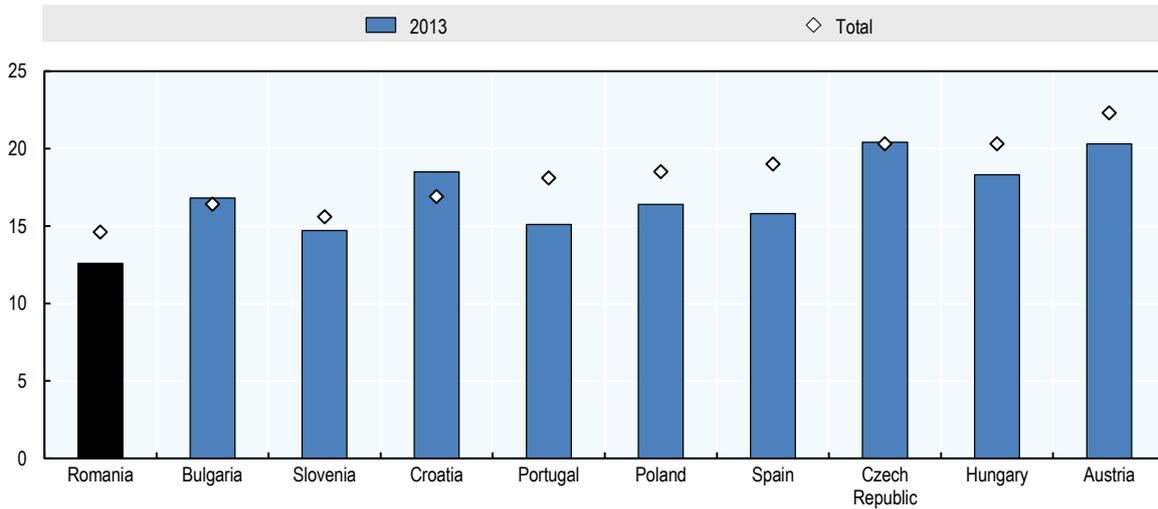


Sources: Community Innovation Survey 2014 (CIS) <https://ec.europa.eu/eurostat/web/microdata/community-innovation-survey>; Eurostat (2018), *Tertiary Education Statistics*, https://ec.europa.eu/eurostat/statistics-explained/index.php/Tertiary_education_statistics.

European programmes for science and innovation are an opportunity for HEIs and firms to participate in science and innovation networks. Romania's performance in EU programmes can improve: during the European Union's Research and Innovation funding programme

for 2007-2013 (FP7) – which has become Horizon 2020 – Romania’s total success rate was of 14.6%, below neighbouring countries such as Bulgaria (16.4%) and Hungary (20.3%) (Figure 1.15).

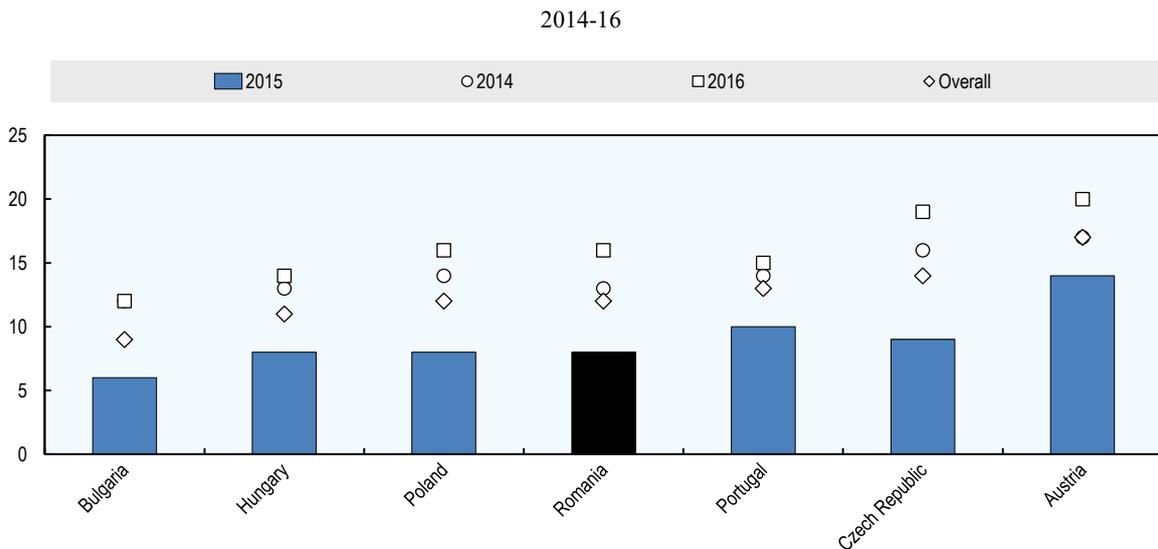
Figure 1.15. EU success rated for FP7 calls concluded in 2007-13, by country



Source: EC (2015), “Seventh FP/monitoring report”, European Commission.

Conversely, when considering the European Commission Horizon 2020 programme, Romania has an overall success rate of 12%, below Austria (17%), the Horizon 2020 average (14.8%) and the Czech Republic (14%) although above neighbouring countries as Bulgaria and Hungary (Figure 1.16).

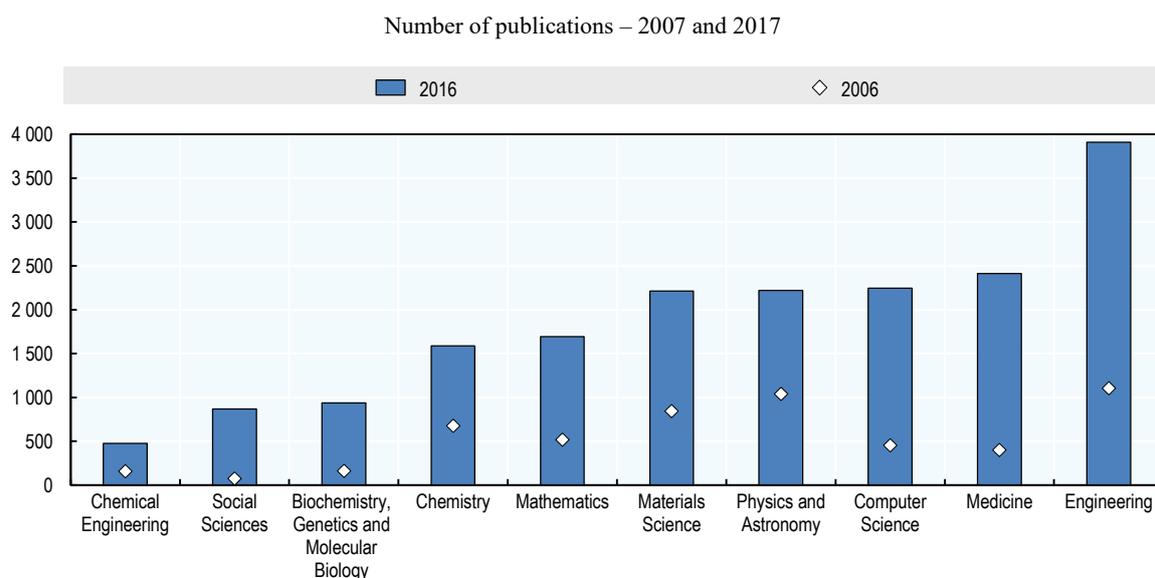
Figure 1.16. Success rates of Horizon 2020 applications per member state



Source: EC (2017b), “Horizon 2020 in full swing. Three years on. Key facts and figures 2014/2016”, European Commission.

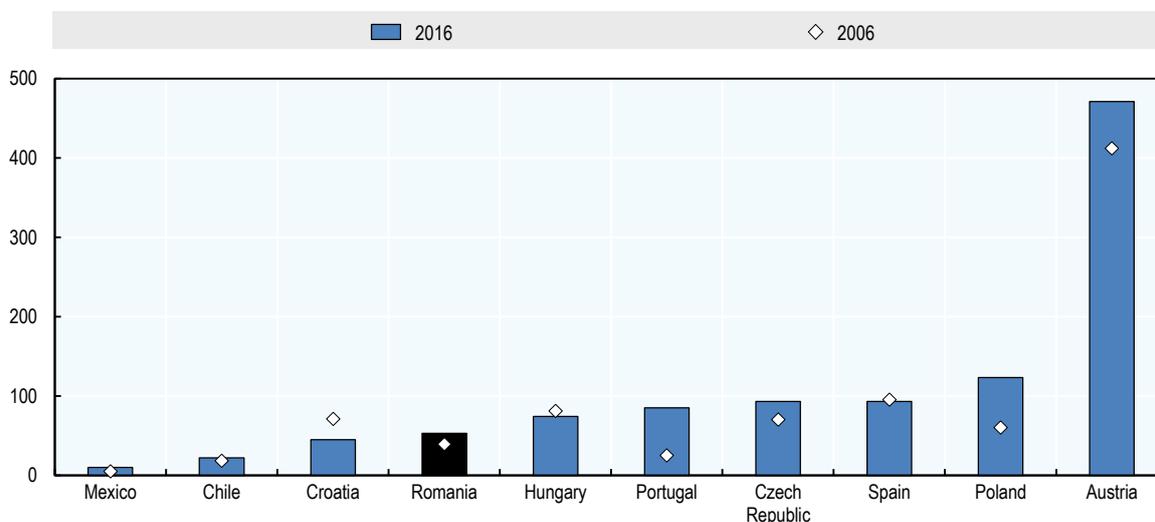
Regarding Romania's top scientific production, it is concentrated primarily on basic and applied sciences, mainly focused on fields such as engineering, medicine, material science, physics and astronomy, chemistry and mathematics, and to a lesser extent social sciences. The country's publication production has increased in all top scientific fields presented in the 2007-17 period (Figure 1.17).

Figure 1.17. Top scientific fields in terms of publication production, Romania



Source: Scimago Research Group (2018), *Scimago Website*, <http://www.scimagojr.com>.

Patents are frequently used as an indicator of innovation output and as a proxy for the creation of economically useful innovation. In this regard, Romania's resident patent applications per million population are modest in comparison to European countries such as Austria, Hungary, Portugal and Spain. However, the country has increased its applications per million population in the 2006-16 period, from 39 to 53 (Figure 1.18).

Figure 1.18. Resident patent applications per million population (by origin), total count by 2

Source: World Intellectual Property Organisation (WIPO) <https://patentscope.wipo.int/search/en/search.jsf>.

An introduction to the higher education system of Romania

As in other higher education systems, the mission of Romanian higher education is to generate and transfer knowledge to society. The national education system is open in character; in the case of HEIs, this is reflected in the University Charter, adopted by the university senate, comprising the rights, obligations and norms of the academic community. Romania was one of the 1999 Bologna Declaration signatories. Consequently, starting with the 2005/06 academic year, all Romanian HEIs, private and public, implemented the new three-cycle structure: bachelor, master and doctorate. The public higher education system is free but allows for fee-paying students to be part of the public system, too. The higher education system offers a combination of free and paid tuition.

Higher education providers

The Romanian higher education system consists of: i) universities; ii) study academies; iii) institutes; and iv) higher studies schools, the latter temporarily authorised and referred to as higher education institutions or universities. They all enrol high school graduates with a high school diploma, under varying admission conditions. Universities are the largest higher education institutions and most of them combine teaching responsibilities with those related to research activities and the third mission. Academies are higher education institutions that prepare their graduates in a specific field. These include economics and business administration, arts, music, military studies, etc. Polytechnic universities train students for technical fields of study and were founded based on pre-1990 polytechnic institutes. Institutes are higher education units, which confer vocational diplomas and qualifications, based on studies and professional experience in limited specialisation fields. The forms of organisation of the higher education are full-time, low-frequency and long-distance education.

According to the Law on National Education 1/2011 (art. 193), universities are classified as: i) education-centred universities; ii) universities for education and scientific research/artistic creation; and iii) universities of advanced research and education, the latter

status being attributed to only 12 HEIs at the time of writing this report. Romanian HEIs are autonomous and have the right to establish and implement their own development policies, in compliance with the provisions of the legislation in force. HEIs are accountable for their teaching and research activity, as well as the management of their national funding or own income. HEIs are state-budgeted based on individual contracts signed between the Ministry of National Education (MEN) and the HEI. Annual governmental decisions set the enrolment quota financed by the state budget for all education levels. Additionally, HEIs are authorised to accept a number of students exceeding the number of state-funded places, meaning the students support the costs for the education provided (Law 441/2001) with the fees established by each university depending on specialisation. The universities have full control over the management of their research budget and autonomously design research agendas and topics of research specialisation, yet implementation can be limited because of budget expenditure constraints.

In 2017/18, there were 48 comprehensive, medical and polytechnic state universities, 7 military academies, 37 private universities, of which 10 are temporarily accredited.

Student population

The upward trend in student population that dominated the period between 1990 and 2008 started reversing from the 2009/10 academic year onward. This depends on the significantly lower numbers of students born after 1990 as well as the decreasing number of high school graduates who pass the baccalaureate exam and the reduction in years of study (the effects of the Bologna process implementation started showing after 2008/09).² Other possible causes leading to a drastic decrease in the number of students include the high early-leaving rate in the pre-university education system and the phenomenon of external migration, which affects the size of the cohort that can reach this educational level. If in the 2010/11 academic year there were 871 842 students enrolled in public and private HEIs, the figures showed 531 586 students in 2016/17 (UEFISCDI-CNFIS, 2017). This is also due to the fact that many programmes in private universities have closed down.

According to National Statistics Institute data for the 2009-13 period, the analysis of student distribution by study profile reveals gradual decrease in the share of students enrolled in legal and economic profiles, constant increase of the share of students enrolled in technical, agricultural, medical profiles, with relatively constant weighting in higher education. These trends were determined, on the one hand, by the changes in the orientation of the faculties/students in relation to the labour market (from traditional profiles to other profiles required by more employers) and, on the other, by the massive drop in students registered in recent years in private education programmes (still predominantly oriented towards the two traditional profiles: economic and legal). The drop in private education programmes was also due to the stricter quality assurance mechanisms introduced in the higher education system. In 2016/17, the predominance of students enrolled in graduate and undergraduate studies in the business, administration and law fields is still evident, whereas doctoral and post-doctoral studies display higher figures in the fields of arts and humanities, health and social work, and engineering.

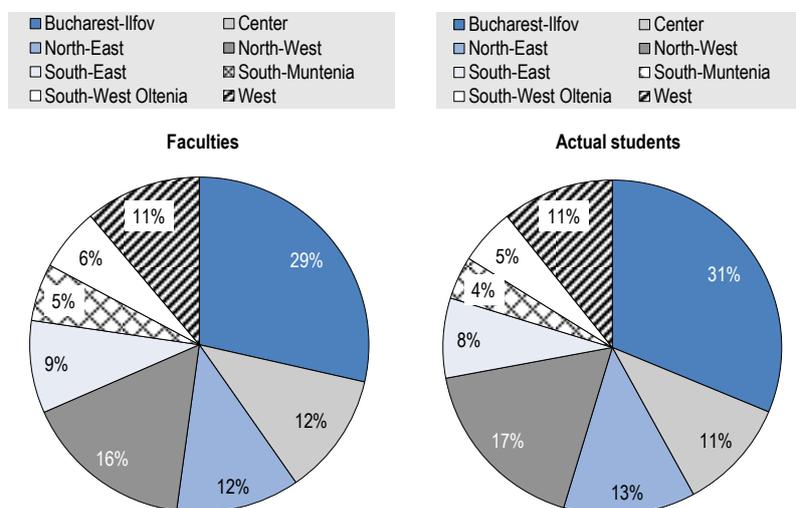
Still looking at data calculated using statistical notebooks on higher education from the National Statistics Institute for 2010-17, of the total number of students enrolled in undergraduate studies, more than 90% are enrolled full-time, almost 6% of students are enrolled in distance learning courses, and almost 4% are enrolled in low-frequency study programmes. Evolution of the number of students enrolled in undergraduate studies in various forms of study programmes highlights a significant increase – from year to year –

of options for full-time study programmes. The decrease in the number of students in the undergraduate cycle was different, depending on the form of property. Thus, in the 2009/10 academic year, the percentage of students in private education attending undergraduate studies in total number of students was 41.6% and in 2016/17 this percentage reached only 13.7%. Naturally, there is a reverse situation in public education, the value rising from 58.4% in 2009/10 to 86.3% in 2016/17.

Considering international students, depending on the country of origin, the data for the 2016/17 academic year shows that 94.2% of all students enrolled in undergraduate studies are Romanian and 5.4% foreign students. Compared with previous years, the share of foreign students has slightly increased in public education and is relatively constant at the level of private higher education. Most foreign students come from Europe (63.7%), Asia (22%) and Africa (12.6%).

In the 2016/17 academic year, in Romanian HEIs, 531 600 students were registered, showing a drop of 3 600 individuals compared to the previous academic year. Of the total number of students enrolled in higher education in 2016/17, 76.3% did so in undergraduate degree programmes, 19.5% in master's degree programmes, 3.6% in doctoral programmes and 0.6% in postgraduate programmes (postdoctoral programmes, postgraduate and postgraduate academic programmes, postgraduate specialisation programmes). Unsurprisingly, the capital Bucharest withholds the highest percentage of higher education institutions and students, namely more than a quarter (26.7%) of public education students and over half (56.5%) of students in private education.

Figure 1.19. Distribution by region of development of faculties and students enrolled in undergraduate higher education in the 2016/17 academic year



Source: National Institute of Statistics (2019), *Anuarele Statistice ale României (Statistical Yearbooks of Romania)*, Statistical Notebooks on Higher Education, INS, 2010-2017, <http://www.insse.ro/cms/ro/content/anuarele-statistice-ale-rom%C3%A2niei>.

In the last academic years, the distribution of students by basic specialisation group shows higher weights in certain areas. In the 2016/17 academic year, the following distribution was registered: 23.7% of students are in undergraduate degree programmes within the specialised fields of business, administration and law; 21.1% – in the specialised fields of

engineering, processing and construction; 16% – in the health and social assistance group. The lowest numbers are recorded in the following fields: education sciences (3.1%), services (3.7%), and natural sciences, mathematics and statistics (4.1%).

University staff

The staff in Romanian HEIs and generally in the education, research and medical systems, remains heavily underpaid in comparison with other national groups (judges, local administration, police, army) working in the public system, which leads to dissatisfaction, high staff turnover and, eventually, migration. The 2016 report of the CNFIS or National Council for Funding the Higher Education System (UEFISCDI-CNFIS, 2017) shows that the number of students enrolled in public HEIs, funded by MEN, has decreased in the period 2010-16 by 23.17%, from 579 290 to 445 048 students, and the number of contracted staff by 8.57%, from 24 291 to 22 207 permanent academic staff. Following the evolution of the ratio between the different categories of academic staff, a significant drop can be observed in the numbers of the teaching assistants (*preparator* in Romanian) from 10% in 2005/06 to 0.3% (72 teaching assistants) in 2015/16, eventually leading to the disappearance of this category. This is explained by the fact that academic titles of teaching staff were modified by the Law of National Education in 2011. The assistant professor ratio also fell to 5.9%, from 26.2% in 2005/06 to 19.3% in 2015/16. On the other hand, a growth of 10% from 26.6% in 2005/06 to 37.2% in 2015/16 can be seen in the case of lecturers, and even associate professors (+6.9%) from 17.1% in 2005/06 to 24% in 2015/16. The number of professors shows a slight reduction from 20% in 2005/06 to 18.8% in 2015/16 (UEFISCDI-CNFIS, 2017). The total number of academic staff decreased by 11% from 2009/10 to 2014/15 (Chioncel, del Rio, 2018). If in 2010/11 the ratio was of 1 academic staff member to 23.84 students, in 2017/18, the total number of teaching staff in HEIs was 26 266³ (almost perfectly gender-balanced), translating into a ratio of approximately 1 academic staff member to 17 students. Because of the low salaries and the strict performance in which academics are evaluated against criteria “to which academics in top world ranked universities may not comply” (Chioncel, del Rio, 2018), staff fluctuation and migration may be observed.

Other issues related to teaching staff mentioned in the various reports are: significant constraints on universities resulting from national regulations, especially regarding the recruitment and promotion of academic staff; salary incentives can be awarded to recognise excellent performance in research but not directly to teaching excellence or innovation in teaching. The current follow-up of the performance evaluation of the academic staff is mainly based on person-to-person discussions and is not backed by any resources that would recognise and stimulate performance in teaching. The current method of funding for teachers, based on contact hours, has a disproportionate influence on curriculum design and may be a disincentive to curriculum reform.⁴ Although, the recent governmental decrees and political programmes have led to consistent salary increases (by 25% gross since January 2018), in the context of significant reduction of the number of students, the personnel schemes in many fields are frozen, discouraging even further research and academic careers.

Romanian governmental actors related to the higher education and innovation system

In the last decade, a series of reforms were initiated but some of them still need the development of subsequent legal documents, based on coherent policies and sound

research, as well as impact assessments. The general legal framework for the organisation, administration and functioning of education in Romania is established chiefly by the Romanian Constitution (Chapters 2 and 3) and the Law of National Education (2011), whereas subsequent specific procedures and regulations are established by government decisions and orders of the Ministry of National Education (MNE).

The main policymakers are: the MNE, which works with universities that are involved in education but also research and innovation (R&I), inherently contributing to the development of R&D in higher education; the Ministry of Research and Innovation (MRI), which was created at the beginning of 2017 based on the National Authority for Scientific Research and Innovation, responsible for drafting research and innovation policies and for the co-ordination of the national R&I system (before 2017 subordinated to MNE&Research). Other national councils and advisory boards of registered experts working under the co-ordination of MNE are involved in the Romanian Higher Education System: the National Qualifications Authority (NCA), the National University Research Council (CNCS), the Advisory Board for Research and Development and Innovation (CCCDI), the National Council of Ethics for Research, the Technological Development and Innovation (CNECSDTI) and the National Council for Higher Education Financing (CNFIS) to name a few of the current ones. Also included in the decision-making process are the 3 main students' bodies: i) the National Alliance of the Students' Organizations in Romania; ii) the National Union of Students in Romanian; and iii) the Union of the Students of Romania. The representatives of the students' bodies participate in the debates on education, parliamentary meetings and institutional evaluation missions of the Romanian Agency for Quality Assurance in Higher Education (ARACIS).

Concerning R&D in higher education, the policy actors collaborating with the Ministry of National Education (MEN) for establishing the institutional mechanisms and implementing their objectives as reflected in Law on National Education no. 1/2011, with further amendments, are as follows: the Executive Unit for Financing Higher Education, Research, Development and Innovation (UEFISCDI) – a public institution with legal personality and subordinated to the Ministry of National Education (MNE) and functional advisory committees of the MNE and MRI with responsibilities in higher education, scientific research, development and innovation; the Romanian Agency for Quality Assurance in Higher Education (ARACIS) for the external evaluation of the quality of education provided by higher education institutions and by other organisations offering higher education study programmes, certifying compliance with quality standards; and the National Council of Rectors (CNR) composed of all the rectors of accredited higher education institutions and a very active body advising the ministry. Its role in adopting the new legislation for the reorganisation of university studies was fundamental. Law 288/2004 stipulates that the length of study cycles in different fields and specialisations is set by the Ministry of Education, at the proposal of the National Rectors Council, Ministry of Business Environment, Trade and Entrepreneurship (MBETE). In 1995, the 4 best universities in Romania (subsequently 5, the Academy of Economic Studies in Bucharest joining the University of Bucharest, Babeş-Bolyai University, “Alexandru Ioan Cuza” University of Iaşi, and West University of Timișoara) formed a consortium (*Consoțiul Universitaria*), which together – according to the Ministry of Education – accounts for one-third of budgeted places, while the other 50 universities have two-thirds.

National strategies and policies

The various policy reforms in Romania can be seen in the plethora of amendments that surpassed the effective number of actual articles of the old Education Law of 1995 which

resulted in the appointment of a presidential commission in 2006, created for making the necessary changes in the RHES. This presidential commission issued the report *Education and Research in Romania* in 2007 and submitted it to public debate, showing the need for substantial reform. Following the public debates, a National Pact for Education was adopted as a political document endorsed by all political parties and key stakeholders. Based on the analysis and the pact, a reform strategy – Education and Research for the Knowledge Society was developed and agreed with the key stakeholders.

The National Pact for Education set ambitious objectives to be reached by 2013 such as curricular reform, improvements in the management of higher education institutions, full university autonomy, classification of universities by their mission statements, and achievements and ranking of study programmes (connected with the financing system), introducing student charter and improving equity in higher education and lifelong learning programmes as a basis for increasing participation rates in higher education. Such policy documents were then considered as offering the grounds for adopting a new law in education and research, in order to generate the legal framework that would facilitate new developments and corresponding competitive outcomes in higher education,⁵ with the final goal for Romanian universities being to reach the top 500 in the Shanghai World Ranking or high positions in other world or European rankings. The National Pact resulted in the revision of the education law in 2011. More recent political initiatives include Educated Romania, a flagship initiative of the President of Romania. The Ministry of Education has recently announced its intention to redraft the education bill.

Although tracking of university graduates is not done systematically in Romania, recent measures mark some progress in this direction. An ESF-financed project developed and is currently implementing a tool to monitor graduates' insertion into the labour market. The aim of the project is to correlate higher education skills and employers' requirements, analysing the quality and relevance of labour market programmes offered by universities by field of study at the regional level. The project also seeks to improve the decision-making process at the level of the Ministry of Education and to support its forecasting capacities by developing partnerships and a permanent consultation mechanism between the ministry, universities and employers.⁶ With a 37.26% gross graduation ratio in 2016 (UIS-UNESCO, 2016), only one-fourth of adults aged 25-34 have completed tertiary education, the second lowest rate among European countries. Access to tertiary education is particularly limited for students from socio-economically disadvantaged areas since they tend to perform less well on the baccalaureate, which is required to enter university.⁷ They are at a higher risk of early school leaving and may not afford the costs associated with pursuing a higher education degree. Thus, tertiary attainment is considered unlikely to increase in the coming years since the gross enrolment rate in tertiary education has plunged from 66% in 2008 to 48% in 2016.

Tertiary education attainment (ages 30-34) has more than doubled over the last decade – from 12.4% in 2006 to 25.6% in 2016 and 26.3% in 2017, compared to the EU average of 39.9% in 2017, nevertheless still remaining the lowest in the EU. This is due to a combination of factors that limits the potential number of students: high dropout rates in pre-university education, increasing but relatively low pass rates for the baccalaureate exam and low participation of disadvantaged groups in higher education.⁸ In 2016, the rate of early school leavers (age 18-24) was of 19% and data for the same year show that 23.6% of the population aged 25-34 years old had less than lower secondary education compared to an EU average of 16.6%.⁹ Nonetheless, acquiring a HE degree remains a challenge due to high dropout rates in higher education. The statistical dropout rate at undergraduate and graduate level is of almost 25%, according to the National Alliance of the Student

Organizations in Romania (NASOR), the main reasons being underfinanced and understaffed career counselling centres as much as the lack of accommodation facilities. There is also the fact that the open entrance system allows for enrolling in more than one field or faculty; students chose to pursue only one of the degrees and drop out from the other.

Strategies governing research and higher education

The main recent strategies addressing the higher education and research sector include:

- The National Strategy for Tertiary Education 2015-20 represents the national strategic policy framework for higher education, aiming to improve tertiary education attainment, quality and efficiency, and making higher education more relevant to labour market needs and more accessible to disadvantaged groups. Furthermore, it ensures the co-ordination of all national policies in the field, focusing on the provision of adequate funding, good governance and public accountability, and on monitoring and evaluation data. The financing is to be covered by the state budget and EU-funded operational programmes with a total estimate of EUR 2 103.75 million for an estimated total of 625 000 beneficiaries. There are three main pillars of implementation: i) enhancing participation in tertiary education; ii) promoting the development of high-quality curricula, flexible and linked to labour market requirements; and iii) strategic commitment to the economic sector, thus showing a growing concern for smart specialisations and enhanced knowledge exchange. However, implementation of this strategy is slow. One of the instruments related to this strategy is the Strategic Institutional Plan of the Ministry of National Education 2017-20, which aims to improve participation in tertiary education (through Support Program 2.1 of the Strategic Objective OS2 – Development of Tertiary Education, capable of boosting economic development and promoting social cohesion by laying the foundations of a knowledge-based society).
- The National Strategy for Research, Technological Development and Innovation 2014–20 was outsourced by the Ministry of Education and Research (from that time) to a consortium headed by 11 main partners supported by an additional 11 associated partners. A commitment to the project was secured from a broad group of key decision-makers in relevant ministries and other public bodies, leaders of important businesspersons associations, members of civil society, heads of the Regional Development Agencies, and so on. The vision for 2020 includes an innovation ecosystem where research and development support the advancement in the global value-added chains. The focus lies on excellence and an entrepreneurial spirit, making the companies key actors in the process of innovation. The selection resulted in four smart specialisation priorities: i) bio-economy, based mainly on the considerable agricultural potential of the country; ii) ICT, space and security; iii) energy and environment, in connection with the challenges of energy efficiency, water resources and substitution of critical materials; iv) eco-nanotechnologies and advanced materials. Three additional fields were added as national priorities: health, cultural identity and heritage, and new emerging technologies. In the context of correlation with European cohesion policies, RDI Strategy sets to connect Romania to the new scientific and technological priorities of the European Union mentioned in the Europe 2020 strategy and the European initiative *A Union of Innovation*, as well as its main implementation instrument, the Horizon 2020 funding programme.

- The National RDI Plan 2015-2020 (RDI Plan) is the main instrument for implementing the RDI Strategy. The plan was designed with a budget of maximum RON 15 000 million. The implementation period is from the date of approval to the end of 2020. The programme is structured around five sub-programmes, each of them with distinct targets, financing instruments and co-ordinating institution (even within the same sub-programme). The efforts toward innovation via fiscal facilities for R&D aim to stimulate private investments in RDI. So far, the additional tax deduction of 50% (totalling 150%) for R&D expenditure of enterprises in establishing the taxable profit is applied. Under certain conditions, the exemption from income tax has been extended to individual researchers.
- To increase innovation at the SME level and boost technology transfer through financial support, the Operational Programme Competitiveness¹⁰ 2014-20 was implemented as Priority Axis 1 “RDI for competitiveness and business development”,¹¹ addressing the challenges stemming from low support for research, development and innovation (RDI) and the under-developed information and communication technology (ICT) services and infrastructure.¹² In 2018, approximately EUR 55 million were allocated following the call for projects carried out by SMEs in partnership with an innovation and technology transfer (ITT) entity in order to apply research results in the areas of smart specialisation. By implementing a minimal state aid scheme in the form of venture capital investments, around 50 SMEs received financial support for innovation activities in the areas of smart specialisation. This project also follows the line of the Strategy for National Competitiveness 2014-20 (SNC 2014-20), a strategic document drafted by the Ministry of Economy (formerly Ministry of Economy Trade and Relations with the Business Environment), elaborated subsequently to consultation with the private sector and the Ministries of Agriculture and Rural Development, National Education, Regional Development and Public Administration, according to national priorities of excellence. Based on the context evaluation of both national and European policies for development, the strategy for competitiveness aims to capitalise on Romania’s resources, embedded in local skills, entrepreneurial initiative and environmental factors, to stimulate and simplify business regulations and create synergies between development initiatives at the sectoral, territorial and societal levels for effective competitive advantages.

Financing the higher education system

Although the National Law of Education requires 6% of the GDP for education, Romania invests only half of that (3.7% in 2016, EUROSTAT data), the second lowest share in the EU28 (5.27% EU28 average) and the lowest expenditure per pupil/student, with a nominal value smaller than one-third of the EU average.¹³

Public funding of HEIs is covered by the Ministry of Education budget and includes three main areas: core funding, additional and complementary. All funds to finance basic and additional state universities are considered income. The core funding for state universities is ensured by study grants, calculated in relation to the average costs per student, per field, per level of study and teaching language. The ratio is of 72% institutional financing, 26.5% supplementary financing and 1.5% allocated to the Institutional Development Fund, as proposed by the 2016 methodology for distributing institutional funding for HEIs.¹⁴

The complementary funding is carried out by the Ministry of Education in the form of: i) grants for accommodation; ii) funds allocated based on priorities and specific rules for

facilities and other capital expenditure and major repairs; iii) funds allocated on a competitive basis for university scientific research. The financing of the HEIs is based on a contract signed between the Ministry of National Education and the higher education institution, the rectors of public universities being directly responsible for the allocation of institutional resources. The financing is theoretically allocated according to the proposals developed by the National Council for Higher Education Funding (CNFIS), based on statistical studies and simulations.

Recent developments in research and innovation

Innovation is a relatively new policy domain, in Romania. Public authorities had limited science awareness, in the past and allocated low importance to research and innovation, compared with the societal challenges that were affecting the transition economy. This legacy still affects the current situation. As a consequence, research and innovation in the Romanian Higher Education system, depend mostly on European funds (UEFISCDI projects) which support the National Strategy for Research and Innovation 2007–13 and the National Strategy for Research, Technological Development and Innovation 2014–20.

The development of the MRI's administrative capacity to implement the actions set out in the National Strategy for Research, Technological Development and Innovation 2014-20 (NSRDI), code "SIPOCA 27" (Development of the National Roadmap for Research Infrastructures), co-ordinated by the MRI, included a strategic orientation mechanism in the National Roadmap for R&I meant to identify the smart specialisation niches through an active entrepreneurial discovery process, triggering the development of an individual R&I strategy for each of the regions.

All the identified smart specialisation fields in the regions match the science and technology indicated in the NSRDI 2014-20 and the Strategy for Competitiveness.¹⁵ The strategy targets have been set in line with Romania's convergence with the EU average: until 2020, the public spending on research and innovation will gradually increase up to 1% of GDP, plus tax incentives – indirect aid – for private companies and incentives for private investment in research in order to meet the projected target of 1% of GDP. Unfortunately, the figures are showing a significant gap between plans and actual achievements.

The Institutional Development Fund

The Institutional Development Fund addresses the best higher education institutions in each category and is granted on a competitive basis aligned with international standards. The methodology for allocation of funding for institutional development is regulated by the ministries.

Since 2016, universities can submit projects intended to finance specific institutional development objectives that promote new study programmes, capacity building, improvement of the quality of teaching, development of research infrastructure, cultivating ties with local and/or regional community, social inclusion and/or internationalisation of higher education activities.

Among the main goals of the Institutional Development Fund are: social equity – increasing social inclusion and increasing access to higher education (including counselling and guidance in career); the internationalisation of higher education in Romania; transparency in student management and implementation of the Unique Register of Romanian Universities; the good functioning of the botanical gardens, of the teaching facilities, of the practice bases and other infrastructures supporting the didactic and research activities;

establishing and supporting the activities of the student entrepreneurial societies (SAS) subordinated to the universities; improving the quality of teaching activity, correlation of the educational offer with the demand of the labour market; cultivating links with the local and/or regional community; the creation of an integrated education management information system.¹⁶ Also envisaged by this funding was the institutional development of universities that recently merged.¹⁷

Steps have been taken to set up the National Register of Mentors for Entrepreneurs. Moreover, an order of the Minister of Education (OMEN 3094/2018) regulates the organisation and functioning of student entrepreneurial societies (SAS). SAS are not legal entities but rather mechanisms for supporting, developing and encouraging entrepreneurship in the university environment, especially among students and graduates.

The activity of SAS is aimed at both students of the higher education institution in which they operate and their graduates in the first three years after graduation. The CNFIS has been involved in supporting universities to implement actions aimed at facilitating the activities of SAS, such as the introduction of a new strategic domain dedicated to setting up and supporting the activities of SAS within the Fund for Employers and Entrepreneurship's institutional development. Within this field, 36 projects were submitted by the state higher education institutions financed from the MEN budget (in 2017 and 2018), of which 15 projects were proposed for financing, with a total amount of approximately EUR 275 thousand (in 2017) and 28 projects with a total amount of EUR 660 thousand in 2018.

The Romania Secondary Education Project (ROSE Project) – Strategic project 2015-22

The International Bank for Reconstruction and Development and the Romanian Government signed a loan agreement worth EUR 200 million to develop and implement the Romania Secondary Education Project – ROSE. The strategic project ROSE is implemented by the Ministry of National Education over seven years and has as a main objective to improve the transition from upper secondary education (high school) to tertiary (higher) education and increase retention in the first year of higher education. ROSE is addressing the needs of students who are at risk of dropping out from high school, of failing the baccalaureate exam or of abandoning their studies at university, increasing, through the proposed interventions, the chances that Romanian students successfully complete high school and access higher education. The project is advancing but there are some delays in implementation.

Notes

¹ However, STEM graduates as a share of total graduates represent a high number, amongst the highest in the EU. This is due to the low participation rate in higher education in Romania, which makes STEM graduates as a share of total graduates high but low as a share of total population.

² The Bologna Process, named after the Italian city, encompasses a series of ministerial meetings and related agreements among European countries that were organised to ensure comparability in the standards and quality of higher-education qualifications.

³ Romanian National Statistics Institute, Exhaustive statistical research in education for the school/academic year 2017/2018.

⁴ Matei, L., C. Mihai Hâj and D. Alexe, “Student centred learning: Translating trans-national Commitments into institutional realities. The Romanian experience”, in A. Curaj, L. Deca and E. Egron-Olak (eds.), *Higher Education Reforms in Romania. Between the Bologna Process and National Challenges*, Springer Open, <http://dx.doi.org/10.1007/978-3-319-08054-3>, p.119.

⁵ Curaj, A., L. Deca and C. Mihai Hâj, “Romanian higher education in 2009–2013. The Bologna Process and Romanian priorities in the search for an active European and global presence”, in A. Curaj, L. Deca and E. Egron-Olak (eds.), *Higher Education Reforms in Romania. Between the Bologna Process and National Challenges*, Springer Open, <http://dx.doi.org/10.1007/978-3-319-08054-3>, pp.10-11.

⁶ Education and Training Monitor 2017 Romania, p. 11.

⁷ Kitchen, H. et al. (2017), “The Romanian education system”, in *Romania 2017*, OECD Reviews of Evaluation and Assessment in Education, OECD Publishing, Paris, <http://dx.doi.org/10.1787/9789264274051-en>, p. 12.

⁸ Education and Training Monitor 2017 Romania, p. 10.

⁹ <https://ec.europa.eu/info/sites/info/files/2018-european-semester-country-report-romania-en.pdf>.

¹⁰ Under the Competitiveness Operational Programme, 44 calls have been launched up to the time of writing (90% of the total). In 2018, 9 calls were launched, of which 3 for Priority Axis 1 (“Research, technological development and innovation in support of economic competitiveness and business development”) and 6 for Priority Axis 2 (“Information and Communication Technology for a competitive digital economy”). In 2019 the Managing Authority plans to launch the calls for CLOUD and for research infrastructure, as a follow-up to the last modification of the OP. Other calls in the pipeline include innovative clusters (PA1) and e-health, e-education, NGN, e-commerce and cybersecurity (PA2). 69.1% of the PA1 allocation and 42.5% of the PA2 allocation has been contracted. Over 20% of the total programme allocation has been paid. EUR 59.3 million were launched under two Financial Instruments developed within the OP, comprising a sharing loan portfolio and a risk capital facility.

¹¹ ROP, Priority Axis 1 – Promoting technology transfer: Priority Intervention (PI) 1.1.A – Supporting innovation and technology transfer entities, PI 1.1.B – Supporting scientific and technological parks and PI 1.1.C – Investments for SMEs to for the application of research results in partnership with an ITT. Allocated budget: ERDF+ state budget EUR 206.51 million.

¹² ERDF 2014-2020.

¹³ Chioncel, M. and J.C. del Rio (2018), *RIO Country Report 2017: Romania*, EUR 29169 EN, Publications Office of the European Union, Luxembourg, <http://dx.doi.org/10.2760/4105>.

¹⁴ http://www.cnfis.ro/wp-content/uploads/2012/08/PropunereCNFIS_MetodologieFB-FS-2018-final-act1-1.pdf.

¹⁵ The regional surveys focused on the following: analysing the educational offer of higher education institutions in the region; studying the region’s profile in terms of economy, structure, existence and development; studying the supply in the region’s labour market; studying the main objectives of the National Strategy for Research and Development and Innovation (SNCDI), with implications at the level of the region; comparative analysis of how to allocate student-funded places to study programmes; analysing the degree of insertion into the labour market of graduates, taking into account the matching between field of study and jobs; analysing the way in which co operation between faculties and the business environment is achieved.

¹⁶ http://www.cnfis.ro/wp-content/uploads/2018/02/OMEN-3094_25_01_2018_-FDI-1.pdf.

¹⁷ As is the case of the North University in Baia Mare that merged with the Technical University of Cluj-Napoca in 2011, as well as the undergoing fusion between the “Petru Maior” University in Tîrgu Mureş to be incorporated in the University of Medicine and Pharmacy of Tîrgu Mureş at the

beginning of 2019. The mergers are nevertheless funded from a special fund, this article being removed from the Minister's Order 2018.

References

- Chioncel, M. and J.C. del Rio (2018), *RIO Country Report 2017: Romania*, EUR 29169 EN, Publications Office of the European Union, Luxembourg, <http://dx.doi.org/10.2760/4105>.
- Chioncel M. and J. Zifciakova (2017), *RIO Country Report 2016: Romania*; EUR 28490 EN, <http://dx.doi.org/10.2760/479397>.
- CNIF (2018), Results evaluation FDI projects in 2018, National Council for the financing of Higher Education, <http://www.cnfis.ro/competitia-fdi-2018>.
- Curaj A., L. Deca and E. Egron-Olak (eds.) (2015), *Higher Education Reforms in Romania. Between the Bologna Process and National Challenges*, Springer Open, <http://dx.doi.org/10.1007/978-3-319-08054-3>.
- EC (2018a), *Education and Training Monitor 2018, Romania*, Publications Office of the European Union, Luxembourg.
- EC (2018b), *Country report Romania 2018*, European Commission.
- EC (2017a), *Education and Training Monitor 2017, Romania*, Publications Office of the European Union, Luxembourg.
- EC (2017b), "Horizon 2020 in full swing. Three years on. Key facts and figures 2014/2016", European Commission.
- EC (2015), *Seventh FP/monitoring report*, European Commission.
- Eurostat (2018), *Tertiary Education Statistics*, https://ec.europa.eu/eurostat/statistics-explained/index.php/Tertiary_education_statistics.
- Eurostat (2017), *Real GDP Growth Rate – Volume – Percentage Change on Previous Year*, <http://ec.europa.eu/eurostat/tgm/table.do?tab=table&init=1&plugin=1&language=en&code=tec00115>.
- Eurydice (2019), *Support Measures for Learners in Higher Education*, https://eacea.ec.europa.eu/national-policies/eurydice/content/support-measures-learners-higher-education-56_en (accessed on 3 June 2018).
- Eurydice (2017), *Romania Overview*, https://eacea.ec.europa.eu/national-policies/eurydice/content/romania_en (accessed on 7 September 2018).
- GEM (2017), *Global Entrepreneurship Monitor, Romania Country Page*.
- Growth Lab (2016), *Country Complexity Rankings (ECI)*, Center for International Development at Harvard University, <http://atlas.cid.harvard.edu/rankings>.
- Kitchen, H. et al. (2017), *Romania 2017*, OECD Reviews of Evaluation and Assessment in Education, OECD Publishing, Paris, <http://dx.doi.org/10.1787/9789264274051-en>.
http://www.minind.ro/strategie_competitivitate/REZUMAT_ENGL.pdf (accessed on 7 September 2018).
https://ec.europa.eu/education/compendium/national-strategy-tertiary-education-2015-2020_en (accessed on 31 May 2018).

Ministry of Education of Romania (2018), *Background Report for the HEInnovate Country Review*, unpublished.

Ministry of Education (2016), *Descriere*, <https://www.edu.ro/descriere-0> (accessed on 5 September 2018).

OECD (2016), *PISA 2015 Results in Focus*, PISA in Focus, No. 67, OECD Publishing, Paris, <https://doi.org/10.1787/aa9237e6-en>.

OECD Main Science and Technology Indicators database, <https://www.oecd.org/sti/msti.htm>.

National Institute of Statistics (2019), *Anuarele Statistice ale României (Statistical Yearbooks of Romania)*, Statistical Notebooks on Higher Education, INS, 2010-2017, <http://www.insse.ro/cms/ro/content/anuarele-statistice-ale-rom%C3%A2niei>.

Scimago Research Group (2018), *Scimago Website*, <http://www.scimagojr.com>.

UEFISCDI-CNFIS (2017), *Starea finanțării învățământului superior și măsurile de optimizare ce se impun [2016 Public Annual Report on the Financing of Higher Education and the Optimization Measures Required]*, http://www.cnfis.ro/wp-content/uploads/2018/08/raport_public_2016-final.pdf.

UEFISCDI-CNFIS (2017b), *Raport public anual – 2016. Starea finanțării învățământului superior și măsurile de optimizare ce se impun [2016 Public Annual Report on the Financing of Higher Education and the Optimization Measures Required]*, http://www.cnfis.ro/wp-content/uploads/2018/08/raport_public_2016-final.pdf, p.11.

UIS-UNESCO (2016), <http://data.uis.unesco.org>.

World Bank (2018), *Doing Business 2018. Reforming to Create Jobs*, World Bank Group.

World Intellectual Property Organisation (WIPO), <https://patentscope.wipo.int/search/en/search.jsf>.

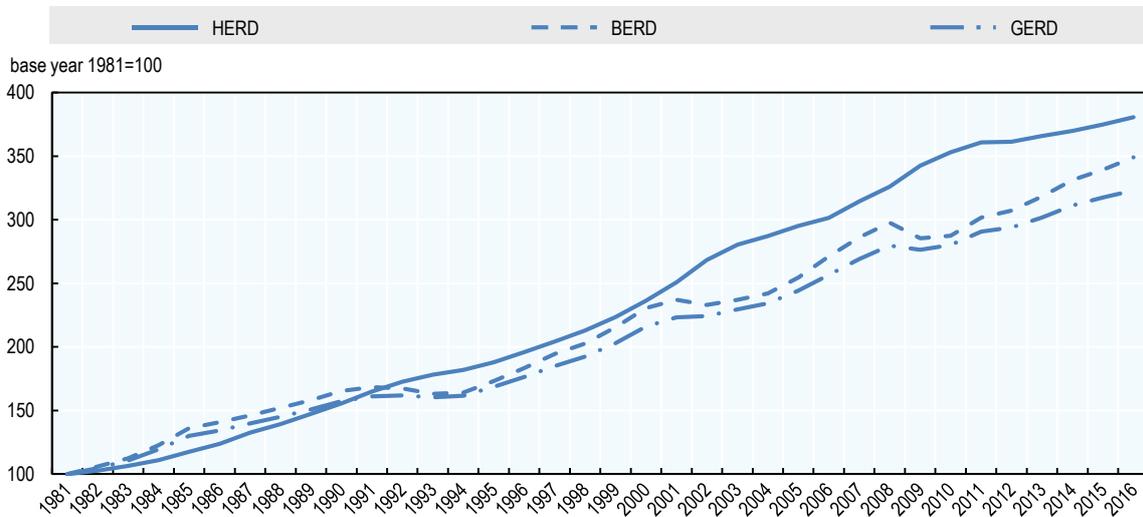
Chapter 2. Applying the HEInnovate guiding framework to the Romanian higher education and innovation system

To promote the entrepreneurial and innovation agenda in higher education, there is a need for a holistic approach. For this reason, the HEInnovate guiding framework encompasses eight dimensions illustrating the means, the governance arrangements, and the goals that should feature entrepreneurial and innovative higher education systems and institutions. This chapter discusses these eight dimensions in general, and applies them to the case of Romania and Romanian HEIs.

The HEInnovate guiding framework

In recent decades, the missions and mandates of higher education institutions have become more complex and their activities have broadened, both in OECD countries and emerging economies. For instance, as illustrated in Figures 2.1 and 2.2, Higher education institutions (HEIs) have considerably expanded their research and development (R&D) activities since the 1980s, partly at the expense of public research organisations. HEI R&D expenditures have increased more rapidly than R&D expenditures in the business and government sectors.

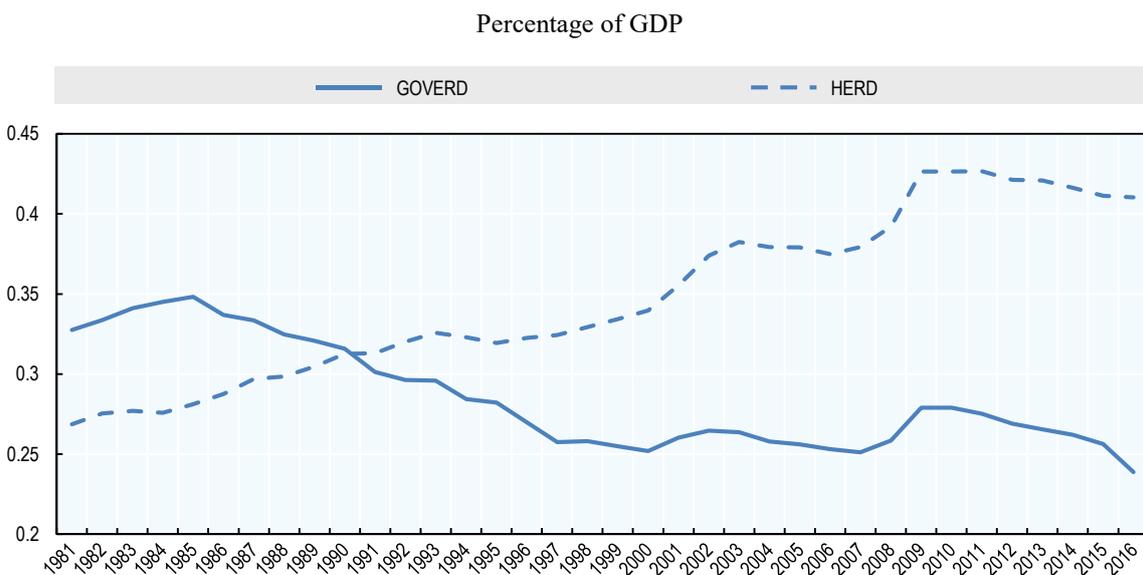
Figure 2.1. R&D expenditure in the OECD area, trends over time



Note: 1981 = 100.

Source: OECD Main Science and Technology Indicators Database. <https://www.oecd.org/sti/msti.htm>

Figure 2.2. R&D performed by HEIs and governmental bodies in the OECD



Source: OECD Main Science and Technology Indicators Database. <https://www.oecd.org/sti/msti.htm>

This transformation has gone hand in hand with the following global trends:

- In many OECD countries and emerging economies, the governance of HEIs has been decentralised. This has often resulted in a greater autonomy of HEIs combined with shifts in funding towards greater emphasis on performance and competition. This has allowed HEIs to autonomously allocate resources, set strategic targets and shape their own profiles in research and education. Research suggests that the shift towards greater autonomy of HEIs has had a positive impact on HEIs performance (Aghion et al., 2010).
- Globalisation has been affecting the way that HEIs interact and compete at the international level. Increasing participation in international science and innovation networks has enabled greater international exchange and mutual learning in research activities and education practices. It is also, however, leading to increased competition between institutions for attracting and retaining talented students and researchers.
- The changing context for HEIs has given origin to the concepts of the “third mission” and the “entrepreneurial university” (OECD, 2017a; Etzkowitz et al., 2000; Gibb, Coyle and Haskins, 2013; www.heinnovate.eu). The third mission of HEIs refers to all the activities that go beyond their education and research functions. These activities can be very broad and diversified and take place at different geographical scales (international, national, local). One of the key third mission activities of HEIs is “knowledge exchange” with businesses, public organisations and more broadly society (OECD, 2007; 2017a; Goddard, Kempton and Vallance, 2013). This is also a key feature of what is known as the entrepreneurial university.

To support policymakers and HEI leaders to make the most of these transformations, the OECD and the European Commission have collaboratively developed HEInnovate, a guiding framework for innovative and entrepreneurial HEIs. The stimulus for HEInnovate was the University-Business Forum in March 2011, an annual event organised by the European Commission for HEIs and their key strategic partners. Delegates expressed a need for support and guidance in implementing practices that will help them become more innovative and entrepreneurial institutions.

The HEInnovate guiding framework is developed around eight dimensions, defined and detailed in the next section of this chapter. The following sections define and explain these eight dimensions and what they mean for HEIs in Romania.

Other elements of the HEInnovate framework include the following:

- **The HEInnovate Self-assessment Tool** (www.heinnovate.eu). The HEInnovate self-assessment tool was conceived for individual higher education institutions that wish to explore their innovative potential. It guides HEIs through a process of understanding, prioritisation and action planning in the eight key dimensions mentioned above. HEInnovate also identifies areas of strengths and weaknesses, opens up discussion and debate on the innovative and entrepreneurial nature of individual HEIs and allows the comparison of trends over time. The self-assessment tool gives instant access to your results, learning materials and a pool of experts.

- **The HEInnovate Country Reviews.** The HEInnovate country reviews have been developed to provide a national systemic perspective about innovation in national higher education systems. They complement the HEInnovate tool that targets individual HEIs by providing a systemic perspective and taking into account the different roles and features of different HEIs in a national system. HEIs do not operate in isolation but collaborate and compete with other HEIs in the same country (and abroad) in a variety of fashions. The country reviews were developed to capture and assess these complex interactions and dynamics. At the time of writing, country reviews had been completed for the following OECD or EU countries: Bulgaria, Ireland, Hungary, the Netherlands, Poland (OECD, 2018; 2015a; OECD/EU, 2017a; 2017b; 2017c).
- **The HEInnovate Policy Learning Network.** The HEInnovate Policy Learning Network (PLN) was established as a platform for peer-learning and policy dialogue among the policymakers of countries participating in HEInnovate country reviews. PLN participants regularly meet and discuss key themes linked to the eight HEInnovate dimensions relevant to their countries, enabling them to learn from and compare similar experiences across OECD and EU countries.

The eight HEInnovate dimensions in the Romanian context

Entrepreneurship and innovation are key to achieving sustainable long-term economic growth (OECD, 2015c). The way HEIs interact with other actors of innovation ecosystems is fundamental to drive innovation, as detailed in the paragraphs below.

However, innovation actors and innovation policy alone are often not enough to drive change. It is important to remember that the quality of institutions has a major impact on the pace of innovation and sustainable economic development (Marques and Morgan, 2018; Rodriguez-Pose and Di Cataldo, 2015; Acemoglu and Robinson, 2012). The research literature suggests that institutional quality is one of the most powerful drivers of socio-economic development.

Therefore, while the eight dimensions described above are certainly fundamental for the development of many aspects of the Romanian innovation ecosystem, the quality of institutions represents a determinant *ex ante* factor for HEIs to innovate and become actors of change.

Leadership and governance

The HEI leadership and the way its governance is organised are key to developing an innovative and entrepreneurial culture within the HEI. Leadership and governance arrangements are crucial to defining the framework of incentives to promote change and innovation within higher education institutions. Many HEIs across OECD and EU countries include the words “innovation” and “entrepreneurship” in their mission statements but, in an innovative and entrepreneurial institution, this is more than a reference. The statements that follow highlight some of the important factors an HEI may consider in order to strengthen its innovation and entrepreneurial agenda.

Entrepreneurship is a major component of the HEI's strategy

An HEI should see itself as an innovative and entrepreneurial organisation, with a common vision, values and mission. To promote innovation and the development of an entrepreneurial mindset, the strategy of an HEI should reflect its innovative and entrepreneurial aspirations and agenda. The HEI could, for instance, have a mission statement and written strategy setting out an entrepreneurial vision for the future of the institution. This strategy could clearly emphasise the importance of entrepreneurship culturally, socially and economically. In addition to the strategy, it is equally important to articulate a clear implementation plan with clear objectives and define key performance indicators to measure progress.

Because HEIs in Romania are primarily dedicated to teaching (EC, 2017a), entrepreneurship and innovation are generally not a major pillar of most HEI strategies in Romania. However, the Ministry of National Education has recently begun to promote the development of entrepreneurship strategies by encouraging HEIs in Romania to use the HEInnovate tool and apply the HEInnovate framework, with the support of non-governmental organisation JA Romania.¹ This has led to a greater awareness of the issue and the definition of some preliminary steps in several HEIs in the country.

There is commitment at a high level to implementing the entrepreneurial agenda

A deep commitment at the senior management level of an HEI is needed to drive the implementation of the innovation and entrepreneurial agenda. This commitment could take several forms: for example, it is important to communicate the strategy across the institution and make sure that it is understood as a priority by staff, students and also external stakeholders. In some cases, this may mean appointing a dedicated person at a high level/in senior management responsible for the implementation of the innovation and entrepreneurial vision and strategy. Another important element is the regular review and revision of the entrepreneurial strategy to keep it up to date and relevant in local, national and international contexts.

As mentioned above, some actions have been encouraged by the Ministry of National Education, including the use of the HEInnovate tool, with the support of JA Romania, as well as national initiatives such as the “Entrepreneurial Society” and the “Innovation Labs” (see Chapter 4 for more details). The Romanian-American Foundation implemented the “Entrepreneurial University Programme” in 34 HEIs. This programme included several entrepreneurship-related initiatives such as the organisation of “innovation days” in nine universities. These universities worked with local communities to develop sustainable approaches to real challenges. At the level of individual HEIs, the level of commitment varies depending on the leadership team. Some HEIs are clearly committed to developing an entrepreneurial agenda, such as the West University of Timisoara, the University Stefan cel Mare of Suceava, the Technical University of Cluj-Napoca or the Politehnica University of Bucharest.

There is a model in place for co-ordinating and integrating entrepreneurial activities across the HEI

An HEI needs an effective model for co-ordinating and integrating innovative activities across the institution. There are a variety of models which can be used, such as a dedicated person at the senior management level, a dedicated unit close to senior management,

co-ordination mechanisms across departments, faculties or other units and centres, and the establishment of an innovation or entrepreneurship centre within the HEI. It is also important that the HEI co-ordinates its activities with other relevant stakeholders within the local innovation ecosystem.

Currently, while some actions have been encouraged at the national level, each HEIs is selecting its own model for the development of entrepreneurial activities. As already mentioned, the level of maturity of these activities varies from HEI to HEI in Romania.

The Technical University of Cluj-Napoca has established not only a vice-rectorate for management and enterprise but also a department for the Institutional Relation with Enterprise. These departments are also helped in their mission by the HEI's advisory committee of the rector that includes members from companies and other non-academic organisations.

The HEI encourages and supports faculties and units to act entrepreneurially

An HEI with open and flexible approaches finds it easier to undertake innovative activities and speed up decision-making. An HEI should provide an environment that encourages idea creation and the emergence of new activities and initiatives.

Several of the HEIs visited by the OECD team encourage and support entrepreneurship activities. Some HEIs have established "Innovation Labs" or "Entrepreneurial societies" (see Chapter 4). Others have also developed incentives to support staff innovation and entrepreneurship activities, such as the Transilvania University of Brasov, where the university's management team has developed a system of incentives to promote collaborations between faculty members and the business sector.

The HEI is a driving force for entrepreneurship and innovation in regional, social and community development

An HEI can play several roles in its community and wider surrounding ecosystem. One of the key functions of an HEI is to contribute to and support regional, social and community development. There are several ways an HEI can contribute to this. For instance, an HEI can be actively involved in the development and implementation of local, regional and national innovation and entrepreneurship strategies. It can co-develop study programmes with business partners or other stakeholders to support local job markets. It can also support local partners by providing general access to the facilities of the institution to others in the wider community. Other channels include the support of start-ups and established companies in the region to enhance innovation and entrepreneurship. An HEI can also have a strong presence in its communities, by supporting local cultural and artistic activities, for example.

Some HEIs in Romania are playing a key role in their communities and surrounding ecosystem (Chapter 5). The University Stefan cel Mare of Suceava, in the North East of Romania, plays an important role in one of the least developed regions in the country. The West University of Timisoara is building a hub for entrepreneurship and innovation in the city. The Politehnica University of Bucharest is active in using the instruments of the Enterprise Europe Network. While interesting initiatives are taking place, however, there is potential to do more and participate more actively in local development strategies, especially in less developed regions (EC, 2017a).

Organisational capacity, funding, people and incentives

The organisational capacity of an HEI drives its ability to deliver on its strategy and implement any action to translate the strategy into practice. However, a strategy alone is not enough. If an HEI is committed to carrying out innovative and entrepreneurial activities to achieve its strategic objectives, it needs to fund and invest in these areas accordingly and consistently. People are, of course, also essential: they need to have or acquire the skills, expertise and knowledge to transform the HEI into a more innovative and entrepreneurial organisation. Finally, properly designed incentive mechanisms for researchers, staff, students and also external stakeholders need to be in place to promote and strengthen innovative and entrepreneurial practices in the HEI.

Entrepreneurial objectives are supported by a wide range of sustainable funding and investment sources

Becoming an innovative and entrepreneurial HEI is an incremental and long-term organisational development process that requires a sustainable and diverse financial basis and access to key resources and investments. Examples of success factors include the following: a strong alignment between investments in innovative and entrepreneurial activities and the HEI's overall financial strategy; a continuous and long-term engagement with funders and investors, also outside the academic world, to secure financial resources to deliver strategic objectives; a balanced and diversified range of funding and investment sources, including in-kind contributions; the possibility to reinvest revenues generated from research, teaching and knowledge exchange activities.

While some funding is available at the national level, overall sustainable and long-term funding for entrepreneurship and innovation activities in HEIs is limited in Romania. Most HEI funding is based on student numbers and frequent changes in policy cycles are often an obstacle to long-term planning and steering with respect to innovation and entrepreneurship.

The HEI has the capacity and culture to build new relationships and synergies across the institution

All internal stakeholders, staff and students have a role in supporting an HEI's entrepreneurship and innovation agenda. Encouraging dialogue and synergies between the administration, academic faculties and staff, students and management helps break down traditional boundaries, foster new relationships and exploit internal knowledge and resources. Several approaches can support these synergies, for example promoting a shared usage of facilities across faculties, establishing structures to encourage dialogue between students and staff as well as decision-makers, creating and supporting inter-disciplinary structures, such as the creation of cross-faculty teaching and research groups.

HEIs in Romania have the possibility to set incentive mechanisms to promote synergies and relationships across the institution. However, for historical and cultural reasons, in many HEIs the entrepreneurial culture still needs to be fully developed. Entrepreneurial and innovative activities are often established and managed by motivated individuals but are not mainstreamed.

The HEI is open to engaging and recruiting individuals with entrepreneurial attitudes, behaviour and experience

An HEI can build an entrepreneurial and innovation culture by engaging stakeholders with a strong entrepreneurial background and experience. These individuals can bring different viewpoints, knowledge, and expertise unavailable internally. Such individuals can be permanent members of staff, guest contributors, visiting associates or external stakeholders.

In Romanian HEIs, the recruitment of individuals with a non-academic background is not common. There are examples of staff recruited from the business sector but this is not the general rule. Efforts are being made in many HEIs to invite guest contributors from the business sector and other non-academic environments as guest lecturers and speakers in conference events and mentorship programmes.

The HEI invests in staff development to support its entrepreneurial and innovation agenda

Staff, both academic and administrative, are a key and necessary resource required to deliver on all elements of an HEI's innovation and entrepreneurial agenda. These include the delivery of entrepreneurship education, provision of support for business start-ups, development of partnerships with other external stakeholders and supporting local and regional development. To support these activities, some HEIs in OECD countries have established formal criteria for career development for staff linked to the implementation of the institution's entrepreneurial strategy and vision; have set individual objectives and performance indicators supporting the implementation of the entrepreneurial agenda; have been measuring staff progression against these objectives on a regular basis; have linked the training needs of staff with career objectives that support the entrepreneurial agenda.

There is a general framework for investing the entrepreneurship and innovation skills of faculty and staff. As the main task of staff is teaching, entrepreneurial and innovation activities are often linked to the motivation of individuals rather than an overarching strategic plan.

Incentives and rewards are given to staff and students who actively support the entrepreneurial agenda

Encouraging and rewarding innovative and entrepreneurial behaviour in all staff and students is a key feature of innovative and entrepreneurial HEIs. The innovative and entrepreneurial behaviour of staff and students relates to staff and students seeking to become entrepreneurs but also staff and students who actively seek new opportunities to bring innovation and entrepreneurial behaviour within the HEI. Incentive and reward systems should be available at an individual level as well as for faculties/departments, extending beyond classic career progression models.

There are many examples of good practices to reward entrepreneurial behaviour. For example: adjusting staff teaching and research workloads for those who take on new responsibilities that support the institution's entrepreneurial agenda; providing institutional funds to staff to stimulate innovation and change; allow sabbaticals for staff who seek to enhance their entrepreneurial capacity; develop rewards and incentive mechanisms going beyond traditional research, publications and teaching metrics; making office and laboratory space available for staff and students to pursue entrepreneurial activities.

As already mentioned, the main tasks of HEI staff in Romania are teaching and performing research, depending on the type of institution (namely more or less research-intensive HEIs). There is no overarching system of incentives for entrepreneurial and innovation activities. This is confirmed by the results of the HEInnovate Leader Survey which highlight how only a minority of respondent HEIs have developed mechanisms to reward these types of activities.² However, several HEIs have put in place some forms of incentive mechanisms, as HEI autonomy allows individual HEIs to set different criteria. Some (but not all) HEIs in Romania have set objectives and developed incentive mechanisms to support entrepreneurship and innovation in the HEI. For example, the Transilvania University of Brasov rewards professors and researchers who proactively participate in an international research project and collaborate with the business sector.

Entrepreneurial teaching and learning

Entrepreneurial teaching and learning are about exploring innovative teaching methods and finding ways to stimulate entrepreneurial mind-sets. This involves learning about entrepreneurship and how to start a new company, for instance, by receiving training on support mechanisms, tax rules, financial schemes and other private or public policy support. However, this means acquiring the skills and competencies for developing entrepreneurial mind-sets, which are often associated with the ability to tackle problems using a variety of methodologies and inter-disciplinary approaches, problem-solving skills and more generally soft skills such as communication, management, organisational skills, etc. This can be achieved, for instance, through problem-based learning, interdisciplinary courses, internships, teamwork assignments, etc.

In Romania, HEIs are mostly responsible for traditional teaching and learning. To date, there is no coherent framework for entrepreneurship education, although there are frameworks in individual HEIs (EC, 2017a).

The HEI provides diverse formal learning opportunities to develop entrepreneurial mindsets and skills

An innovative and entrepreneurial HEI provides a range of learning opportunities to facilitate innovative teaching and learning across all faculties. Such an HEI should be encouraging innovation and diversity in its approach to teaching and learning across all faculties and departments as well as developing entrepreneurial mind-sets and skills across all programmes.

A range of practices can promote the development of an entrepreneurial mind-set across the student and staff body. Examples to promote these skills across the student body include supporting change in curricula to stimulate and develop entrepreneurial mind-sets and skills through, for instance, new teaching methods, student-centred, cross-disciplinary and project-based learning (e.g. internships, business competitions, living labs, the use of case studies, hackathons, games and simulations). Academic staff can also take part in these activities as organisers or participants. Staff can receive training to acquire entrepreneurship skills and knowledge on how to create a business but also training to support interdisciplinary teaching and research methods.

In many HEIs in Romania, formal teaching and learning follow traditional approaches. However, several HEIs are developing some forms of activities to promote the development of entrepreneurial mind-sets and skills, such as the already mentioned “Innovation labs”, “Entrepreneurial Students Associations”, as well as ad hoc student

competitions, workshops with businesses, etc. The Technical University of Cluj-Napoca has developed a special education module for the development of the students' and researchers' soft skills, that is especially necessary given the technical focus of the traditional study programmes.

The HEI provides diverse informal learning opportunities and experiences to stimulate the development of entrepreneurial mindsets and skills

Extracurricular learning opportunities are an important complementary part of entrepreneurship teaching and learning provision. An innovative HEI should offer a range of informal learning opportunities for students to inspire individuals to act entrepreneurially. For example, it can organise networking events between students and entrepreneurs/businesses and engage students in business idea/plan competitions as part of their extracurricular opportunities. These initiatives are more effective when these extracurricular activities are formally recognised (for examples in exams or other evaluations).

Many HEIs in Romania organise different learning opportunities to promote entrepreneurship and innovation. However, the recognition of these activities is rarely formally acknowledged through exams or evaluations. The West University of Timisoara is an innovative education hub build with the contribution of 34 companies and students associations and clubs. The hub organises projects to generate impact for students in the West Region of Romania. The Polytechnic University of Bucharest has developed partnerships with different associations and entrepreneurship centres to offer a diverse set of skills complementing technical education.

The HEI validates entrepreneurial learning outcomes which drive the design and execution of the entrepreneurial curriculum

An entrepreneurial learning experience is essential for both graduate entrepreneurs as well as entrepreneurial graduates entering into employment. An HEI that values entrepreneurial learning commits to regular review, validation and the update of curricula content and learning outcomes across all study programmes.

Monitoring and evaluation of entrepreneurial learning outcomes are not common in Romanian HEIs. In this respect, the usage of the HEInnovate tool can be a useful reference to start the discussion on possible ways of monitoring and evaluation.

The HEI co-designs and delivers the curriculum with the external stakeholders

External stakeholders are an important source of expertise that can be used in entrepreneurial teaching and learning. External stakeholders can participate in the development and delivery of extracurricular learning activities and support services. Regular engagement with external stakeholders encourages long-term collaborative relationships that can provide useful inputs to understanding future skills needs as well. A wide range of external stakeholders can be useful in this respect. This is why it is important to support a broad range of collaborative partnerships with local communities and organisations, local and regional governments, chambers of commerce, industry and HEI alumni.

The co-design of curricula with external stakeholders does not happen systematically in Romania, also because the national accreditation process tends to be slow and not apt to react quickly at the request of potential partners such as the business sector. However, several HEIs have developed curricula after discussing with relevant local partners. These include, for example, courses in the Technical University of Cluj-Napoca, the University of Stefan cel Mare of Suceava or the University of Agronomic Sciences and Veterinary Medicine of Bucharest.

Results of entrepreneurship research are integrated into the entrepreneurial education offer

For a curriculum to stay up to date and relevant, the entrepreneurial education offer needs to be continuously reviewed and updated. Therefore, an HEI should integrate the results of entrepreneurship research into its teaching. Every HEI could, for example, encourage staff and educators to review the latest research in entrepreneurship education, provide a forum whereby staff and educators can exchange new knowledge and ideas, incorporating the latest research, provide access to inspiration from other HEIs through networking and sharing good practices.

To date, and also partly because entrepreneurship teaching and learning is not yet fully developed in Romania, there is no regular integration of the results of entrepreneurship research in the education programmes of HEIs. As already mentioned, this would be a welcome development in the education offer.

Preparing and supporting entrepreneurs

HEIs can help students, graduates and staff considering starting a business as a career option. HEIs can have an important role to help individuals reflect on the commercial, social, environmental or lifestyle objectives related to their entrepreneurial aspirations and intentions. For those who decide to proceed and start a business or any other type of venture, HEIs can offer targeted assistance to generate, evaluate and act upon new ideas, building the skills necessary for successful entrepreneurship and, importantly, find relevant team members get access to relevant networks. It is important to remember, however, that context matters (OECD, 2007; 2011): the support measures described above are likely to be effective when the entrepreneurship and innovation ecosystem surrounding the HEI is well developed and well-functioning. This happens when HEIs act as part of a wider business and innovation support ecosystem rather than when they operate in isolation.

It has to be noted that in Romania HEIs are primarily dedicated to teaching, teaching duties being clearly specified in the national education law. Activities related to the preparation and support of entrepreneurship, therefore, are generally encouraged and supported both at the national and institutional level in a project-based manner (EC, 2017a).

Finally, despite the clear role that HEIs have to play in preparing and supporting entrepreneurs, national framework conditions conducive to innovation and entrepreneurship are a key factor for allowing start-ups to survive and grow. Without fixing these overarching conditions, HEIs alone will struggle to achieve this function.

The HEI increases awareness of the value of entrepreneurship and stimulates the entrepreneurial intentions of students, graduates and staff to start up a business or venture

Raising awareness of entrepreneurship in an HEI is about helping people make informed decisions about their careers, including the option of starting an enterprise. HEIs can help this process by providing support for those individuals who want to start up a company. This support can take different forms, such as informing staff about intellectual property right (IPR) regimes at the national and HEI level, enabling staff to own shares, work part-time, take sabbaticals and the possibility for students to extend the duration of their study programmes to support starting a new venture while working or studying. Equally important is to celebrate and recognise successes of student, graduate and staff that became entrepreneurs.

For historical and cultural reasons, HEIs in Romania have not a long tradition of supporting staff to create and develop their own companies. However, the situation is changing especially thanks to new generations of motivated and dynamic students and researchers.

IPR frameworks at the HEI level are often not fully clarified yet. Even if the intellectual property (IP) generated by Romanian HEIs is still very limited, there is scope to define and harmonise IPR frameworks to avoid potential future issues.

Some HEIs, nevertheless, have developed interesting activities. For example, the Technical University of Cluj-Napoca has developed an IPR policy at the HEI level and also has implemented mechanisms to encourage and support proof of concept and feasibility studies for students and staff.

The HEI supports its students, graduates and staff to move from idea generation to business creation

An HEI can support motivated students, graduates and staff in taking their first steps in preparing for a start-up. This includes helping entrepreneurs at different stages: developing an idea, finding a team, and exploring the technical and market feasibility of a project. As well as introducing staff to new networks, an HEI can offer regular activities to generate and evaluate business ideas emerging across the institution. Support measures for students and staff include different types of measures, from team building and conflict management support to advice regarding IP issues, to the organisation of idea and start-up pitch prizes, etc.

Academic spin-offs are in their infancy in the Romanian innovation system. However, some first steps have been taken. While there is no systematic support mechanism in place, some HEIs have developed interesting initiatives. Most of the support in place is targeted to students rather than researchers and academics, as confirmed by the HEInnovate Leader Survey responses.³

In 2017 the West University of Timisoara has created an Office of Innovation, Technology Transfer and Intellectual Property to promote innovation and entrepreneurship activities. This office is involved in local and international communities and organises workshops and meetups. The office also offers training related to automotive, Internet of things (IoT) and industry 4.0. The University of Stefan cel Mare of Suceava developed ANTUR, a project to start entrepreneurship in urban areas, as well as Stud SA-USV, a project supporting entrepreneurial activities of students.

Training is offered to assist students, graduates and staff in starting, running and growing a business

Entrepreneurship training can provide some of the skills and competencies needed to start, run and grow a business. The training should impart relevant knowledge and skills about a wide range of topics, for example, financing, legal and regulatory issues, but also the development of soft skills such as dealing with people and building relationships, managing innovation processes, coping with success, stress and risk, and how to restructure or exit. Emotional preparation is as important as the technical aspects. The involvement of entrepreneurs and key actors from the entrepreneurship ecosystem is often very useful in the approaches described above. This type of training is not widespread in Romanian HEIs. Again, the HEInnovate framework can provide guidance in this respect.

The Romanian-American Foundation supported start-up programmes with the aim to develop entrepreneurial mindsets in students. This programme trained and supported around 20 000 students over the past 10 years. Other tools are offered by JA Romania, an NGO supporting entrepreneurial behaviour in students, which runs the JA Business Plan Challenge and the JA Company of the Year Competition.

Mentoring and other forms of personal development are offered by experienced individuals from academia or industry

Mentoring and other personal development relationships (such as coaching and tutoring) can help start-up entrepreneurs identify and overcome problems and develop their business networks. They provide valuable support in the form of knowledge, experience, social capital and encouragement on a long-term basis. In many HEIs, mentors and coaches tend to be experienced (academic) entrepreneurs, company managers and often alumni.

In most HEIs in Romania, there is no systematic mentoring programme. However, through specific initiatives including the “Innovation labs”, the “Entrepreneurial societies” as well as student competitions and workshops, students and academics attempting to start a business may be put in contact with relevant mentors from the business sector.

The HEI facilitates access to financing for its entrepreneurs

External financing can be essential for the success of the initial stages of a new venture, e.g. providing investment for feasibility and market studies, product and prototype development such as proof of concept funding, for initial production or for offering the founders some living income before their first revenues are generated. HEIs with well-developed start-up support often offer financial education to potential entrepreneurs. The aim is to provide potential entrepreneurs with the capacity to understand different financial schemes, and with the capacity to use effectively. HEIs can also be instrumental in the organisation of pitch and prizes idea competitions as a way to connect wannabe entrepreneurs with networks of potential investors (business angels, seed and VC investors, etc.).

These types of actions are not widespread in the Romanian higher education landscape; indeed, business angels, seed and VC networks are not well developed yet. Some initial attempt to create these types of networks is currently happening in Cluj-Napoca, Bucharest and Timisoara (with the active participation of the West University of Timisoara). JA Romania support incubation of student ideas and offer mentoring activities, examples include the Bizzfactory Incubator, the network of entrepreneurial hubs in some universities.

The HEI offers or facilitates access to business incubation

Business incubators commonly provide a range of services such as free or subsidised premises where start-uppers can work on their projects and access laboratories and research facilities, prototyping support, as well as advice on IP matters and financial opportunities. They also offer a visible and accessible location for entrepreneurs to access an integrated package of coaching, mentoring and training.

Some HEIs in Romania have established or are establishing incubators.⁴ However, these are very small and generally incubate a low number of companies as there is not yet a large demand for incubation services. For example, the University of Agrofood and Veterinary Sciences in Bucharest actively support start-ups in the field of biotechnologies.

Digital transformation and capability

HEIs are already and increasingly deploying digital technologies; however, the uptake and integration vary among and within institutions. HEIs should make the most of the opportunities presented by the digital transformation and consider digital technologies as a key enabler. The HEI's digital capability refers to the ability to acquire, integrate, use, optimise and transform digital technologies to support innovation and entrepreneurship in higher education (Elliott, 2017; OECD, 2017b). This dimension has been officially launched in June 2018. At the time of the study visits of the HEInnovate Review of Romania, it was not yet explicitly part of the HEInnovate framework. The information on the level of digital activity of Romanian HEIs is therefore limited. Overall, according to the Digital Economy and Society Index (DESI),⁵ Romania scores below the EU average and is part of the group of countries catching up (Chioncel and Del Rio, 2018).

The HEI fosters a digital culture as a means for innovation and entrepreneurship

Digital tools and practices are drivers of innovation and entrepreneurship. An HEI should understand, explore and promote new ways of working with a strong vision based on digital-first thinking. A well-functioning digital culture balances top-down leadership while welcoming bottom-up innovation. This includes a coherent and shared strategy and action plan allocating resources for digital transformation across the HEI. As most HEIs in the OECD and EU countries, Romanian HEIs are developing tools and activities based on digital technologies. However, digital strategies are not common in most HEIs.

The digital infrastructure is planned, managed and continuously improved to align with the vision, mission and strategy of the innovative HEI

An HEI should integrate the design and organisation of its digital infrastructure to support innovation across all its activities. This includes, for example, the integration of its learning technologies and platforms, research and administrative systems, and supporting ICT services. Many HEIs in Romania are strengthening their digital infrastructure.

The HEI is committed to digital teaching, learning and assessment practices

Digital technologies provide opportunities for innovative curriculum design and delivery, new pedagogies, learning processes and assessment methods. This fosters the development of digital competency and skills in staff and students, which are crucial today for every aspect of personal and professional development. The Technical University of Cluj-Napoca

has established a digital incubator in a science and technology park. It is the first of this kind in Romania and it focuses on the digital economy, start-ups in cloud computing, IoT, drones and robotics, big data analytics, etc.

Open science and innovation practices are widespread across the HEI

Open science improves the effectiveness, quality and productivity of a research system, encourages the adoption of new research methodologies and scales up innovation in HEIs (OECD, 2015b; Dai, Shin and Smith, 2018). Through open science, the HEI promotes collaborative efforts, faster knowledge exchange and new ways of sharing results (including publications, research data and methodologies) among students, staff and the society at large. In general, as in many OECD and EU countries, open science practices can be strengthened in Romanian HEIs.

The HEI has a dynamic digital presence supporting all its activities

An entrepreneurial HEI exploits the opportunities of digital technologies for communication, collaboration and networking. The HEI takes a co-ordinated approach to engage with its internal and external stakeholders, as well as to strengthen its international, national and local/regional outreach.

As most of HEIs, Romanian HEIs have websites. Some HEIs such as the Technical University of Cluj-Napoca has developed an online portal to advertise internship and job opportunities for students directly within the HEI website. Interested companies can use this portal to reach out directly to students through the HEI online portal. The Politehnica University of Bucharest has also developed a similar platform to connect graduates with job opportunities.

Knowledge exchange and collaboration

Innovative and entrepreneurial HEIs do not operate in isolation but are strongly connected to other actors (companies – including both MNEs, large domestic firms and small- and medium-sized enterprises [SMEs], other public and private research organisations, governmental agencies – national and local – such as regional development agencies or metropolitan authorities, cluster associations, technology and science parks, etc. (OECD, 2017a) of local, national and international innovation systems. Knowledge exchange is an important catalyst for organisational innovation, the advancement of teaching and research, and local development. It is a continuous process which includes the so-called “third mission” of an HEI, defined as the stimulation, direct application and exploitation of knowledge for the benefit of the social, cultural and economic development of society.

It has to be noted however that in Romania national innovation systems are currently developing and it will take time to strengthen connections amongst different actors in the system. HEIs have a great role to play but actions started by other types of actors are equally important. Domestic companies may not be proactive yet in establishing linkages with HEIs given their low levels of R&D and limited technological specialisation and knowledge intensity (EC, 2017a). In Romania, knowledge exchange activities are legally part of an HEI’s missions but until now have only been encouraged in a project-based manner (EC, 2017a).

The HEI is committed to collaboration and knowledge exchange with industry, the public sector and society more broadly

Knowledge exchange is an important component of any innovative HEI. Knowledge exchange activities flourish when it is a high priority at the senior level and the implementation of knowledge exchange activities is in line with the institution's entrepreneurial agenda. HEIs can develop support mechanisms for co-ordinating and sharing relationships across the HEI and give guidance on how to develop and implement all types of relationships with the public and private sector.

For historical reasons, HEIs in Romania have developed relatively recent linkages with the business sector. These linkages are not yet fully developed, however many HEIs, including the ones visited by the OECD team, are currently developing activities with industrial partners and other stakeholders. The Technical University of Cluj-Napoca has developed a database of relevant actors in the regional ecosystem that is regularly updated: companies, clusters, NGOs, banks, foundations, etc. The database contains more than 200 organisations. This university is also active in meeting the demands of companies with respect to curricula development. The HEI is also a member of the board of 13 industrial clusters.

The University Stefan cel Mare of Suceava developed CENTRIC, a centre for the transfer of knowledge to information and communications technology (ICT) companies. This HEI also developed MANSID, the integrated research, development and innovation centre for advanced materials, nanotechnology and control systems. MANSID promotes multidisciplinary R&D activities to attract young researchers and specialists from the HEI and companies from the North East of Romania to work together on projects.

The HEI demonstrates active involvement in partnerships and relationships with a wide range of stakeholders

An innovative HEI understands the value of engaging with multiple stakeholders. There are many types of organisation with whom an HEI can form partnerships. These include, for example, regional and local organisations, quasi-public or private organisations, businesses (SMEs, large and international firms, social enterprises and entrepreneurs), schools and alumni.

Several HEIs are active in this respect. For example, the University Polytechnica of Bucharest is actively involved in the Smart City association of Bucharest. The Technical University of Cluj-Napoca has campuses in five different cities to maximise its impact in different communities. The Transilvania University of Brasov has established since 2012 a Council of Economic and Socio-cultural partners which includes representatives of the main companies and institutions in the region and meets twice per year to discuss and implement collaborations.

The West University of Timisoara has started a collaboration with Google Romania for the development of Google Digital Workshops, a modern infrastructure dedicated to young students with a comprehensive training programme. The centre offers training in digital marketing, free online courses, digital marketing events, free and personalised advice to use digital tools and online marketing.

The HEI has strong links with incubators, science parks and other external initiatives

Several types of surrounding innovation infrastructure can provide opportunities to exchange knowledge and ideas with non-academic actors. These include, for example, incubators, technology transfer offices, science and technology parks, clusters, etc. Modern innovative HEI in most OECD and European countries have developed a system of such structures that allow both inward and outward flows of knowledge and ideas.

Examples of these practices exist in Romania. The Transilvania University of Brasov organises every year an event called “Meet the company” where students and staff can liaise with the business community. The Technical University of Cluj-Napoca has started with Google a “Google Hub” helping students who want to start a company with the help of colleagues from Google, including financial support. The Technical University of Cluj-Napoca has also established a Knowledge and Technology Transfer Center as well as a Regional Center for Prompting the Industrial Property Protection to support start-up support. The Politehnica University of Bucharest developed an Entrepreneurship Center and a Tech Transfer Center to link with the business sector.

The HEI provides opportunities for staff and students to take part in innovative activities with the business sector and the external environment

An entrepreneurial and innovative HEI engages with the external environment through a variety of activities. These can range from informal activities, such as clubs and networking events, to more formal initiatives such as internships, collaborative research, industrial PhDs and entrepreneurship projects. Sometimes HEIs provide the physical space where these collaborations and experimentations can take place. HEIs can also organise events that encourage engagement with external stakeholders, such as joint workshops, conferences and other networking events.

The Technical University of Cluj-Napoca has developed bachelor’s, master’s and PhD studies in collaboration with the business sector. The University Stefan cel Mare of Suceava developed a Student Cultural Center to promote cultural activities linked to the city and the region. It is also in close contact with chambers of commerce from the local vicinity.

The HEI integrates research, education and knowledge exchange activities to absorb and exploit new knowledge

Effective relationships with the external environment often help stimulate the creation of new knowledge in every HEI. An innovative HEI should have mechanisms in place to integrate and absorb information and experiences from the wider innovation ecosystem, initiate dialogue and discussion between the HEI and the external environment, have clear mechanisms for exploiting entrepreneurial opportunities with commercial and industrial partners. According to the HEInnovate Leader Survey, collaboration on research activities is the most common form of knowledge exchange activities (the most common activity according to the 25.5% of the respondent HEIs, followed by dissemination activities of scientific results to the wider public, 19.4%).⁶

An interesting example comes from HEIs in the City of Cluj-Napoca. Here the HEIs in the city have established a co-ordination committee that meets regularly and discusses common project and activities across HEIs and the city. Another interesting example is the University of Agronomic Sciences and Veterinary Medicine of Bucharest. This University is actively involved in knowledge exchange activities in a key economic sector for the

country that is agriculture. The university is a hub for companies and research activities, they are for instance developing new crops and seeds and also have stations in rural areas to serve the needs of students and also the business community.

The internationalised institution

HEIs in Europe, OECD countries and beyond increasingly compete and operate at the international level. For this reason, they often integrate an international or global dimension into the design and delivery of education, research and knowledge exchange. Internationalisation is not an end in itself but a vehicle for change and improvement by learning from peers from other countries. International connections contribute to introduce alternative ways of thinking, questions traditional teaching and research methods, opens up governance and management to external international stakeholder, offer opportunities to exchange knowledge and collaborate with relevant partners (business, academia, public agencies, etc.) abroad. Therefore, it is linked very strongly to innovation and entrepreneurship.

Internationalisation is an integral part of the HEI's entrepreneurial agenda

An international perspective is a key characteristic of an entrepreneurial and innovative HEI. Most HEIs in OECD and EU countries have internationalisation strategies which ideally needs to be consistent with entrepreneurial and innovation agendas by aligning objectives and action plans.

Currently, Romania has no overall internationalisation strategy for its HEI sector but over the last decade, national actors promoted a series of initiatives to promote internationalisation and mobility of people (Curaj et al., 2015). Internationalisation is particularly important for Romanian HEIs, given the current demographic trends as well as emigration that is drastically reducing the numbers of domestic students (Chioncel and Del Rio, 2018). For this reason, several Romanian HEIs are actively looking at attracting students from neighbouring countries or emerging economies. Despite these activities, however, overall Romanian HEIs suffer from a lack of attractiveness for foreign students for a number of reasons, including the limited number of study programmes offered in English.

The University of Agronomic Sciences and Veterinary Medicine of Bucharest has developed a strategy to attract students from abroad. Part of the strategy is the delivery of courses in English and French. During the last years, they managed to attract 150 foreign students from 23 countries and they are planning to expand that. The Transilvania University of a Brasov likewise has developed 16 programmes in foreign languages: English, German and French, mainly in engineering. The West University of Timisoara also is committed to strengthening its international position with more than 5% of the student body coming from foreign countries and offering 20 study programmes in English, German and French.

The HEI explicitly supports the international mobility of its staff and students

International mobility brings in new education and research ideas, develop intercultural connections and long-lasting partnerships (Appelt et al., 2015). In addition to attracting international staff and students, an innovative and entrepreneurial HEI actively encourages and supports the international mobility of its staff and students. It can promote, encourage and reward international mobility through exchange programmes, scholarships,

fellowships and internships, for instance through European programmes. Several HEIs in Romania actively support the mobility of students and staff. Some HEIs have allocated specific grant systems to support mobility, in other cases, mobility is granted through the participation in European programmes. In particular, the participation in Erasmus programmes is one of the activities more frequently supported by HEIs in Romania, as emerged from HEInnovate Leader Survey respondents.⁷

The HEI seeks and attracts international and entrepreneurial staff

The internationalisation of an HEI depends upon people who can stimulate new approaches to teaching, learning, research and knowledge exchange in a global framework, using worldwide reputations and contacts to benefit the HEI's international network.

The share of international staff is low in Romanian HEIs, also due to the fact that most programmes are taught in Romanian. HEIs, however, have the possibility to seek to attract academics from the Romanian diaspora in international HEIs. The Technical University of Cluj-Napoca participates in a cross-border innovation network for technology transfer with the Slovak Republic and Ukraine. The University Stefan cel Mare of Suceava explicitly targets Moldova and Ukraine to attract students.

International perspectives are reflected in the HEI's approach to teaching

Access to new ideas for teaching and learning in the international environment can increase an HEI's ability to attract and retain talented individuals. Therefore, an innovative HEI should have a teaching and learning environment tailored to a more global audience.

Because of the declining number of students, Romanian HEIs actively try to attract students from abroad. The share of international students, however, is low (5.4% in 2017). According to Curaj et al. (2015), the number of Romanian students choosing to study abroad is significantly higher than the number of foreign students coming to Romania. Similar patterns are reflected in Erasmus student statistics.⁸

The international dimension is reflected in the HEI's approach to research

Strategic international research partnerships are an important part of an HEI's entrepreneurial and innovation agenda. The partnerships should be fully functional, not just on paper, and engage both staff and students. Many Romanian HEIs participate in European programmes for research and innovation. However, the success rate is below EU averages: according to preliminary data from participation in Horizo2020 (EC, 2017b) the Romania success rate was 12% below the EU average of 14.8% over the period 2014-16. Moreover, international research collaborations are amongst the activities mostly supported by HEIs that responded to the HEInnovate Leader Survey.⁹

Measuring impact

Innovative HEIs need to understand the impact of the changes they bring introduce in their institution and in the wider ecosystem in which they operate. Innovative and entrepreneurial HEIs combine institutional self-assessment, external evaluations and evidence-based approaches. However, impact assessment of innovation and entrepreneurship activities in HEIs remains underdeveloped. The current metrics used to assess impact typically focus on the number of spin-offs, the volume and quality of intellectual property and of the commercialisation of research results, but often tend to rely

less on metrics related to teaching and learning outcomes, the attraction and retention of talent, the contribution to local economic development, graduate entrepreneurship, or the impact of the broader entrepreneurial agenda. The reason is partly that even in advanced innovation-intensive countries, there is no consensus on the metrics to use to assess many of these initiatives.

The HEI regularly assesses the impact of its innovation and entrepreneurial agenda

The impact of the innovation and entrepreneurial agenda can be wide-ranging across research, education and knowledge exchange, as well as within the governance and leadership of the HEI. Understanding whether objectives are being met is crucial if an HEI wants to progress and achieve its intended outcomes. HEIs that regularly review and assess the impact of their innovation and entrepreneurial agenda generally define clear intended outcomes related to their innovation entrepreneurial agenda, collect evidence of the outcomes of the entrepreneurial agenda and use this evidence as a tool for reflection and review of the strategy and mission of the institution. In most HEIs in Romania innovation and entrepreneurship activities are not monitored or evaluated.

The HEI regularly assesses how its personnel and resources support its entrepreneurial agenda

Becoming an innovative and entrepreneurial institution may require an HEI to rethink how its personnel and resources are employed. An HEI may need to develop new human resource strategies, leverage external partnerships to overcome internal shortcomings and secure new sources of financial support. HEIs could, for example, undertake a skills/competency audit against the entrepreneurial agenda to assess their institutional development needs, use the information from the skills assessment and embed it in recruitment strategies and staff performance appraisals, leverage external partners and resources to address any skills gaps, review and assess the success of the allocation of personnel and resources at regular intervals. These activities are generally not evaluated in Romanian HEIs.

The HEI regularly assesses entrepreneurial teaching and learning across the institution

Ensuring that entrepreneurial and innovative teaching activities reach their full potential requires systematic assessment across all faculties and departments. An entrepreneurial HEI should develop clear objectives, which are regularly monitored and evaluated, and the results fed back into the renewal of study programmes and staff development. As entrepreneurial teaching and learning are not widespread in Romania, there are no regular assessments of entrepreneurial teaching and learning.

The HEI regularly assesses the impact of start-up support

It is important to monitor and evaluate start-up support activities to ensure that they are providing the appropriate quality of support in an effective manner. An entrepreneurial HEI should also monitor the outreach, take-up and role played by start-up support across all faculties and departments. As start-up support is not well developed in Romanian HEIs, monitoring and evaluation are still in their infancy.

The HEI regularly assesses knowledge exchange and collaboration

Assessing and gaining a better understanding of the HEI's knowledge exchange and collaborative activities allow the HEI to gain a better idea of the type and the scope of collaborations with the external stakeholders and society. Therefore, an innovative HEI should have mechanisms and activities in place to regularly monitor and evaluate the intended outcomes and impacts of these activities across all faculties and departments. These activities are generally not evaluated in Romanian HEIs.

The HEI regularly assesses the institution's international activities in relation to its entrepreneurial agenda

Having an international perspective is a key characteristic of an innovative and entrepreneurial HEI. An innovative and entrepreneurial HEI should develop an internationalisation strategy and regularly monitor and evaluate whether this internationalisation strategy supports the development of its entrepreneurial agenda across all faculties and departments. Romanian HEIs monitor the internationalisation of their activities especially in relation to the number of students and the participation in European programmes for science and innovation. However, these elements are not necessarily monitored in connection to the entrepreneurial agenda of HEIs.

In Romania, an interesting example is offered by the West University of Timisoara that regularly develops science maps to understand its international positioning in science and research compared to international peers.

Notes

¹ The HEInnovate Tool was widely used by Romanian HEIs thanks to the support and the activities promoted by JA Romania, an international NGO promoting and supporting entrepreneurship amongst students of different education levels.

² The HEInnovate Leader Survey was conducted at the end of 2018 and reached out all HEIs in Romania. Only 34 HEIs filled in the survey. In 2017/18, there were 48 comprehensive, medical and polytechnic state universities, 7 military academies, 37 private universities, of which 10 are temporarily accredited.

³ See endnote 2.

⁴ According to HEIs that participated in the HEInnovate Leader Survey, most HEIs had not yet established an incubator.

⁵ DESI is an index developed by the European Commission to assess the development of EU countries towards a digital economy and society and is organised around five dimensions: Connectivity, Human Capital, Use of Internet, Integration of Digital Technology and Digital Public Services.

⁶ Other activities mentioned as important included: continuous learning by 17.3% of respondent HEIs; collaborations on internships by 12.2%; systematic involvement of external stakeholders in teaching by 8.2%; consultancy contracts by 5.1%; offering facilities to external stakeholders by 5.1%; industrial doctorates by 3.0%; co-patenting by 1.0%. The HEInnovate Leader Survey was conducted at the end of 2018 and reached out all HEIs in Romania. Only 34 HEIs filled in the survey. In 2017/18, there were 48 comprehensive, medical, and polytechnic state universities, 7 military academies, 37 private universities, of which 10 are temporarily accredited.

⁷ See endnote 2.

⁸ Most foreign students are enrolled in degree programmes (bachelor's). Programmes taught in French have the highest proportion of foreign students.

⁹ See endnote 2.

References

- Acemoglu, D. and J.A. Robinson (2012), *Why Nations Fail: The Origins of Power, Prosperity and Poverty*, New York, Crown, p. 529.
- Aghion, P. et al. (2010), "The governance and performance of universities: Evidence from Europe and the US", *Economic Policy*, Vol. 25(61), pp. 7-59.
- Appelt, S. et al. (2015). "Which factors drive the international mobility of research scientists?", in A. Geuna (ed.), *Global Mobility of Research Scientists: The Economics of Who Goes Where and Why*, Elsevier, Philadelphia.
- Chioncel, M. and J.-C. del Rio (2018), *RIO Country Report 2017: Romania*, EUR 29169 EN, Publications Office of the European Union, Luxembourg.
- Curaj, A. et al. (2015), *Higher Education Reforms in Romania, Between the Bologna Process and National Challenges*, Springer Open.
- Dai, Q., E. Shin and C. Smith (2018), "Open and inclusive collaboration in science: A framework", *OECD Science, Technology and Industry Working Papers*, No. 2018/07, OECD Publishing, Paris, <https://doi.org/10.1787/2dbff737-en>.
- EC (2017a), *Higher Education for Smart Specialisation, The Case of North Romania*, JRC Technical Reports, European Commission.
- EC (2017b), "Horizon 2020 in full swing. Three years on. Key facts and figures 2014/2016", European Commission.
- Elliott, S. (2017), *Computers and the Future of Skill Demand*, Educational Research and Innovation, OECD Publishing, Paris, <https://doi.org/10.1787/9789264284395-en>.
- Etzkowitz, H. et al. (2000), "The future of the university and the university of the future: Evolution of ivory tower to entrepreneurial paradigm", *Research Policy*, Vol. 29, pp. 313-330.
- Gibb, A., P. Coyle and G. Haskins (2013), *The Entrepreneurial University: From Concept to Action*.
- Goddard, J., L. Kempton and P. Vallance (2013), "The civic university: Connecting the global and the local", in R. Capello, A. Olechnicka and G. Gorzelak (eds), *Universities, Cities and Regions: Loci for Knowledge and Innovation Creation*, Routledge, Abingdon, pp.43-63.
- Marques, P. and K. Morgan (2018), "The heroic assumption of smart specialisation: A sympathetic critique of regional innovation policy", in *New Avenues for Regional Innovation systems – Theoretical Advances, Empirical Cases and Policy Lessons*, Springer International Publishing.
- OECD/EU (2018), *Supporting Entrepreneurship and Innovation in Higher Education in the Netherlands*, OECD Skills Studies, OECD Publishing, Paris/EU, Brussels, <https://doi.org/10.1787/9789264292048-en>.
- OECD (2017a), *The Knowledge Triangle – Enhancing the Contributions of Higher Education and Research to Innovation*, OECD Publishing, Paris.
- OECD (2017b), *OECD Digital Economy Outlook 2017*, OECD Publishing, Paris, <https://doi.org/10.1787/9789264276284-en>.

- OECD (2015a), *Supporting Entrepreneurship and Innovation in Higher Education in Bulgaria*, OECD Publishing.
- OECD (2015b), “Making Open Science a Reality”, *OECD Science, Technology and Industry Policy Papers*, No. 25, OECD Publishing, Paris, <https://doi.org/10.1787/5jrs2f963zs1-en>.
- OECD (2015c), *The Innovation Imperative: Contributing to Productivity, Growth and Well-Being*, OECD Publishing, Paris, <https://doi.org/10.1787/9789264239814-en>.
- OECD (2011), *Regions and Innovation Policy*, OECD Reviews of Regional Innovation, OECD Publishing, Paris, <https://doi.org/10.1787/9789264097803-en>.
- OECD (2007), *Higher Education and Regions: Globally Competitive, Locally Engaged*, OECD Publishing, Paris, <https://doi.org/10.1787/9789264034150-en>.
- OECD/EU (2017a), *Supporting Entrepreneurship and Innovation in Higher Education in Hungary*, OECD Skills Studies, OECD Publishing, Paris/EU, Brussels, <https://doi.org/10.1787/9789264273344-en>.
- OECD/EU (2017b), *Supporting Entrepreneurship and Innovation in Higher Education in Ireland*, OECD Skills Studies, OECD Publishing, Paris/EU, Brussels, <https://doi.org/10.1787/9789264270893-en>.
- OECD/EU (2017c), *Supporting Entrepreneurship and Innovation in Higher Education in Poland*, OECD Skills Studies, OECD Publishing, Paris/EU, Brussels, <https://doi.org/10.1787/9789264270923-en>.
- OECD (n.a), Main Science and Technology Indicators Database . <https://www.oecd.org/sti/msti.htm>.
- Rodriguez-Pose, A. and M. Di Cataldo (2015), “Quality of government and innovation performance in the regions of Europe”, *Journal of Economic Geography*, Vol. 15(4), pp. 673-706, <https://doi.org/10.1093/jeg/lbu023>.

Chapter 3. Building entrepreneurial capacity in Romania through teaching and learning

As highlighted by the Sustainable Development Goals, education plays an important role in developing entrepreneurially competent people, institutions and the society. Romania has strong reasons to designing policies promoting access to entrepreneurial education. The country is going in the right direction. For instance, the National Strategy for Tertiary Education in Romania 2015-20, support efforts to “develop an ongoing curricular assessment for transversal skills and entrepreneurship” as part of the quality assessment of the Higher education system. Going forward, progress need to be made increasing the opportunities for entrepreneurship teaching and learning in all HEIs, and in the capacity to involve the business sector in curricula development. The chapter discusses these characteristics and provides policy recommendations to mainstream entrepreneurship education in Romania’s Higher education system.

Quality of life, innovation and education, a general overview

Access to education and health are important aspects affecting the quality of life for all (OECD Well-Being Index: OECD, n.d.).¹ UN Sustainable Development Goals (SDGs) highlight areas of policy planning and interventions required to narrow the development gap across countries, by 2030. This chapter uses three SDGs to analyse the role of education in developing entrepreneurially competent people, institutions and the society: No. 4 Quality of Education, No. 17 Partnership for the Goals and No. 8 Decent Work and Economic Growth. They are defined as:

- **No. 4 Quality of Education:** “Obtaining a quality education is the foundation to creating sustainable development. In addition to improving quality of life, access to inclusive education can help equip locals with the tools required to develop innovative solutions to the world’s greatest problems. [...] By 2030, substantially increase the number of youth and adults who have relevant skills, including technical and vocational skills, for employment, decent jobs and entrepreneurship”.²
- **No. 17 Partnership for the Goals:** “A successful sustainable development agenda requires partnerships between governments, the private sector and civil society. These inclusive partnerships built upon principles and values, a shared vision and shared goals that place people and the planet at the centre, are needed at the global, regional, national and local level”.³
- **No. 8 Decent Work and Economic Growth:** “Sustainable economic growth will require societies to create the conditions that allow people to have quality jobs that stimulate the economy while not harming the environment. Job opportunities and decent working conditions are also required for the whole working age population”.⁴

Romania has strong reasons to follow the triangle of those UN SDGs in designing policies promoting activities leading to socio-economic development and access to education. The low level of national competitiveness, low share of highly educated population and low level of innovative capacity ask for consistent and interlinked policies across different areas.

Competitiveness

According to the World Economic Forum Global Competitiveness Report, from 2014/15 to 2017/18, Romania fell from 59th out of 144 participating countries to 68th out of 137 countries (Schwab, 2017). Among the lowest ranked components of competitiveness relevant for sustainable economic development are:

- quality of the education system,⁵ rank 115 (with negative trend)
- extent of staff training, rank 123 (with negative trend)
- country capacity to retain talents, rank 132 (with negative trend)
- country capacity to attract talents, rank 131 (with negative trend)
- company spending on research and development (R&D), rank 110
- quality of scientific/research institutions, rank 57 (with positive trend)
- availability of engineers and scientists, rank 80

- capacity for innovation, rank 109.⁶

Among the most problematic factors for doing business are the lack of educated workforce and the general level of corruption (Schwab, 2017, p. 246).

On the achievement of the EU 2020 Strategy targets

As the most recent data show, the highest distances from the planned targets for Romania are for gross domestic expenditure on R&D (0.48% of GDP in 2016 vs. planned 2%) and for lifelong learning (1.26% in 2016 vs. planned 10%) (Table 3.1). This is in the line with the low ranking of Romania in those dimensions of competitiveness: Romania ranks 123rd out of 137 countries on extent of staff training and 110th on company spending in R&D (Schwab, 2017).

Table 3.1. Indicators to support the EU 2020 strategy, Romania and EU targets

	EU (target)	Romania (target)	Romania (recent achievement)
Employment rate age group 20-64 year-olds (%)	75	70	68.8 (2017)
Gross domestic expenditure on R&D (% of GDP)	3	2	0.48(2016)
Share of early school leavers (% of population aged 18-24)	below 10	11.3	18.1 (2017)
Completed tertiary education (% of population aged 30-34)	minimum 40	26.7	26.3 (2017)
Lifelong learning (% of population aged 25-64)	15	10	1.2 (2016)

Source: EC (2018a), *Smarter, Greener, More Inclusive? – Indicators to Support the Europe 2020 Strategy, 2018 Edition*, <https://ec.europa.eu/eurostat/documents/3217494/9087772/KS-02-18-728-EN-N.pdf/3f01e3c4-1c01-4036-bd6a-814dec66c58c>, p. 150.

Despite Romania making strong progress by raising tertiary educational attainment between 2008 and 2017 and being likely to achieve the targeted share of 26.7% of population aged 30-34 with tertiary education in 2020, it will remain considerably below the EU minimum target of 40%. The slow process of increasing the share of the population with tertiary education is not contributing to solving the identified problem of an inadequately educated workforce (as identified in Schwab, *Global Competitiveness Report*, 2017). Moreover, a worrying indicator is the continuous fall of the number of students, accompanied by intensive emigration of highly educated people, causing an important mismatch between available skills and market labour requests.

The number of students in public universities slightly increased (from 56 455 in 2017/18 to 62 264) but the number of tuition-paid students almost halved: from 84 960 to 44 477). The enrolled number of students that do not pay any fee is not based on foresight and labour market demand studies, but rather correlated to the number of academic staff and students' demand. Many highly skilled individuals, especially those with a PhD, leave the country to look for opportunities abroad (Chioncel and del Rio, 2018).

Since tertiary education with its links to research and innovation is a major source of highly skilled human capital, it is of utmost importance to ensure that the education systems meet the needs of a competitive economy, which is heavily dependent on knowledge-intensive businesses. For instance, knowledge-intensive activities employed more than one-third

(36.1%) of the EU labour force in 2016. In Romania, this share was less than 30% and the country placed at the bottom of EU member states alongside Bulgaria.

Unequal access to high-quality education contributes to the risk of poverty. Despite the decrease in the number of persons at risk of poverty, with 38.8% Romania was in 2016 still at the top of EU member states in 2016 (38.8% for an EU average of 23.5%). In comparison, Bulgaria comes first with 40.4% and Greece third with 35.6% (EC, 2018b). In addition, according to the EC/EACEA/Eurydice (2018), only 4% of new entrants in higher education come from families with low education backgrounds.

Without strong, long-term partnerships among policymakers, higher education institutions and the business sector, the expected and much-needed changes in the education and innovation system of Romania (through a better-educated population and a more innovative and competitive economy) will be significantly slowed down.

Regional development imbalances and higher education in Romania

In a country with strong regional development imbalances (World Bank, 2018), higher education institutions should be analysed both from a national and regional perspective (Chapter 5). Romania is participating in the EU project on lagging regions.⁷ In Romania, regions were created by the central government for the purpose of co-ordinating development projects, without any legal status, long-term joint interests and collaboration mechanism. Changing the focus from the national to subnational (regional) level confirms the consistency of data related to gross domestic product (GDP) per head (purchasing power consumption standards – PPCS), as a proxy for quality of life, competitiveness, innovation dimension of competitiveness and higher education (Table 3.2).

Table 3.2. Competitiveness, innovation and higher education in Romanian regions

The EU Regional Competitiveness Index 2016, rank based on 263 EU regions (NUTS 2)

Region	GDP per head (PPS)*		RCI 2016		Innovation dimension**		Higher education and lifelong learning***	
	Score EU28=100	Rank	Score 0-100	Rank	Score 0-100	Rank	Score 0-100	Rank
Nord Vest	47	249	11.9	241	8.7	254	43.0	245
Centru	51	244	8.2	246	6.8	256	41.4	252
Nord Est	34	260	6.4	251	1.5	262	38.6	255
Sud Est	48	247	0.1	262	1.8	261	36.5	257
Sud Muntenia	42	254	5.7	254	2.4	260	36.3	258
Bucuresti Ilfov	128	38	45.4	161	42.3	159	63.1	131
Sud Vest Oltenia	40	257	5.6	255	0.0	263	42.6	248
Vest	57	231	13.2	240	14.5	247	46.2	235

* Net adjusted disposable household income in PPCS per capita (index EU28=100), 2013.

** Composed from indicators on Technological Readiness, Business Sophistication and Innovation, 2013-14 or 2013-15.

*** Based on indicators on population aged 25-64 with higher educational attainment (ISCE 5-8); Lifelong learning: Early school leavers; 2013.

Note: Boldface indicates weaknesses relative to 15 EU comparable regions in terms of GDP per capita.

Source: Developed using data from Annoni, P., L. Dijkstra and N. Gargano (2017), *The EU Regional Competitiveness Index 2016*, http://ec.europa.eu/regional_policy/en/information/publications/working-papers/2017/the-eu-regional-competitiveness-index-2016.

The most economically developed region (Bucuresti Ilfov) is also the one with the highest scores on competitiveness, innovation and higher education indicators. The most

economically deprived regions (such as Nord Est and Sud Vest) are the ones with the lowest scores on competitiveness, innovation and higher education. Except for the Bucuresti Ilfov region, all other regions are placed among the 10% of the least competitive regions in the European Union.

Statistical analysis confirmed that both indicators (higher education and lifelong learning; innovation) have a positive correlation with the competitiveness of countries and regions (Annoni, Dijkstra and Gargano, 2017). The indicator of Early school leavers⁸ shows a negative correlation with competitiveness.

The low innovative capacity of Romanian regions has been also confirmed by the Regional Innovation Scoreboard surveys. All eight NUTS2 Romanian regions are modest⁹ innovators and innovation performance has decreased significantly when comparing 2017 to 2011, especially in the two easternmost regions (Nord-Est and Sud-Est). Out of 22 EU regions in the category of modest innovators, 8 are in the last third – 7 of them are Romanian regions (EC, 2017a).

Among three the most influential structural factors which determine the values of innovation indicators (expressed by the Summary Innovation Index) in the longer period, two are related to education (EC, 2018c):

- Basic-school entrepreneurial education and training, measuring the extent to which training in creating or managing small- and medium-sized enterprises (SMEs) is incorporated within the education and training system at primary and secondary levels.
- Post-school entrepreneurial education and training, measuring the extent to which training in creating or managing SMEs is incorporated within the education and training system in higher education such as vocational, college, business schools, etc.
- Total R&D personnel (full-time equivalent, percentage of the labour force).

The findings confirm once again the importance of education and innovation as drivers of long-term, socio-economic development and well-being (Stiglitz, Sen and Fitoussi, 2009). For all these reasons education and innovation policy are crucial for improving competitiveness and regional development and should help to identify priorities and linkages among different strategic policy trajectories given their inter-disciplinary nature.

Strategic and policy framework for building entrepreneurial capacity through teaching and learning

Within the European Union, discussions on entrepreneurial competencies (Box 3.1) were initiated in 2000 with the Lisbon Agenda. The reason was a growing awareness of asymmetry between available knowledge and skills and needs to cope with demographic, societal and environmental changes. The widening competitiveness gap between the European Union, Japan and the United States was a wake-up call to act upon identified bottlenecks caused by the lack of entrepreneurial competencies and low contribution of all types of education (formal, informal, non-formal) to building entrepreneurial competencies among the population (Box 3.2).

Box 3.1. Entrepreneurship competency as a lifelong competency, EU Council Recommendation

In 2018, the EU Council Recommendation on Key Competences for Lifelong Learning identified entrepreneurship competency as one of eight key competencies for lifelong learning along with definitions of categories of knowledge, skills and attitudes needed for building and maintaining those competencies during a lifetime (p. 14):

- **knowledge** is composed of the facts and figures, concepts, ideas and theories which are already established and support the understanding of a certain area or subject
- **skills** are defined as the ability and capacity to carry out processes and use the existing knowledge to achieve results
- **attitudes** describe the disposition and mindsets to act or react to ideas, persons or situations.

Entrepreneurship competency (p. 24) “refers to the capacity to act upon opportunities and ideas, and to transform them into values for others. It is founded upon creativity, critical thinking and problem solving, taking initiative and perseverance and the ability to work collaboratively in order to plan and manage projects that are of cultural, social or commercial value.

Essential knowledge, skills and attitudes related to this competency

Entrepreneurship competency requires knowing that there are different contexts and opportunities for turning ideas into action in personal, social and professional activities, and an understanding of how these arise. Individuals should know and understand approaches to planning and management of projects, which include both processes and resources. They should have an understanding of economics and the social and economic opportunities and challenges facing an employer, organisation or society. They should also be aware of ethical principles and have self-awareness of their own strengths and weaknesses.

Entrepreneurial skills are founded on creativity which includes imagination, strategic thinking and problem-solving, and critical and constructive reflection within evolving creative processes and innovation. They include the ability to work both as an individual and collaboratively in teams, to mobilise resources (people and things) and to sustain activity. This includes the ability to make financial decisions relating to cost and value. The ability to effectively communicate and negotiate with others, and to cope with uncertainty, ambiguity and risk as part of making informed decisions is essential.

An entrepreneurial attitude is characterised by a sense of initiative and agency, pro-activity, being forward-looking, courage and perseverance in achieving objectives. It includes a desire to motivate others and value their ideas, empathy and taking care of people and the world, and accepting responsibility taking ethical approaches throughout the process.”

Source: For 2018 Council Recommendation on Key Competences for Lifelong Learning, see: https://eur-lex.europa.eu/legal-content/EN/TXT/?qid=1527150680700&uri=CONSIL:ST_9009_2018_INIT.

Box 3.2. The EU Entrepreneurship Competence Framework - EntreComp

The entrepreneurship competency framework, developed by the Joint Research Center of the European Commission, can be used as a basis for the development of curricula and learning activities in formal and non-formal educational settings, aiming to foster entrepreneurship as a competency.

EntreComp provides detailed information on entrepreneurship competency, grouped by knowledge, skills and attitudes into three interrelated and interconnected competency areas, as building blocks of entrepreneurship competency:

- Ideas and opportunities.
- Resources.
- Into action.

EntreComp develops 15 different components of the entrepreneurship competency using an 8-level progression model (learning process) and proposes a comprehensive list of 442 learning outcomes.

Implementation of curricula developed on EntreComp approach is based on an experiential learning process, which brings into learning process students, teachers and different actors outside of the educational system (from the business sector, governments, civil society).

Source: EC (2018d), *EntreComp into Action – Get Inspired, Make It Happen: A User Guide to European Entrepreneurship Competence Framework*, <https://ec.europa.eu/jrc/en/publication/eur-scientific-and-technical-research-reports/entrecomp-action-get-inspired-make-it-happen-user-guide-european-entrepreneurship-competence>.

After joining the EU in 2007, Romania had the opportunity to participate in the development of several EU policy documents related to education and entrepreneurship education and in designing its own strategic and policy framework to promote entrepreneurial capacity based on them.

Three main national strategic documents, already briefly described in Chapter 1, are particularly relevant in the Romanian context to understand the role of tertiary education (and specifically entrepreneurship education):

- The National Strategy for Tertiary Education in Romania 2015-20
- The National Strategy for RDI 2014-20
- The National Strategy for Competitiveness 2015-20.

These documents refer very generally to entrepreneurship but do not refer to any of the above-mentioned strategic EU policy documents related to entrepreneurship competencies and education (neither are updated along with the new relevant EU policy documents from 2013-17). In particular, they do not mention the role of entrepreneurship education in providing transversal skills and do not provide workable policy framework needed for reforming the higher education sector and fostering efficient collaboration of education, business sector and government in the process of strengthening entrepreneurship education. However, there are initiatives in individual universities in these areas.

All three strategic documents provide a framework for positioning education as a major mechanism for developing human and social capital. No strategy specifically identifies entrepreneurship education but all of them refer to innovation and entrepreneurship, entrepreneurial initiative and employability, i.e. implicitly referring to entrepreneurship education as a source of knowledge and skills for building entrepreneurial competency (how to be innovative and entrepreneurial) on an individual level during the lifetime.

In developing and implementing these strategies, especially the Strategy for Research Development and Innovation, the National Strategy for Competitiveness 2014-20, Smart Specialisation Strategies at the regional level and the National Reform Programme should involve many actors (higher education institutions, business sector, government at the national and sub-national levels) for an efficient co-ordination between all ministries and actors. For fruitful co-ordination, there is need to build a “shared language” and approach between all levels of governance (OECD, 2016) in order to make substantial progress in areas such as strategic planning and regular monitoring and evaluation of effectiveness and efficiency of the higher education system. Without such information, it is not possible to provide evidence-based policies in the higher education sector.¹⁰

The National Strategy for Tertiary Education 2015-20

The National Strategy for Tertiary Education in Romania 2015-20 called for urgent education reforms in order to deal with projections of the declining number of students for 40% by 2025 (compared to 2005 level) and the EU 2020 target of achieving 26.7% of 30-34 year-olds with completed tertiary education by 2020. In order to make this vision a reality, one of the four main actions is “fostering engagement with the economy, especially as related to the labour market and innovation/entrepreneurship” (p. 9). In order to upgrade the capacity of tertiary education institutions to participate in such processes, it is necessary to “recalibrate the level of institutional autonomy with accountability for performance against well-defined expectations” (p. 21). The strategy identifies three major areas for reforms in the Romanian tertiary education system (quality, attainment and engagement with the economy). It has to be noted however that the implementation of the strategy is slow.

As a part of *quality*, the need to revise curricula and “develop an ongoing curricular assessment for transversal skills and entrepreneurship” (p.22) has been identified. This requires regulatory interventions to provide more freedom at the higher education institution (HEI) level for curriculum design. As part of the *engagement with the economy*, the involvement of employers in the design and delivery of programmes, supporting staff exchanges and including practical experience in courses are called upon (p. 22), but it is also acknowledged that “tertiary education and industry must have much deeper knowledge of each other’s needs and capabilities than exists at present” (p.35).

The strategy also mentions a survey of employers, as a necessary activity to collect needed information about the labour market requests to be used to adapt curricula. According to the strategy, the survey would also support the evidence-based policymaking as presented in the tertiary education model (p. 10). The estimated costs for the implementation of this strategy are approximately EUR 2.1 billion (2015-20). Most of the funding is allocated to scholarships and developing a student loan scheme, less (if anything) has been allocated for re-training HEIs leaders and professors teaching entrepreneurship in new pedagogies.

The Romanian Agency for Quality Assurance in Higher Education (ARACIS) is responsible to “develop a plan to access the national state of curricular innovation in institutions with respect to transversal skills and entrepreneurship so that progress of the

strategy between 2015 and 2020 can be monitored” (p. 35). It is even stipulated that the financial incentives will be provided to institutions to improve the integration of transversal and entrepreneurial skills into the curriculum.

The methodology for external evaluation, the benchmarks, and the list of performance indicators of the Romanian Agency for Quality Assurance in Higher Education, ARACIS, 2017 cover many well-known aspects of an efficient education process. These include: interconnectedness of education and research; need for collaboration with business sector; permanent challenge to build institutional capacity on strategic and operational level for efficient education process (e.g. by providing lecturers with possibilities to upgrade their pedagogical skills); identification of key performance indicators (e.g. the level of employability of graduates).¹¹

ARACIS is a body with legal prerogatives to propose to the Ministry of National Education advice and recommendations based on its own evaluations. Their recommendations should be used to modify strategic policy documents as well as for interventions in the regulatory framework relevant to the higher education sector.

The National Strategy for RDI 2014-20

The National Strategy for Tertiary Education in Romania 2015-20 emphasises the need for the development of national research for innovation and entrepreneurship programme, to encourage dialogue between the education and business sectors. Based on the National Strategy for Research, Development and Innovation 2014-20, such collaboration was promoted by the national Smart Specialisation Strategy as well as subnational Smart Specialisation Strategies through an active entrepreneurial discovery process (EDP). However, at the implementation phase, the lack of long-term and stable sources of funding contributes to the low predictability and stability of the RDI activities, to the lack of RDI data at the regional level and to the growing brain drain and limited RDI policy design capabilities (Chioncel, Del Rio, J. 2018).

The National Strategy for Competitiveness 2015-20

The National Strategy for Competitiveness 2015-20 has been built on identified competitive advantages that correlate with intelligent specialisation areas from the National Strategy of Research, Development and Innovation 2014-20. This document also calls for entrepreneurial initiative, incentives for innovation and the training/education needed to increase quality of life, through economic development based on innovations and competitiveness. Specifically, the National Strategy for Competitiveness 2015-20 stipulates the need to work on preparing the Generation 2050 and respond to societal challenges. According to the strategy, it is expected that innovative and open (compulsory) education should have a leading role in those processes.

Entrepreneurial teaching and learning matter

Global Entrepreneurship Monitor (GEM) data confirm that entrepreneurship education matters for entrepreneurial activities. Across participating countries, in the GEM survey, there is a recognisable educational pattern: a higher level of educational attainment (with a focus on entrepreneurship competency) is connected with more intensive entrepreneurial activity measured by the Total Early Stage Entrepreneurial Activity index¹² (Table 3.3). This pattern is stable not only in time but also across countries, irrespectively of the development stage (Table 3.4).

Table 3.3. Entrepreneurial activity and educational attainment, 2015

Total early entrepreneurial activity (TEA), %				
	Lower than secondary	Secondary	Post-secondary	Postgraduate
Romania	2.5	10.6	11.7	22.2
EU member states participated in GEM	4.6	7.0	9.8	11.9
Overall average for all countries participating in GEM	10.5	12.4	15.3	16.9

Note: 2015 is the last year when Romania participated in GEM.

Source: Global Entrepreneurship Monitor database 2015, <https://www.gemconsortium.org/data>.

Table 3.4. Entrepreneurial activity and educational attainment, 2017

Total early entrepreneurial activity (TEA), %				
	Lower than secondary	Secondary	Post-secondary	Postgraduate
EU member states participated in GEM	5.4	6.9	10.6	12.5
Overall average for all countries participating in GEM	9.6	11.4	14.7	15.6

Source: GEM database, 2017, <https://www.gemconsortium.org/data>.

Another important feature of entrepreneurial activity and educational attainment is that individuals with a higher level of entrepreneurship education are more frequently starting a business venture out of recognised opportunity.¹³ Conversely, a larger share of individuals with a lower education level tend to start a business venture out of necessity.¹⁴ The opportunity/necessity feature of the entrepreneurial activity has several implications on economic growth. Opportunity-based entrepreneurs usually have longer business perspectives, their expectations about job creation are higher and are more interested in investing in increasing the competitiveness of their businesses based on innovation. Necessity-based entrepreneurs usually see their ventures as channels to overcome situations in which they do not see other employment options.

The motivational index is presented by a ratio of those who start a business by recognising opportunities and those who do it out of necessities. The higher motivational index indicates the dominant presence of adults (18-64 years of age) who enter entrepreneurial activity because they wanted to and not because they were pushed into it due to the lack of any other employment option. With a motivational index of only 1.2, Romania was in 2015 among the group of EU countries with the lowest motivational index (together with Croatia, 1.0, and Bulgaria, 0.9). At the same time, the motivational index in Switzerland was 6.5, 6.3 in Norway and 5.6 in Luxembourg (Kelley, Singer and Herrington, 2016). This finding confirms how education outcomes cannot be evaluated in isolation but have to be connected to the wider environment, such as economic factors and societal changes which lead to improving the quality of life.

The positioning of Romanian HEIs with respect to entrepreneurship education and vice versa

The National Strategy for Tertiary Education in Romania 2015-20 defines the role of HEIs with respect to entrepreneurship education: “fostering engagement with the economy,

especially as related to the labour market and innovation/entrepreneurship” has been identified as one of the main actions. Also, an ongoing curricular assessment for transversal skills and entrepreneurship was introduced in quality assessment activities. At the same time, it was recognised that in order to upgrade the capacity of tertiary education institutions to participate in such processes it is necessary to “recalibrate the level of institutional autonomy with accountability for performance against well-defined expectations”.

The positioning of entrepreneurship education within the HEIs is more challenging. There is no systematic monitoring of entrepreneurship education organised and delivered in HEIs, but there are several reports, mainly produced by the EU and the OECD, in which entrepreneurship education is analysed as a part of the Romanian entrepreneurial ecosystem.¹⁵ The only mapping of educational programmes focused on entrepreneurship and business administration (UEFISCDI, 2015) showed a concentration of such programmes in the most developed region Ilfov Bucharest (Table 3.5).

Table 3.5. Entrepreneurship and business administration programmes for tertiary education

Number of programmes, February-May 2015*

Region (NUTS2)	Main city	Total	Bachelor's degree programmes	Master's degree programmes	MBA programmes**
Bucharest Ilfov	Bucharest	13	3	6	4
North-West	Cluj	6	1	4	1
West	Timisoara	3	1	1	1
Centre	Brasov	3	1	2	
South-West	Craiova	3		3	
South	Pitesti	1		1	
South East	Constanta	4	2	2	
North East	Iasi	3	1	2	
Total		36	9	21	6

* No available information on criteria for identifying entrepreneurship programmes and the share of such programmes in this mapping.

** Including Joint MBA programmes.

Source: UEFISCDI (2015), *The Romanian Entrepreneurship Ecosystem. An Exploratory Study*.

Despite the National Strategy for Tertiary Education in Romania 2015-20 having identified a need to “develop an ongoing curricular assessment for transversal skills and entrepreneurship” (p.22) as part of the quality assessment, this effort is not visible from the reports on external evaluations of HEIs.¹⁶

In the absence of any evaluation of entrepreneurship educational programmes, it would be useful to use the HEInnovate tool (www.heinnovate.eu) to self-assess entrepreneurship teaching and learning, as well as other dimensions of an innovative and entrepreneurial university.

Entrepreneurship education is isolated in courses, not mainstreamed across the campus

In Romania, formal entrepreneurial education is mainly part of curricula at the faculties of economics and business schools.¹⁷ Analysing those curricula, Leovaridis, Frunzaru and Cismaru (2016)¹⁸ identified a wide range of courses in the entrepreneurship area, covering many skills necessary for a starting a venture. Such courses, using a narrower definition of

entrepreneurship competency (starting a business), are part of a curriculum, but educational content leading to the entrepreneurship competency is not embedded *across* curricula. In other educational fields (science, technology, engineering and mathematics [STEM], humanities, other social disciplines, entrepreneurship education is missing, or present on a case to case basis. This is a missed opportunity as entrepreneurship education in these areas could contribute to reducing the gap between the educational output of the tertiary education and the competencies required in particular by innovative high-growth start-ups and companies in which most STEM graduates find employment. The University of Strathclyde offers an example of a university that managed to embed these disciplines in the overall university activities (Box 3.3).

Box 3.3. From co-operation to integration – The case of the University of Strathclyde

The University of Strathclyde was established in 1765 as “a place of useful learning” (the vision of Professor John Anderson, founder of the university). This simple definition was always a guiding thought which profiled the university for its excellence in research (e.g. in 2014, based on the Research Excellence Framework results, the Times Higher Education listed Strathclyde as a Top 20 UK research-intensive university, No. 1 in the UK in Physics, 7th place for engineering, Strathclyde Business School 3rd in the UK for research impact and in the top ten in the UK overall). Strathclyde was also fifth in the UK for company creation in the period 2004-14.

For this research-intensive university, it is of the utmost importance that teachers of technology commercialisation understand how people can learn “to commercialize technology in many ways, and attending class is only one way” (Levie, 2014). A university’s entrepreneurial ecosystem (including teaching activity) is a prerequisite in enabling the university community to learn technology commercialisation or to be a “place of useful learning”.

In 1984, the Business Ventures Group was created with a remit to encourage and support spin-out companies based on research. In 1990, the university opened Scotland’s first university incubator, while a dedicated university spinout company development officer post was created in the technology transfer office in 1998. In 2005, ERDF funding of GBP 950 000 enabled the growth of services to young alumni entrepreneurs (advisors, events, networking).

In building its own entrepreneurial ecosystem, highlights included an open business plan competition started in 2002, the closing of the first round (GBP 4.5 million) of fundraising for the Strathclyde Innovation Fund for spinouts in 2008 and, in 2015, the Strathclyde Entrepreneurs Fund was corner-stoned with proceeds from the first student spinout exit event.

Those activities were combined with a series of investments in developing educational programmes: in 1996, the Strathclyde Entrepreneurship Initiative provided to all students the possibility of choosing entrepreneurship elective courses; in 1999, the Technology Entrepreneurship for Postgraduates training programme; in 2000, the Hunter Centre for Entrepreneurship was established with a GBP 5 million endowment from Sir Tom Hunter, alumnus; in 2001, Supercoach@Entrepreneurial Training “train the trainers” course ran at the Hunter Centre for the first time; in 2007, 4-year undergraduate Business Enterprise Pathway launched by Hunter Centre in the BA business degree; the Strathclyde Enterprise Pathway for all students and the Growth Advantage Programme (GAP) for established entrepreneurs launched in 2015; the MSc in Entrepreneurship, Innovation and Technology in 2016; the MSc in Entrepreneurial Management and Leadership in 2017; and iGAP training programme for early-stage entrepreneurs in the Glasgow City Council accelerator in 2018.

To accommodate the growth of the university’s entrepreneurial ecosystem, changes were needed to the ecosystem’s governance structure. In hindsight, the following phases are apparent:

- Phase 1: 1984-2008 – **Co-operation** between departments/centres/units; no central co-ordinating body; a loosely connected “Strathclyde Entrepreneurial Community of Practice”; goodwill-dependent.
- Phase 2: 2008-11 – **Realignment** and separation of responsibilities by senior officers.
- Phase 3: 2011-13 – **Regular co-ordination** by senior officers via Enterprise Forum and small Strategic Board (4 people).
- Phase 4: 2013- – **Integration**: Strathclyde Entrepreneurial Network brand introduced; four key areas: Nurturing Entrepreneurial Talent, Supporting New Ventures, Celebrating Success and Influencing Policy and Practice. Aim: to have research, teaching and outreach inform and enhance each other.

This journey from co-operation to integration strongly contributed to the university’s mission – to be “a place of useful learning”. It also brought the university several national awards, including entrepreneurial university of the year and business school of the year, as well as the Small Business Charter Gold award, one of only five issued to a UK university.

Sources: Information provided by Professor Jonathan Levie, Hunter Centre for Entrepreneurship, University of Strathclyde, Glasgow, UK (September 2018); Levie, J. (2014), “The university is the classroom: Teaching and learning technology commercialization at a technological university”, *Journal of Technology Transfer*, Vol. 39(5), pp. 793-808, <http://dx.doi.org/10.1007/s10961-014-9342-2>; for the Strathclyde Enterprise Pathway for all students, see: <https://www.strath.ac.uk/whystrathclyde/strathclydeentrepreneurialnetwork/eventsactivities/enterprise/enterprise-pathway/>.

There are several reasons for the limited presence of cross-curricula/cross-campus entrepreneurship education in Romania. A traditional disciplinary approach in defining curricula may be a major obstacle for introducing educational contents related to transversal skills, like entrepreneurial competency. Another important obstacle emerges from the regulatory definitions of who can teach at universities (EC, 2017b). Successful entrepreneurship education depends heavily on a balanced combination of academic and experiential approach, in designing the content and in its delivery. If the regulations do not allow the participation of entrepreneurs in the teaching processes (as teachers and mentors)

due to lack of a formal academic degree, then the learning processes are impoverished. Lack of teachers' training in implementing adequate pedagogies (team teaching, problem/project-oriented teaching, blended teaching...) for successful delivery entrepreneurship educational content is an additional obstacle.

The lack of cross-campus entrepreneurship education and limitations on the side of teaching staff are negatively influencing the capacity to build a stimulating entrepreneurship ecosystem at the national and sub-national levels (by developing entrepreneurial competencies in all components of entrepreneurship ecosystem: finance, education, local governments, R&D, supporting institutions: business incubators, accelerators, development agencies...). This is why HEIs should position themselves in the field of entrepreneurship education.

Low level of research-based entrepreneurship educational content

Research and education activities coexist in Romanian universities but there is limited evidence of research-based education or involvement of students in research activities. Reasons for the lack of interlinkages between research and education at the HEIs are mostly related to the financial scheme (financing the public HEIs is based on the number of students, lecturers are overloaded with teaching) but also on a traditional organisational culture and structure which do not support interweaving those functions.

Faculty-centred teaching and evaluation methods in entrepreneurship education are present, but there is a low level of train-the-teachers opportunities

Traditional teaching format is overwhelmingly present in Romanian universities, there is very scarce presence of experiential learning, problem-based teaching and learning, team teaching through partnering faculty and practitioners from outside of academia, blended learning, "flipped classroom" approaches, which provide more room for developing critical thinking and capacity for innovation in problem definition and problem solving. Pedagogical training and systematic upgrading teachers' continuous professional development is not standard practice in Romanian HEIs.

The EC (2017b) report states as a positive sign that there are plans underway to train teachers to teach the modernised curriculum. Regulations related to the tertiary education rarely require university teachers to hold a teaching qualification and the development of teaching skills is often left to ad hoc measures (EC/EACEA/Eurydice, 2018). In order to increase both efficiency and effectiveness of entrepreneurship education investment in teachers are crucial but also requires adequate financial support from the government.

Modest participation of the business sector and students in co-designing the content and learning methods of entrepreneurship educational programmes

The lack of skills and expertise in some sectors or regions of Romania (Cedefop, 2016) – as identified through regional smart specialisation strategies – requests more effective collaboration of different actors in co-designing the content and learning methods of entrepreneurship educational programmes. In Romania, involving employers in curriculum development is compulsory for all institutions (EC/EACEA/Eurydice, 2018).¹⁹ However, there is no systematic collection of employers' opinions on skills needs or joint research projects on future employment trends, taken into account in curricula development.

Box 3.4. An example of experiential learning at the Dublin Institute of Technology (Ireland)

At the Dublin Institute of Technology, there is the possibility to replace some traditional exams with an enterprise project in the social sector, such as organising an event for charity, thus offering value to the community.

Students can decide the scale of the event, with the condition that they must organise and manage the whole event themselves. The students arrange themselves into groups of three. They are given approximately three months in which they must: i) identify a charity that they wish to support; ii) generate and select an idea for a charity event; iii) secure a suitable venue; iv) get sponsors for the event; v) develop and implement a marketing strategy; vi) sell tickets for the event; vii) organise every element of the operations; viii) determine the budget for the event and manage the finances; ix) review the success of the event; x) write a report individually on their learning experiences.

The programme has been running since 1996 and, until 2018, resulted in EUR 675 000 collected for different charitable purposes.

Source: Information provided by Professor Thomas Cooney, DIT, leader of the course, September 2018.

Tracking graduates' careers could be a good source for getting feedback on many aspects of the educational content. Such information is not collected systematically (EC/EACEA/Eurydice, 2018) so its impact on intervening in an educational programme or in policy documents is very limited. If such collaboration resulted in planning future trends, it could be an opportunity to build a research-based educational content and pedagogies relevant for building entrepreneurship competencies which are expected to be needed for foreseen economic and societal development based on the concept of smart specialisation.

The role of informal and non-formal learning in developing entrepreneurial skills is not yet recognised

The 2nd pillar of the National Strategy on Tertiary Education recommends the development of high-quality educational programmes, flexible and relevant to labour market requirements. One of the major measures of quality of educational activities is the level of employability, and the consultation with the labour market representatives has been identified as a norm for better matching educational outputs with the business sector expectations. At the same time, there is limited recognition of informal or non-formal learning in entry to higher education or along with the participation in the formal education process.

The EU renewed agenda for higher education (EC, 2017c) suggests supporting HEIs wishing to award ECTS points to students for voluntary and community activities not only develops their social and civic competencies but broadens experiential learning.

Adult participation in learning remains very low but the labour market signals that the lack of skills are becoming more and more evident

Raising the number of adults involved in lifelong learning is one of the targets of European Union. The indicator of participation in lifelong learning is defined as the percentage of the adult population aged 25-64 participating in education and training over the 4 weeks prior to the survey.

In 2017, Romania exhibited one of the lowest shares of adults in lifelong learning (1.1%) in Europe while advanced countries such as Denmark, Finland and Sweden reported the highest percentages with participation rates of above 25% (EC, 2018e). The EU 2020 target is 15%, it was 10.8% in 2016 and the Romanian target is 10% which will not be achieved due to worsening trends (adult participation in learning decreased over the last 10 years).

According to the EC (2017d), in Romania, the implementation of the national strategy for lifelong learning adopted in 2015 has been delayed. The legal framework for establishing community centres for lifelong learning was adopted in August 2017, but the support for capacity building and training of adult learning professionals has yet to be developed.

Limitations on the positioning of entrepreneurship education in HEIs indicate the lack of entrepreneurial culture and mindset in the educational system (EC, 2017b) and requires some interventions in the leadership capacity and organisational culture of HEIs. Opening a discussion on how to “recalibrate level of institutional autonomy with accountability for performance against well-defined expectations” (National Strategy for Tertiary Education in Romania 2015-20) could be a useful start to evaluate many recent recommendations²⁰ on Romanian tertiary education. At the same time, it would be an opportunity to check how EU policy documents on entrepreneurship competencies, education and ecosystem could be used in order to ensure the Romanian tertiary education is further integrated into the European Higher Education Area and to make it more competitive worldwide (in order to attract and retain talents).

Relevance of entrepreneurship education in the Romanian context

Getting insight into the relevance of entrepreneurship education requires understanding the strategic goals identified by policy documents on education, innovation and competitiveness which are rooted in Romanian development context but framed by the broader perspective provided by EU 2020 targets and UN SDG 2030 goals. The choice of key performance indicators which are valuable inputs for checking the effectiveness and efficiency of policy implementation always has to reflect the identified goals (job creation, start-ups, growing businesses, internationalisation...). Having such a policy framework provides directions toward monitoring processes related to the achievement of identified goals. The designed set of key performance indicators (based on quantitative measures and perceptions) should provide vertical (in time) comparisons and horizontal (the subnational/regional levels in a country and on the national and subnational levels internationally).

Aside from a few indicators (GDP allocation for education and R&D, employment rates, educational attainments), Romania depends on EU surveys focused on entrepreneurship, education, innovation, competitiveness or other international surveys (such as World Economic Forum on competitiveness, the World Bank on the ease of doing business, Transparency International on corruption...). Since 2015, Romania no longer participates in the Global Entrepreneurship Monitor. This led to missing data on perceptions of different aspects of the entrepreneurship ecosystem, including education. The EU (2017b) report states that entrepreneurial ecosystem data are not collected systematically in Romania and that the current methods of collecting data are inadequate.

The outcomes of entrepreneurship education should be monitored through the level of effectiveness (how it contributes to the broader economic and societal goals) and the level of efficiency (looking for the best ratio between inputs and outputs). There are two sources of information which should be used not only to enrich quite a poor existing set of data on

the relevance of entrepreneurship education but also to introduce a consistent and regular approach in evaluating the relevance of entrepreneurship education:

- The HEInnovate Guiding Framework (see Chapter 2) for evaluating the innovative capacity of higher education institutions.
- The National Reform Programme for evaluating the progress of achieving identified development targets on the national level.

Due to the significant regional development imbalances, the relevance of entrepreneurship education should be checked also at the regional level in connection to regional Smart Specialisation Strategies.

The National Reform Programme (NRP) is the EU framework platform for defining the development priorities for each EU member state, guiding a country's evolution until 2020, in view of achieving the Europe 2020 Strategy objectives and for defining structural reforms to meet the challenges each country is facing. It covers macroeconomic context and policy response to economic challenges (fiscal, budgetary and monetary), as well as the progress toward Europe 2020 targets, among others: employment, research, development and innovation, early school leaving, tertiary education and social inclusion and combating poverty.²¹ As part of evaluation of the tertiary education in NRP Romania 2018, the following directions were identified:

- Implementing the National Tertiary Education Strategy 2015-20.
- Supporting the participation of students from rural areas, disadvantaged groups and non-traditional students in tertiary education.
- Developing and integrating an education and research IT system.
- Developing institutional capacity and increasing internationalisation of higher education.
- Increasing the quality of higher education and matching with labour market needs.
- Promoting entrepreneurial education.
- Creating and developing an open and accessible lifelong learning framework.

As a follow-up, Regional Smart Specialisation Strategies could be used to monitor and evaluate changes in entrepreneurship education of regionally located HEIs and in their regional ecosystem (business sector, local/regional social and economic development).

Key performance indicators for evaluating the effectiveness of entrepreneurship education

Proxy indicators for the relevance of university education in the labour market are the employment rate of recent tertiary graduates, which is improving in Romania, but challenges remain (EC, 2017d; 2018e). The employment rate of recent tertiary graduates reached 80.7% in 2016, narrowing the gap with the EU average of 82.8% but remains below pre-crisis 2008 level with its peak value of 93%. Romanian public universities are requested to collect quantitative information on their graduates' entry into the labour market as part of their management system (tracking survey). It is expected that the collected information (through this ESF funded project) will be used to analyse the quality and relevance of higher education outputs and their compatibility with employers' requirements.

The collected information should provide a possibility for checking the compatibility of tertiary education programmes with the requirements of the business sector on the regional level. Since Romania has large internal regional development differences and that each region has its own Smart Specialisation Strategy, such information would be useful to understand the degree of relevance of tertiary education programmes to the regional needs. The EC (2017d) specifically emphasises the expectations that such monitoring of the employability of tertiary education graduates will “improve the decision-making process at the level of the Ministry of Education, and support its forecasting capacities by developing partnerships and a permanent consultation mechanism between the ministry, universities and employers”.

The entrepreneurs who participated in the UEFISCDI (2015) survey²² on the Romanian entrepreneurship ecosystem ranked education in the third place, after social relations and experience, as a success factor in their business career²³ (results combine answers “very high” and “high”):

- social relations (87%)
- experience (79.5%)
- education (66.7%)
- mentoring (60%)
- incubators/accelerators (35.4%).

Additionally, participants evaluated the quality and availability of entrepreneurship education in Romania as a weakness in the Romanian entrepreneurship ecosystem.

The 2015-20 strategy for tertiary education explicitly identified goals for raising the labour-market relevance, by adapting university curricula and teaching practices to equip students with knowledge, skills and competencies they need on the labour market. Since entrepreneurship competency is one of the lifelong competencies, the inclusion of entrepreneurship education across campus should positively contribute to increasing the relevance of tertiary education to the labour market.

Two surveys from 2015 and 2017 conducted through the EU Education and Training Monitor mechanism confirm that the relevance of university education to the labour market is a major concern, in Romania. Such a long-standing issue opens the question of the effectiveness of collaboration between the business sector and tertiary education, which should start significantly earlier than enrolment. Such collaboration should start with joint research (foresight) to foresight the socio-economic development of the society and define the skills that are needed to accompany and support these trends. When any strategic document speaks about research-based education, such collaborative effort between HEIs and other actors in the so-called Triple/Quadruple Helix (business sector, government, civil sector) is essential.

Key performance indicators for evaluating the efficiency of entrepreneurship education

A major source of knowledge for developing key performance indicators to evaluate the efficiency of entrepreneurship education lies within HEIs. Their management systems should provide regular information on output/costs ratios. Additionally, external evaluations should contribute to the quality assurance of operations and outputs of HEIs. It leads to the identification of standards for tertiary education, which should be a guide for

HEIs in organising educational and research processes. It is important that such national standards are supported with adequate funding.

Based on the international standards, faculty members in Romania are evaluated in order to advance in their career on academic research metrics, especially scholarly publications.²⁴ There is limited usage of metrics for evaluating teaching excellence or indicators of serving the community needs by the successful integration of education and research into the broader context of regional/national socio-economic development.

This means that HEI faculty, especially young faculty members who are in the process of building their careers, have limited incentives, except their own enthusiasm, to involve themselves in the entrepreneurial ecosystem or to expand their teaching towards entrepreneurship.

Conclusions and policy recommendations

Entrepreneurship education cannot be considered without understanding the broader context: it is not just an issue of the content of study programmes, how the content is delivered (embedded in all curricula, separate courses) or the number of students enrolled in those programmes. The way entrepreneurship education relates to lifelong competencies and how it contributes to quality of life through building human and social capital needed for promoting knowledge exchange and collaboration with relevant actors is key.

Entrepreneurship competencies, as transversal and lifelong competencies, attracted the attention of experts and policymakers in European and OECD countries since the early 2000s. Over the last two decades, evidence has been collected on good practices around entrepreneurship education. However, in Romania, strategic documents are not building sufficiently on international evidence and best practices. In addition, suggested policy interventions often remain at a higher strategic level, with no action or implementation plan, and are not adequately funded.

In Romania, entrepreneurship education is not spread over the campus and its access is often limited to students of study programmes in economics or business where entrepreneurship courses are most often offered. In developing the educational content and in its delivery, the business sector's participation is generally low. There is no consistent evaluation of the relevance of entrepreneurship education, limiting the possibility of making evidence-based interventions.

The analysis contained in this chapter signals serious disconnectedness, gaps and trends which require policy, financial and organisational interventions. In order to make evidence-based interventions in the field of tertiary education aiming to foster building entrepreneurial capacity through teaching and learning, the following recommendations are suggested:

- Relevant ministries and agencies (primarily on education, research, regional development) need to agree on a joint review of Romanian and EU policy documents and identify needed interventions in the policy and regulatory framework, by providing functional interconnectedness and collaboration across different bodies. It is important to update existing policy documents based on recent recommendations of the European Commission related to entrepreneurship competencies and innovative universities as well as analyse achievements in the EU 2020 targets related to education and prepare for the discussion on new planning perspective.

- While preserving strict criteria of quality assurance, national actors should empower HEIs with more freedom to introduce new educational content/pedagogical methods to promote transversal skills and entrepreneurial mind-sets.
- Key performance indicators for monitoring progress and measuring the relevance of formal, informal and non-formal entrepreneurship education (efficacy and efficiency) should be developed, by combining quantitative and qualitative indicators, at the national and regional levels. A required condition for developing key performance indicators is establishing learning outcomes based on the European 2018 Key Competences for Lifelong Learning and the EntreComp framework.
- Professors and faculty members should receive training on teaching/learning methods focused on experiential learning, using living labs, case studies from the community in which an HEI is located, team teaching by combining expertise from an educator and a professional external to the HEI, using cross-disciplinary students' teams.
- At the same time, training is also required for policymakers and university senior management in the understanding of key performance indicators to be developed and the dynamics of Quadruple Helix collaboration (i.e. collaboration across the business sector, governmental actors, public research organisations and civil society).
- The adoption of a peer learning approach in order to make these recommendations operational is also key: policymakers, HEI leaders and other relevant actors should learn from experiences in other OECD and EU countries that could be adapted and implemented in Romania.

Notes

¹ Trying to go beyond the GDP and economic indicators in traditional measurement of how societies are doing, the OECD identified 11 topics (income, jobs, health, education, housing, access to services, environment, safety, civic engagement and governance, community and life satisfaction) as crucial in the measurement of well-being - see <http://www.oecd.org/statistics/better-life-initiative.htm>. The developed tool and methodology can be used across the world in order to get very valuable information, among other elements, comparing your own country with others as well as identifying the efforts still to be made to reach the UN Sustainable Development Goals.

² For more information see, <https://www.un.org/sustainabledevelopment/education/>.

³ For more information, see <https://www.un.org/sustainabledevelopment/globalpartnerships/>.

⁴ For more information, see <https://www.un.org/sustainabledevelopment/economic-growth/>.

⁵ Based on the question: “In your country, how well does the education system meet the needs of a competitive economy?”.

⁶ Such low rank is confirmed by the fact that Romania has the lowest proportion of innovative enterprises, only 12% – compared to 49.1% of innovative companies with 10 employees or more in the EU in 2012-14 as shown by the latest Community Innovation Survey. The highest proportions of businesses with innovation activity were recorded in Germany (67.0% of companies), Luxembourg (65.1%), Belgium (64.2%), Ireland (61.0%) and the United Kingdom (60.2%) (<https://ec.europa.eu/eurostat/web/products-eurostat-news/-/DDN-20170124-2>). For a full insight in the latest Community Innovation Survey 2014, see <https://ec.europa.eu/eurostat/web/science-technology-innovation/data/database>.

⁷ RIS3 Support in Lagging Regions, which is managed by the Joint Research Centre’s (JRC) S3 Platform in Seville.

⁸ Percentage of the population aged 18-24 having attained, at most, lower secondary school and not going further.

⁹ Innovation performance below 50% of the EU average.

¹⁰ In November 2015, an integrated cross-sectoral implementation framework (including monitoring and evaluation mechanisms) was established by the Ministry of National Education. This framework is supposed to include the National Strategy for Tertiary Education with four other national strategies (for lifelong learning, early school leaving, vocational education and training, and educational infrastructure). There are no evaluation reports on this initiative.

¹¹ This methodology has been developed by using European Standards and Guidelines for Quality Assurance in Higher Education and is rooted in the principles of the European Higher Education Area.

¹² Percentage of the adult population between the ages of 18 and 64 who are in the process of starting a business or who have started a business which is less than 42 months old.

¹³ Opportunity-based entrepreneurs are identified as a percentage of the adult population between the ages of 18 and 64, who are in the process of starting a business or who have started a business which is less than 42 months old, out of a recognised opportunity.

¹⁴ Necessity-based entrepreneurs are identified as a percentage of the adult population between the ages of 18 and 64 who are in the process of starting a business or who have started a business which is less than 42 months old, out of a necessity because they have no other option.

¹⁵ The most recent publications are: EC (2017b), *Specific Support to Romania – Starts-ups, Scale-ups and Entrepreneurship in Romania*, European Commission, <https://rio.jrc.ec.europa.eu/en/library/specific-support-romania-final-report-%E2%80%93-start-ups-scale-ups-and-entrepreneurship->

[romania](#); Radauer, A. and L. Roman (2017), *The Romanian Entrepreneurial Ecosystem – Background Report*, https://rio.jrc.ec.europa.eu/sites/default/files/report/KI%20AX%2017%20002%20EN%20N%20Romania_Background.pdf; UEFISCDI (2015), *The Romanian Entrepreneurship Ecosystem. An Exploratory Study*.

¹⁶ As a part of the project “Development and consolidation of quality culture at the level of Romanian Higher Education system – QUALITAS” (co-financed by the European Social Fund, Sectoral Operational Program Human Resources Development 2007-13), 20 synthetic reports were translated into English. None of them provide any information on how transversal skills and entrepreneurship are included in curricula, despite one of the listed objectives of external institutional evaluation being stated as: “Evaluation of educational effectiveness by checking the satisfaction of performance standards regarding the content of study programmes, the results of learning, [...]”.

¹⁷ From the final report on the best procedure project: “Entrepreneurship in higher education, especially in non-business studies” March 2008: “There is as yet no general framework or any other kind of guidance in the Ministry of Education for entrepreneurial education at technical universities. In the absence of such a framework, individual universities have developed entrepreneurial education “embryos” wherever there were professors interested in teaching and supporting this kind of initiative. Most of the specialised classes are taught at master’s rather than undergraduate level. There are no entrepreneurial or business management departments”. In ten years’ time, the situation has not changed much.

¹⁸ The authors used content analysis of curricula available on Romanian university websites.

¹⁹ This is an interesting contrast: if employers are expected to participate in curriculum development, why are they not involved in team teaching or experiential teaching/learning in parts of the entrepreneurship programmes?

²⁰ From Specific Support to Romania – Starts-ups, Scale-ups and Entrepreneurship in Romania, 2017: develop a specific scheme to support the involvement of academics in entrepreneurial activities; set up an intellectual property law for Romanian universities to regulate the transfer of intellectual property (IP); define criteria for the evaluation of university entrepreneurship activities; establish a common technology transfer office (TTO) structure for all universities and provide international training and coaching for TTO personnel.

²¹ In the 2018 European Semester evaluation report, the following conclusions related to education, skills and labour force are:

- Limited progress was made on improving access to quality mainstream education. However, research and development intensity and early school leaving remain some distance away from their respective targets.
- Labour and skills supply are not keeping up with the fast-changing needs of the economy.
- Skills shortages and mismatches have an adverse impact on competitiveness and convergence.
- The weak performance of the education system limits growth prospects in the long run.
- Employers increasingly report difficulties in hiring and retaining workers. [...] weak links between labour market needs and education contribute to increasing labour shortage.
- Critical: The number of young people neither in education, employment or training (NEETs) remains very high. Many of the NEETs are economically inactive or discouraged workers.
- Limited skill forecasting capacity could further affect labour market supply. The current evaluation of skills on which training programmes are based follows a standard procedure, which however is not sufficiently taking into account the rapidly changing needs in the economy (Cedefop, 2017).

²² The survey used the adapted concept of the Endeavour methodology and was conducted in the period of February-April 2015. In the survey, 132 entrepreneurs participated.

²³ The question: “How would you rate the influence of the following factors for your success?”.

²⁴ Some bitterness about the fairness of such approach can be heard in many HEIs especially in those located in the lagging regions. The situation in which “the RDI input is the lowest in EU28, yet the scientific performance for career progression in many S&T fields is evaluated against criteria ‘to which academics in top world ranked universities may not comply’, while academic salaries are among, if not the lowest, in the EU” (Chioncel and del Rio, 2018, p. 6) leads to difficulties of retaining and attracting talents.

References

- Annoni, P., L. Dijkstra and N. Gargano (2017), *The EU Regional Competitiveness Index 2016*, European Commission Directorate-General for Regional and Urban Policy, http://ec.europa.eu/regional_policy/en/information/publications/working-papers/2017/the-eu-regional-competitiveness-index-2016.
- Boldureanu, G. (2013), “Entrepreneurship education in Romania in comparison to the European Union”, *International Journal of Communication Research*, Vol. 5(3), pp. 176-182, www.ijcr.eu/articole/257_03%20BOLDUREANU.pdf.
- Cedefop (2016), *European Sectoral Trends: The Next Decade*, European Center for the Development of Vocational Training, http://www.cedefop.europa.eu/files/8093_en_0.pdf.
- Chioncel, M. and J.-C. del Rio (2018), *RIO Country Report 2017: Romania*, Publications Office of the European Union, Luxembourg.
- EC (2018a), *Smarter, Greener, More Inclusive? – Indicators to Support the Europe 2020 Strategy, 2018 Edition*, European Commission, <https://ec.europa.eu/eurostat/documents/3217494/9087772/KS-02-18-728-EN-N.pdf/3f01e3c4-1c01-4036-bd6a-814dec66c58c>.
- EC (2018b), “European Semester: Assessment of progress on structural reforms, prevention and correction of macroeconomic imbalances, and results of in-depth reviews under Regulation (EU) No 1176/2011”, European Commission, <https://ec.europa.eu/info/sites/info/files/2018-european-semester-country-report-romania-en.pdf>.
- EC (2018c), *European Innovation Scoreboard 2018 – Exploratory Report C: Supplementary Analyses and Contextualization of Innovation Performance Data*, European Commission.
- EC (2018d), *EntreComp into Action – Get Inspired, Make It Happen: A User Guide to European Entrepreneurship Competence Framework*, European Commission, <https://ec.europa.eu/jrc/en/publication/eur-scientific-and-technical-research-reports/entrecomp-action-get-inspired-make-it-happen-user-guide-european-entrepreneurship-competence>.
- EC (2018e), *Education and Training Monitor 2018 Romania*, European Commission.
- EC (2018f), *Council Recommendation on Key Competences for Lifelong Learning*, European Commission, https://eur-lex.europa.eu/legal-content/EN/TXT/?qid=1527150680700&uri=CONSIL:ST_9009_2018_INIT.
- EC (2017a), *Regional Innovation Scoreboard 2017*, European Commission.
- EC (2017b), *Specific Support to Romania – Starts-ups, Scale-ups and Entrepreneurship in Romania*, European Commission, <https://rio.jrc.ec.europa.eu/en/library/specific-support-romania-final-report-%E2%80%93-start-ups-scale-ups-and-entrepreneurship-romania>.

- EC (2017c), “Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions on a Renewed EU Agenda for Higher Education”, COM(2017) 247 final, European Commission, <https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:52017DC0247&from=EN>.
- EC (2017d), *Education and Training Monitor 2017 Romania*, European Commission.
- EC (2017e), *A Renewed EU Agenda for Higher Education*, Economic and Social Committee and the Committee of the Regions, European Commission, https://ec.europa.eu/education/sites/education/files/he-swd-2017-165_en.pdf.
- EC (2016a), *The EU Regional Competitiveness Index 2016, Annex: RCI Index, Sub-indices and Pillar Scores*, European Commission.
- EC (2016b), *Using the Quadruple Helix Approach to Accelerate the Transfer of Research and Innovation Results to Regional Growth*, European Commission, <https://cor.europa.eu/en/engage/studies/Documents/quadruple-helix.pdf>.
- EC (2016c), *Analytical Report on Subjective Well-being 2016 Edition: GDP and Beyond*, European Commission, <https://ec.europa.eu/eurstat/documents/3888793/7439887/KS-TC-16-005-EN-N.pdf/5e59f7a7-0c81-4122-a72c-bf880f84b4ec>.
- EC/EACEA/Eurydice (2018), *The European Higher Education Area in 2018: Bologna, Process Implementation Report*, Publications Office of the European Union, Luxembourg, https://eacea.ec.europa.eu/national-policies/eurydice/sites/eurydice/files/bologna_internet_chapter_6_0.pdf.
- European Community Innovation Survey (2014), *Science and Technology Database*, <https://ec.europa.eu/eurostat/web/science-technology-innovation/data/database>.
- Kelley, D., S. Singer and M. Herrington (2016), *GEM Global Report 2015/16*, <https://www.gemconsortium.org/report>.
- Leovaridis, C., V. Frunzaru and D.M. Cismaru (2016), *Entrepreneurial Education in Romanian Universities*, INTED2016 Proceedings, pp. 92-102.
- Levie, J. (2014), “The university is the classroom: Teaching and learning technology commercialization at a technological university”, *Journal of Technology Transfer*, Vol. 39(5), pp. 793-808, <http://dx.doi.org/10.1007/s10961-014-9342-2>.
- OECD (2016), *Public Governance Reviews Romania*, OECD, Paris, <http://www.oecd.org/gov/public-governance-review-scan-romania.pdf>.
- OECD (n.d.), *OECD Well-Being Index*, OECD, Paris, <http://www.oecd.org/statistics/better-life-initiative.htm>.
- Radauer, A. and L. Roman (2017), *The Romanian Entrepreneurial Ecosystem – Background Report*, Horizon 2020 Policy Support Facility, Directorate-General for Research and Innovation, Brussels, https://rio.jrc.ec.europa.eu/sites/default/files/report/KI%20AX%2017%20002%20EN%20N%20Romania_Background.pdf.
- Schwab, K. (ed.) (2017), *The Global Competitiveness Report 2017-2018*, World Economic Forum, <http://www3.weforum.org/docs/GCR2017-2018/05FullReport/TheGlobalCompetitivenessReport2017%E2%80%932018.pdf>.
- Singer, S., J.E. Amorós and D. Moska (2015), *Global Entrepreneurship Monitor: 2014 Global Report*, <https://www.gemconsortium.org/report>.

Stiglitz, J.E., A. Sen and J.P. Fitoussi (2009), *Report by the Commission on the Measurement of Economic Performance and Social Progress*,
<https://ec.europa.eu/eurostat/documents/118025/118123/Fitoussi+Commission+report>.

UN (n.d.), *About the Sustainable Development Goals*,
<https://www.un.org/sustainabledevelopment/sustainable-development-goals/>.

UEFISCDI (2015), *The Romanian Entrepreneurship Ecosystem. An Exploratory Study*.

World Bank (2018), *From Uneven Growth to Inclusive Development: Romania's Path to Shared Prosperity. Systematic Country Diagnostics*, World Bank, Washington, DC,
<http://dx.doi.org/10.1596/978-1-4648-1317-7>.

Annex 3.A. EU policy documents on education, entrepreneurship education, entrepreneurship competency, background papers

On education

- The 2011 Supporting Growth and Jobs – An Agenda for the Modernisation of Europe’s Higher Education Systems
- The 2017 Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions on a Renewed EU Agenda for Higher Education, COM(2017) 247 final

On entrepreneurship education

- The 2003 Green Paper: Entrepreneurship in Europe
- The 2006 Oslo Agenda for Entrepreneurship Education in Europe
- The 2008 Small Business Act for Europe
- The 2011 Supporting Growth and Jobs – An Agenda for the Modernisation of Europe’s Higher Education Systems
- The 2013 Entrepreneurship 2020 Action Plan

On entrepreneurship competencies

- The 2006 Key Competences for Lifelong Learning
- The 2016 New Skills Agenda for Europe
- The 2018 Council Recommendation on Key Competences for Lifelong Learning

On educators

- The 2011 Budapest Agenda: Enabling Teachers for Entrepreneurship Education
- The 2013 Entrepreneurship Education: A Guide for Educators

On measurement/assessment/impact

- The 2015 HEInnovate
- The 2017 European Entrepreneurship Competence Framework (EntreComp)

The timeline of those documents provides also an insight in focuses – from an overall approach to competencies to educators and measurement. Accompanying analytical background papers additionally support policymakers in designing relevant policies and strategies for fostering entrepreneurship education. The most important analytical background papers, profiling member states related to the leading topics of those papers, are:

- **The 2008 Survey of Entrepreneurship in Higher Education in Europe** used a broad definition of entrepreneurship and entrepreneurship education, introduced the concept of an entrepreneurship-education threshold (an institution to be considered to have entrepreneurship education was that the institution should have at least one course where the subject of entrepreneurship should account for at least 25% of the course curriculum. For a course/module to be considered as a curricular activity, it should account for at least 5 ECTS points).
- **The 2008 Entrepreneurship in Higher Education**, especially in non-business studies, advocating for build inter-disciplinary approaches, evaluating non-formal learning in building entrepreneurial competencies and measuring the impact of the entrepreneurship education, because of the lack of available indicators (mostly available only output indicators).
- **The 2008 Entrepreneurship and Higher Education (OECD)**, analysing the role of universities in entrepreneurship education, as well as the responsibility of policymakers and universities in designing the ecosystem needed for successful building entrepreneurial competencies among students.
- **The 2010 Towards Greater Co-operation and Coherence in Entrepreneurship Education - Report** and evaluation of the pilot action high-level reflection panels on entrepreneurship education, states that entrepreneurship should be embedded in every national¹ or, where appropriate, regional education strategy and lifelong learning strategy. It was specifically emphasised that such strategic framework should enable core entrepreneurial competencies to be developed from primary and secondary level education through to tertiary level. It also explicitly identified the impact of entrepreneurship education upon convergence policy (relative to both to regional disparities within a member state and across the European Union, and the impact upon competitiveness policy).
- **The 2011 Supporting Growth and Jobs – An Agenda for the Modernisation of Europe’s Higher Education Systems** provides an overview of issues in achieving Europe 2020 targets related and the role of higher education in these processes. Important statements are that the main responsibility for delivering reforms in higher education rests with Member States and education institutions themselves and the importance of strengthening the knowledge triangle between education, research and business.
- **The 2012 Rethinking Education: Investing in Skills for Better Socio-economic Outcomes** was communicated to the member states with an aim to foster entrepreneurial skills through new and creative ways of teaching and learning from primary school onwards and to establish a guidance framework for entrepreneurial education institutions; and the development of tools to monitor progress and the acquisition of entrepreneurial competencies.

- The 2017 report on a literature review of reforms related to the **2006 European Framework of Key Competences for Lifelong Learning** and the role of the framework in these reforms indicated that the implementation of cross-curricular competencies or transversal (such as entrepreneurship competency) was the most difficult for policymakers due to the difficulty in measuring and analysing the effects or impact of these competencies.
- **The 2018 The European Higher Education Area in 2018: Bologna Process Implementation Report** discusses the issues of *learning outcomes and how much educators in higher education are equipped with teaching skills*.

Note

¹ The project was conducted in 2010 with 24 member states (out of 27 – Cyprus, Greece and the Slovak Republic did not participate). Only nine had national strategies for entrepreneurship education (Belgium, Denmark, Finland, Lithuania, the Netherlands, Portugal, Sweden and the United Kingdom) and seven had plans to work on them (Austria, Estonia, Ireland, Malta, Poland, Slovenia and Spain). At that time, Romania did not have such a strategy in place or planned to develop one (p. A20).

Chapter 4. Preparing and supporting entrepreneurs

Entrepreneurs have been increasingly benefitting from the support of HEIs. The latter can help faculty in their ventures by providing them with information, specific training, funding, working space, etc. The entrepreneurial and innovative HEI can promote entrepreneurship in its ecosystem, thus promoting inclusive growth. In Romania, HEIs struggle to play this role. The number of start-ups and spin-offs is relatively low and concentrated in the capital region. National public authorities have designed strategies and set ambitious policy targets to support start-ups. Academic institutions have the potential to contribute to change the culture and build entrepreneurial mind-sets and capabilities through education, but regional imbalances remain a structural challenge. There is an acute lack of incubators and accelerators. In addition, Romanian academic entrepreneurs have reported significant difficulty in creating their business mainly due to complex and prohibitive national regulation and low market awareness. However, based on information collected in case studies, appears that the Romanian HE system can count on highly motivated, and skilled students and faculty, who should be better supported in their ventures. The chapter discusses these issues and presents in the end some policy recommendations.

The start-up ecosystem in Romania

Start-up creation and survival

Crunchbase data contains records of 321 Romanian start-ups with 95% of these firms may still be active. During the period between 1996 and 2015, there was a steady increase of start-up activity and effects of the global financial crisis were visible in 2009 (when 13 start-ups were incorporated, as opposed to 20 in the previous year). The number of start-ups founded annually peaked in 2013 when 32 such firms were established (Ministry of Education of Romania, 2018). Though Crunchbase data would indicate that Romania has an overall quite low company formation rates, the total number of active companies has been increasing steadily in the recent years according to Eurostat data (see Table 4.1).

Table 4.1. Romanian Enterprises by Size

Number of employees	2008	2009	2010	2011	2012	2013	2014
Total	512 753	498 127	450 168	609 827	647 325	689 983	696 142
0	96 381	96 201	90 501	252 961	291 580	333 275	341 817
1 to 4	298 070	295 108	259 563	250 089	248 379	249 508	251 810
5 to 9	61 797	54 524	50 552	53 838	53 601	54 240	50 398
10+	56 505	52 294	49 552	52 939	53 765	52 960	52 117

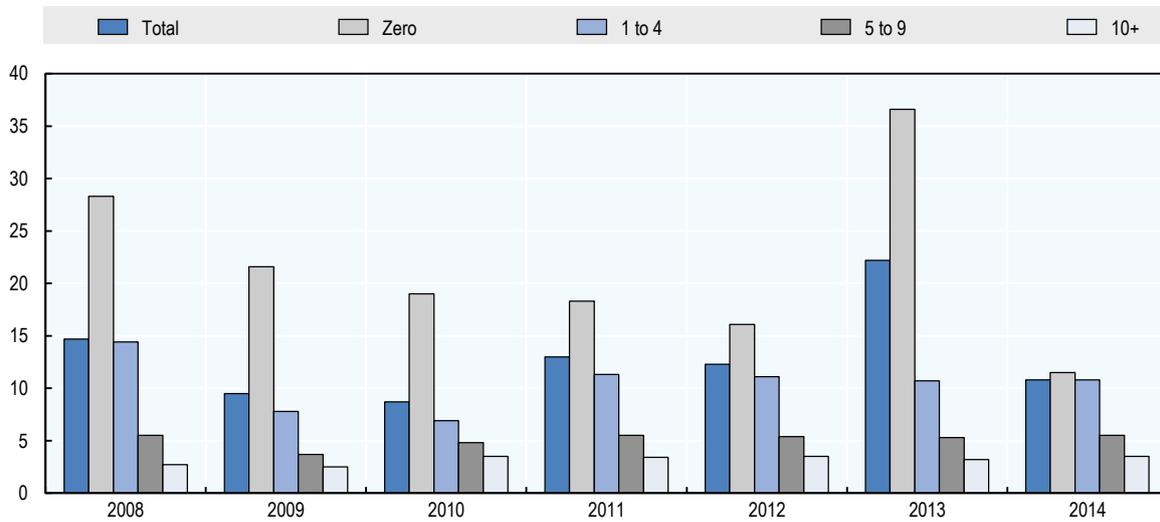
Note: A statistical artefact for companies with zero employees may have occurred as there is a break in time series in 2011.

Source: Eurostat https://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=urt_bd_size&lang=en

The size distribution of start-ups according to Crunchbase shows that most of the firms are small: 60% have between 1 and 10 employees; a further 26% have between 11 and 50 employees and only some 6% have more than 100 employees (HEInnovate Romania Background Report, 2018). Company size is also noticeably related to survival rates, with larger start-ups (of which there are few) having a slightly better chance of being sustained after five years (Figures 4.1 and 4.2) (HEInnovate Romania Background Report, 2018). However, the overall 5-year survival rate has been decreasing between 2009-14, though an overall approximate 40% survival rate is an encouraging sign of the ecosystem being able to retain a significant amount of enterprises (global average is around 50%).

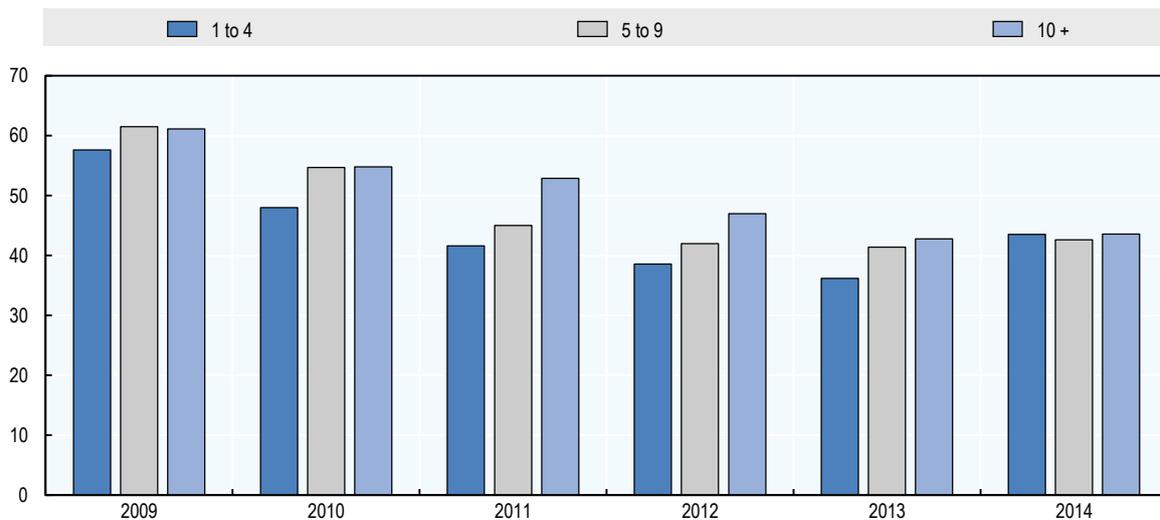
There is a dominant geographical element in company formation conditions, with nearly 60% of all companies formed in Bucharest (Figure 4.3). Some 140 start-ups (or 59% of all Romanian start-ups since 1996) were set up there, with 13% in Cluj/Cluj-Napoca, followed by Iasi (5%) and Timișoara (4%). Moreover, in recent years, Cluj-Napoca and Timișoara have confirmed their location as amongst the most dynamic in the country when it comes to business creation. This geographical concentration depends on access to finance, business premises, and other eco-systemic features, in which a capital city (and a handful of other large centres) is always outperforming the periphery (as noted in most OECD countries). However, in Romania, the gap between the two is particularly stark and exacerbated by poor infrastructure in many places in the country.

Figure 4.1. Companies' birth rate by size, %



Source: Eurostat. https://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=urt_bd_size&lang=en

Figure 4.2. Companies' survival rate, by size, %

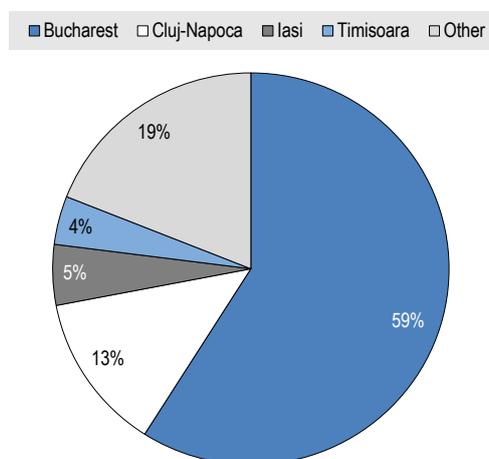


Source: Eurostat. https://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=urt_bd_size&lang=en

Investment

A large variety of institutions and organisations offer access to financial capital, including banks, microcredit institutions, voluntary contribution (VC) funds, business angels, private equity, crowdfunding, and European funds. Barriers to access finance capital relate to the high costs of debt financing and extensive collateral guarantees. A small amount of money is invested by private equity and venture capitalist investors, with a highly unequal distribution of funds across country regions, with the highest concentration found, unsurprisingly, in Bucharest.

Figure 4.3. Cities in Romania hosting companies formed after 1996



Source: Crunchbase, <https://data.crunchbase.com/docs>.

Overall, Romania's financial sector is dominated by credit institutions, which hold the largest shares of the assets in the system (78%). Investment funds only hold 8% of the assets while pension funds are 3.7% and insurance undertakings 3.5% (EC, 2016). The banking sector's resilience improved in 2015. According to the 2015 RIO report (EC, 2015a) on Romania: "Four Romanian banks – joined by a fifth the following year – signed on in 2014 to the JEREMIE initiative of the European Investment Fund (EIF). The amount available for 2014 was EUR 120 million, in addition to 2 other JEREMIE instruments already on the market, under which 2 000 loans exceeding EUR 180 million had been awarded. The budget available for 2015 was increased to EUR 250 million" (Gheorghiu et al., 2016).

Invest Europe data shows that private equity investments into Romanian start-ups declined sharply as a fall-out of the financial crisis hit a low in 2012 with an investment volume of EUR 28 million in 10 start-ups (Invest Europe, 2016). There has been a steady increase in investment volume but the number of firms into which funds are invested fluctuates still in a bandwidth of around 10 to 20 per year. In 2014-15, the investment by type clearly indicates investors prefer to invest in established firms and the investment in early-stage (seed and start-up) enterprises is very erratic. The new data for 2015 shows an overall investment volume of EUR 144 million in 11 firms. Private equity investments as a percentage of GDP amounted to 0.09% in Romania, which puts it in front of the Slovak Republic (0.02%) and the Czech Republic (0.01%), but well behind Hungary (0.15%) or Poland (0.19%).

The 2015 RIO report (EC, 2015a) counts seven venture capital firms (Global Entrepreneurship Monitor, 2016), while UEFISCDI has three VC investors on file – 3TS CapitalPartner, TechAngels, Earlybird Venture Capital – and Crunchbase lists three VC and three micro-VC firms. In total, Crunchbase lists 30 Romanian investors, which include 9 individuals, 4 accelerators, 3 micro-VC firms and 3 venture capital funds, 2 incubators, 1 business angel group, 1 non-equity programme and 7 uncategorised investors (UEFISCDI, 2015). Two investors stand out among those listed in Crunchbase, namely MVP Academy accelerator, sponsored by TechHub Bucharest, which has a total of 26 micro-investments and total funding of USD 59 813 and GECAD group (a VC fund) in

Bucharest, with a total of 23 investments and USD 35.3 million. All other investors on file in Crunchbase have reported zero to a maximum of two investments. However, the micro VC firms are reported to have made investments of USD 7 million (Romanian-American Enterprise Fund), USD 668 100 (Fundatia Post Privatizare) and USD 100 000 (Mentor Fund) (HEInnovate Romania Background Report, 2018).

With around 700 000 active businesses in Romania (2014), such low investment is a real obstacle for company development and survival, and can explain some of the 10% difference between Romania and global average in the 5-year start-up survival rates. However, many other factors may be at play and given the harsh financial barriers, it is interesting to note such high company birth rate. This likely indicates that most companies formed require little capital investment upfront and are likely either doing business in services sectors, are sole traders (i.e. independent professional) or are an alternative employment vehicle (precarious subcontracted self-employment tied to a sole client).

The regulatory and legal framework

National strategies for small- and medium-sized enterprises (SMEs) and start-ups

The Government Strategy for SMEs and the Business Environment – Horizon 2020 is a very ambitious strategy for SME development (Gheorghiu et al., 2016). One of the main targets is that the number of SMEs per 1 000 population should increase by more than 50% (from currently 22 to 36); an increase of the number of SME employees by some 25%; and an increase of the contribution of the SMEs to value-added by 60%.

Foreseen action lies in the following five dimensions: support for, and promotion of, entrepreneurship; improving SME access to adequate funding; support for innovative SMEs; SME internationalisation and access to markets; and public administration response to SME needs. This implies a very broad spectrum of activities, which overlap with the National Research and Innovation Strategy 2014-20 (e.g. support for partnerships between SMEs and R&D institutes, or support for technological transfer). However, it is not clear whether there are additional resources for the respective activities or there will be inter-institutional co-ordination when implementing the two schemes (Gheorghiu et al., 2016).

The SMEs law (Law no. 346/2014) is also attempting to stimulate the establishment and development of firms, and regulates the measures intended to create a favourable framework for the establishment and development of SMEs, through the government setting up of framework conditions for the establishment and development of SMEs, defining development programmes for SMEs and allocating 0.4% of GDP to financing them through the National Credit Guarantee Fund for SMEs, created as “an institution with venture capital” to improve access to financing for SMEs (HEInnovate Romania Background Report, 2018).

The development of an entrepreneurial ecosystem

In 2015, the Romanian government expressed interest in support under the Horizon 2020 Policy Support Facility (PSF) to “assess the Romanian innovative entrepreneurship, start-up and scale-up ecosystem and identify and recommend measures, including legislative ones, and specific instruments to further develop and strengthen the innovative entrepreneurship ecosystem in order to improve its efficiency and foster the growth of Romanian start-ups” (EC, 2017).

The resulting report recommended five key areas of intervention, in order to improve:

- **Access to talent:** empower established and future Romanian entrepreneurs by instilling more predictability and trust in government policies, the legal framework and business conditions.
- **Access to markets:** help companies go global through dedicated funding schemes, non-financial support programmes and by fostering links with the Romanian diaspora.
- **Access to finance:** mobilise business angels and their networks, attract venture capital investors and help Romanian start-ups become scale-ups by strengthening the AeRO market at the Bucharest Stock Exchange.
- **Catalyse change:** establish a Romanian Entrepreneurship Agency dedicated to and responsible for funding innovation and entrepreneurship and empowered to induce entrepreneurial culture at the ecosystem level.
- **Open government data:** develop an IT system that can automatically retrieve data from ecosystem stakeholders and make this data open to the public in a comprehensible way in order to foster transparency, accountability and competition across the ecosystem.

Specifically, they proposed 21 areas of improvement across the 6 dimensions,¹ which centre on the critical development of centralised competencies and capabilities. For instance, they propose to establish a new national-level Romanian Innovation and Entrepreneurship Council (for development and monitoring of national strategies), a new centralised Romanian Entrepreneurship Agency (REA) (administering funding and support and cutting through the complex bureaucracy), and a new “Connecting Hub” platform (linking stakeholders and providing support). They also recommend making as much information and support available on line to even out access across the geographically diverse country and improve transparency and accountability.

These changes combined, if implemented consistently and efficiently, have the potential to radically transform the Romanian entrepreneurial ecosystem and could in time capitalise on the noted substantial potential for entrepreneurship existent within the Romanian society. However, specific attention needs to be paid to prioritising the delivery of the proposed transformational programme (i.e. the noted agencies, platforms and their projects), rather than the introduction of new policies and regulation, as the latter is in of itself inefficient and can create more barriers than solve problems (Marques and Morgan, 2018).

Expanding intellectual property regulation and technology transfer opportunities

The first patent law came into force in Romania in 1906. Since 2007, Romania has industrial property (IP) laws harmonised with European legislation in the IP protection field. Currently, the Romania Office for Inventions and Trademarks (OSIM) is in charge of property protection, in compliance with the ensuring industrial property protection, in compliance with the legislation and the provisions of international conventions to which Romania participates. It co-ordinates the industrial property policy in Romania, elaborates the national strategy for industrial property protection (with government approval) and examines patent applications and grants protection titles over inventions, utility models, trademarks, industrial designs, etc.

The Romanian State Office for Inventions and Trademarks (OSIM) set up 16 regional centres all over the country for promotion of the importance of IP. Successive national strategies for research, development and innovation have been developed, in conjunction with EU framework programmes. The current one is in force over the 2014-20 period. Since 2003, a central remit of the research, development and innovation (RDI) strategy implementation projects has included the creation of technology transfer offices (TTOs) in Romanian higher education institutions (HEIs). Very few European or international patents originate in Romania though. Eurostat data show that there were less than 10 EU patents granted per year during the period 2008-12. International patenting is a standard outcome and measure of technology transfer activities. In general, it leads to the incorporation of spinoffs that benefit from the licensing of intellectual property owned by universities and other HEIs. The low level of patenting shows the weakness of the technology transfer system at universities (EC, 2017).

UEFISCDI is the body implementing four out of six programmes of the National Plan for Research Development and Innovation, namely: i) human resources (exploratory research); ii) ideas (exploratory research); iii) partnerships in priority science and technology areas (applied research); iv) innovation and technology transfer.

Support for entrepreneurship

Direct public support

The main SME support programmes funded from the national budget are co-ordinated by the Ministry of Economy, Trade and Relations with the Business Environment – Directorate-General Entrepreneurial Policies (AIPPIMM), but do not specifically target research and innovation activities. For 2016, they included the following funding schemes (apart from the programmes targeting specifically rural enterprises, artisanal entrepreneurs and enterprises founded by female entrepreneurs) (HEInnovate Romania Background Report, 2018):

- The National Programme for micro-industrialisation (NP3), a scheme for SMEs, with a budget of approximately EUR 13.6 million (RON 60.8 million) in 2016. Funding is provided for the acquisition of equipment, investments in intangible assets (i.e. intellectual property), IT equipment among others.
- The “SRLD programme”, for entrepreneurs starting their first business, with a budget of approximately EUR 5 million (RON 22.7 million) for 2016. Financing can be used for very diverse activities, from acquiring technological and information technology (IT) equipment to furniture or construction works among others.
- The “START programme” for developing the entrepreneurial abilities among young people and facilitating their access to financing, with a budget of EUR 3.8 million (RON 17 million). Eligible costs included the acquisition of technological and/or IT equipment, energy efficient equipment or energy systems based on renewable energy sources, development of a web page.

- A programme for developing the commercialisation of products and services in SMEs with a total budget of EUR 4.7 million (RON 21 million) for 2017.
- The Start-Up Nation programme, available since 2016.

Apart from the funding made available through the NP3 programme and its calls for SMEs and researchers, the following schemes are also notable:

- On 8 September 2016, the government signed a new support programme into effect by which SMEs obtain financial support for investments made. The total budget of the multi-annual programme is RON 900 million (EUR 202 million) between 2017-20. It is expected that there will be some 200 beneficiaries. The programme is administered by the Ministry for Economy, Trade, Industry and the Business Environment. However, it is not apparent whether this programme addresses particularly innovative SMEs and/or start-ups.
- The “Start-Up Plus” scheme is an implementation of the ESF Operational Programme Human Capital 2014–20. Start-Up Plus provides company founders with up to EUR 24 000 as a grant and first instalment and a further EUR 16 000 as the second instalment if certain turnover targets are met. The aim is to fund 1 500 SMEs with this scheme and to have more than 10 000 persons trained in the entrepreneurial education area. The programme guide is currently subject to public consultation.
- The “Romania HUB” programme is designed as a platform for entrepreneurs and to bring together respective stakeholders (governmental organisations, non-governmental organisations [NGOs], educational institutions). The programme covers information activities, training, technical assistance, debates and mentoring. The aims are: i) to develop entrepreneurial skills via workshops; ii) to create partnerships between science and business; and iii) to promote funding programmes for SMEs. The programme relies with its funding entirely on EU structural funds.
- As of February 2013, the Romanian administration introduced a special company tax rate for micro-enterprises (i.e. companies with a turnover of less than EUR 65 000, not in public property and not active in banking, consulting, management, insurance or gambling) of 3% of annual turnover (EVCA, 2013).
- Companies can benefit from an additional deduction of 50% of the eligible expenses for their R&D activities. Moreover, accelerated depreciation may be applied for devices and equipment used in the R&D activity. In order to benefit from this supplementary deduction, the eligible R&D activities must be applicative research and/or technological development relevant to the taxpayer’s activity and must be performed in Romania or in the EU/EEA member states. As of 1 January 2016, a new provision has been introduced, according to which the additional deduction for R&D activities is not available if the R&D project’s objectives are not met.

EU-ESF regional development investment

The following EU European Structural Funds (ESF) schemes are particularly notable for supporting research, development and innovation activities and SMEs in Romania for the 2014-20 programming period:

- The Competitiveness Operational Programme (COP)² addresses, in the current 2014–20 planning period, R&D and innovation as well as information and communications technology (ICT) services and infrastructure. It is therefore earmarked for research, development and innovation supporting economic competitiveness and the development of businesses (total budget EUR 952.57 million), while Axis 2 concerns “information and communication technologies for a competitive digital economy” (total budget EUR 630.2 million). The key issues addressed in the ICT area are e-Government, interoperability, cybersecurity, cloud computing and social networks, use of ICT in education, health, social inclusion and culture; e-commerce, clusters and developing innovation through ICT; further deployment of the broadband infrastructure for the whole country.
- EUR 206.5 million are earmarked in the RDI axis of the operational programme (OP) Regional Development 2014–20 for “technology transfer”, i.e. for the creation, upgrade and extension of the innovation and tech transfer infrastructure. This OP is administered by the Ministry of Regional Development and Public Administration.
- The Operational Programme (OP) “Human Capital” for the implementation of the ESF in the period 2014-20 has in Priority Axis 3 (“Jobs for Everyone – Independent activities, entrepreneurship and founding enterprises”) some EUR 105 million earmarked for the “Romania Start-Up Plus” programme.

Regulation of other sources of finance: Angel investors and business incubators

The business angels law (no. 120/2015) regulates the conditions under which individual investors – business angels – can benefit from tax incentives as a result of the acquisition of shares and of lending to SMEs. It provides limited tax incentives for business angels and the rules regarding beneficiary SMEs and angel investors require a stringent assessment of eligibility, which might be prohibitive to forming a dynamic investment market.

Business angel networks such as Venture Connect, AngelConnect and TechAngels have developed based on the experience of already successful Romanian entrepreneurs who want to support the Romanian entrepreneurial ecosystem further. For instance, “TechAngels” is a platform dedicated to “facilitating the development of tech businesses from South-Eastern Europe through investment, expertise and connections”. The platform shows the profile of 24 angel investors by name. In November 2015, another group, “Business Angels Romania”, was set up, who subsequently became a member of EBAN (The European Trade Association for Business Angels, Seed Funds and Early Stage Market Players).

The business incubators law (no. 102/2016) defines the framework for establishing and operating a business incubator in Romania. A business incubator is defined as a “business support structure, organised in the business incubator infrastructure in a proper area in which the incubator residents are located, managed by a manager who aims to create a favourable and sustainable environment for small- and medium-sized start-ups, stimulating their development potential and viability, helping them to develop in the early stage, by providing shared facilities and the necessary managerial support”. A business accelerator is defined as “a business incubator providing access to funds, in stages, to residents in order to launch on the market a product or service in a short time”.

The uptake of the development of incubator and accelerator facilities is, however, very low and Romania had fewer than 20 such facilities in 2015. Furthermore, they are again showing a very uneven regional distribution, with them being almost exclusively present in Bucharest, with some in the North West region and a few elsewhere.

Unlocking the entrepreneurial potential of Romanian HEIs

Academic institutions have the potential to contribute to change the culture and build entrepreneurial mind-sets and capabilities through education. Entrepreneurial education may promote the development of creative and independent thinking, help understand the diversity of the entrepreneurial phenomenon, allow students to undertake projects in conjunction with industrial partners, and engage them in group work and entrepreneurial activities that may even lead to new ventures.

HEIs can do more than changing mentality and building capabilities. They can be active players in the emergence of entrepreneurial ecosystems. In this sense, one can observe that governments across the world are now looking to technology and innovation as key drivers for economic growth and productivity increase, and to universities as localised incubators of this national capacity. Universities operating within well-known innovation hubs provide inspiring models for success. However, the entrepreneurship and innovation (E&I) profile of HEIs located within less successful regions is also seen as an important driver of change. In places like Romania, some of these HEIs are located in developing urban areas and may become future national leaders.

The Romanian research and innovation system is characterised by:

- A very high organisational complexity, with at least five ministries involved in the administration and redistribution of financial, physical and human resources.
- Some resources dedicated to research activities are distributed on a competitive basis among institutions and thematic domains.
- Limited role for interdisciplinary research, which does not facilitate the development of entrepreneurial behaviour of HEIs through education.

Highlighting the value of entrepreneurship and intrapreneurship

State and development: Expanding the visibility of HEI entrepreneurship

Though the entrepreneurial ambition of Romanian HEIs was clearly visible during the OECD study visits and feature prominently in online presence and promotional material, a comprehensive approach to highlighting entrepreneurial values and benefits to individuals and society is not so well developed.

HEI participation in several well run (national) programmes and structures to promote entrepreneurship and, in some cases, their leading role in the development of other bespoke solutions is widespread. However, not all of them were clearly signposted and easily accessible and the vast majority of them focused on students, while provision for staff was patchy.

The latter is a critical component of developing an entrepreneurial culture, as staff entrepreneurs are the best inspiration for students to consider becoming entrepreneurs themselves.

HEIs' roles in networking and linking staff and students with external partners in the business sphere are quite well developed through formal industry placement programmes, common in many university degrees in Romania. However, those are often directed towards large businesses and are underexploited for bringing entrepreneurs back into HEIs to help develop entrepreneurial strategies and engage them in inspirational mentoring or teaching roles.

Challenges: Multinational corps jobs, migration and cultural barriers

The most significant challenges in promoting entrepreneurial mindset and culture within HEIs relate to the (perceived) relative lack of opportunities for entrepreneurs in comparison to “regular” employment. Some of this perception, clearly evidenced in the OECD study visits, stems from the culture of risk aversion identified amongst Romanians, as well as genuinely very difficult circumstances for business creation and survival, lacking financial investment, mechanisms of ecosystem development and integration, and overbearing bureaucracy.

This is then further contrasted by, on one hand, the recent expansion of inward investment into Romania, with large multinational corporations opening significant numbers of (more) stable and relatively well-paid jobs and on the other hand, opening up of opportunities for employment and entrepreneurial activities abroad, in particular within the EU. “Brain drain” from HEIs towards corporations and through emigration is a significant challenge, as is the development of a (local) entrepreneurial ecosystem able to tempt staff and students to exploit their entrepreneurial potential requires a significant amount of resources, effort and time.

Opportunities: Talented staff and students

From national-level indicators and statistics, case studies of many successful projects and programmes and the OECD study visits, it is clear that the Romanian HEI system has extraordinary potential in talented academic and management staff students, who are highly motivated, hard-working and have impressive knowledge and skillsets. Though evidence was noted suggesting a slight demographic downturn is expected in future years, it should not be too difficult to retain significant level of student enrolment and exploit the opportunities to influence their mindsets and overall cultural outlook towards entrepreneurial and intrapreneurial activities, such as in the recent Student Entrepreneurial Societies (SES) programme (see Box 4.1).

Supporting routes for business creation

Though most HEIs are active in working within and with the local business community, this is predominantly in order to train their graduates in knowledge and skills asked for by the enterprises. At certain HEIs, this extends to research alignment with business partners in sectors of strategic importance. However, these mechanisms almost exclusively relate to the local branches of multinational corporations, which in many cases draws important research, teaching and innovation/exploitation opportunities away from the more entrepreneurial projects. Though this is quite understandable in the current economic conditions (EU transition, post-2009 crisis), in order to develop the local entrepreneurial ecosystem and capitalise on a more diverse set of entrepreneurial ideas, a more entrepreneur-centred engagement with, and development of, the local ecosystem is needed, as noted in Chapter 5.

Box 4.1. Student Entrepreneurial Societies (SES)

The establishment of Student Entrepreneurial Societies (SES) in Romania was targeting a broad area of supporting, developing and encouraging entrepreneurship in the university environment, especially among students and recent alumni.

Though open to all Universities in Romania, currently 15 projects were proposed for financing, with a total amount of RON 1 248 000 available to create an adequate complementary framework to support, develop and encourage the entrepreneurial spirit among the students of the technical HEIs visited.

Key objectives proposed to SESs (which have a certain degree of autonomy over their programmer and its delivery) was to generate new entrepreneurial ideas; create links between students and community that fosters an entrepreneurial spirit; build and support an infrastructure to address key knowledge, skills and competencies; implement activities in order to develop entrepreneurial traits and behaviours while providing opportunities for students to experience entrepreneurial process skills and business functions.

Typical SES activities include organising workshops for entrepreneurship; mentoring and counselling activities on legal issues, intellectual property and financing; organising business ideas sessions to select viable proposals; facilitating contact with potential investors; and finding entrepreneurial spaces for business communities, students and graduates.

Due to the relatively recent introduction of SES programme, evaluation of its impact and efficiency is not yet possible, though during the OECD study visits students and staff commented on the positive experience it has brought them.

Encouraging signs of breaking this (over)reliance on multinational corporations has been observed in several of the HEIs visited, specifically in the presence of significant emergent local industry clusters. Where such clearly identifiable clusters were present, HEIs tended to fair better in promoting and exploiting entrepreneurial opportunities in partnership with the local economy. This is directly related to the rationale for the pan-European smart specialisation strategy (S3) policy, which encourages European regions to identify specific sectors with strong activity, competencies and opportunities and invest in them. Unfortunately, in several areas in Romania, the S3 policies lack focus, as (too) large a number of target sectors and clusters was identified, severely (perhaps fatally) diluting the focus of an already limited investment. In this, HEIs could play a guiding role by providing guidance and empirical evidence to the local authority as to how several sectors can be tied together into more problem-focused groups and/or a re-classification of target sectors to be undertaken.

The additional challenge, once a clearer sectoral focus is present, is low market awareness. Even in cases where HEIs do identify a small selection of target sectors to generate new ideas, backed by graduates and staff with appropriate skills and competencies, they often lack integration with the business community to validate such ideas, skills and competencies in the market. As such, a significant amount of intellectual property generated and skills developed never get exploited and local community needs are not met.

A critical actor in addressing these issues are technology transfer offices (TTOs) who, in working across the HEIs and within the business community can identify priority target areas, engage with a wider variety of stakeholders and develop market awareness. This should then lead to mapping out and aligning interests within both HEIs and the local business ecosystem and the establishment of easy to use mechanisms for transfer of ideas, skills and competencies, as well as (where appropriate) access to R&D resources (for detailed analysis of best practice in supporting routes from HE to enterprise (see OECD, 2013).

Challenges: Overregulation and instrumental generation and use of IP

The most significant persistent challenges to business creation for HEIs in Romania are overregulation and poor governance. On the one hand, this is visible in the significant amount of highly talented individuals' frustration at their inability to act entrepreneurially and, on the other, an abundance of notionally excellent framework parameters (for instance the number of patent filings). This paradox is evidenced in entrepreneurial attitude surveys and from a wealth of official statistics, and was clearly noticed during the study visits.

There is an instrumental generation and exploitation of intellectual property (IP) through patenting and establishment of spin-off companies. The former is a significant activity at most HEI in Romania and is widely publicised, while the latter is barely present in most. When digging deeper, it became apparent that patents are applied for and granted as part of research activities, merely to satisfy funding instruments requirements and mostly without a clear exploitation strategy. This is problematic for two reasons: on the one hand, patents for which there might not be any industry or market demand, drawing on vital limited resources are being worked on; and on the other, the lack of awareness of where industry interests and needs are and an abundance of IP in the portfolio makes any kind of exploitation less likely. Limited resources and lack of strategic approach also means that most patents are applied for nationally, instead of at the EU or international level.

A possible reason for such a paradoxical IP regime is the instrumental valorisation of patents within the HEI system, where volume seems to be the only criteria for recognising IP generators. Instead, international standards have moved on to use income from IP portfolios as a measure of technology transfer, though that too is problematic, as it overemphasises monetary value over actual industrial impact. More recently, it has been suggested that a more comprehensive measure should be adopted including examining research activity, TTO budget, licensing deals; products in the marketplace; companies and jobs created (spin-out companies), etc. Other measures considered include the impact of testing facilities, research parks and incubators in the area around the academic centre (Fraser, 2010).

In any case, the few HEIs in Romania which have spin-out companies have reported significant difficulty in creating them, sustaining them and their limited effect, mainly due to complex and prohibitive national regulation and low market awareness. When spin-outs are established, IP is parked in them and little beyond consultancy work is ever done. Also, save from the individuals involved in the few spin-out companies, almost no evidence of wider academic personnel become directly involved in entrepreneurial activities was found. Hence, strengthening the role of TTOs and ensuring proper IP protection and exploitation can be critical, as it is often a promising route for business creation.

Opportunities: Technology transfer offices as platforms for sectoral partnerships

Technology transfer offices (TTOs) are often seen as providing the central support to boost and to support R&D relations with the socio-economic environment as well as the transfer of the results obtained in research projects conducted by research structures within HEIs. To this end, UEFISCDI has created the Management Agency for Research, Innovation and Technology Transfer (AMCSIT) as part of a nationwide initiative to strengthen intellectual property rights protection and exploitation and encourages HEIs to set up TTOs.

The key services TTOs are expected to offer (under the Romanian policy for their creation and following broader international principles) are:

- technology transfer contracts between the university and companies interested in the application of the results of the research projects
- marketing and promotion of R&D results through different activities, like participation in exhibitions
- providing support for spinoff and start-up companies
- the development of a intellectual property (IP) system by: i) increasing the number of industrial property rights owned by the university; ii) providing information and support to the inventors, for the development of professional skills in IP; iii) organising information sessions and specific training on IP protection and innovation.

Some HEIs have a better managerial and staff capacity to develop active and meaningful TTO programmes, though the particular challenge are administrative burdens (one key HEI manager noted: “without the continuous support of the HEI legal team, the spin-off we started could never manage to deal with bureaucracy”) and an uneven level of local ecosystem development and knowledge exchange awareness (Chapter 5).

However, where TTOs took off the ground, their effect on the HEI and the local ecosystem is transformative. One such case is the West University of Timișoara (UVT) (see Box 4.2). TTOs can leverage various communities of practice to create synergies beyond the reach of a traditional HEI. Being a central point of contact and developing local and global networks, as well as local and global entrepreneurial and business knowledge and know-how, inspiring and guiding students, developing and supporting staff and engaging and influencing local and global stakeholders, from alumni to policymakers.

Box 4.2. The West University of Timișoara (UVT) – An emerging entrepreneurial ecosystem’s epicentre

UVT is the main higher education institution and research centre in Western Romania. Its community comprises roughly 15 000 students and over 700 academic staff. It includes 11 faculties with their respective departments, as well as a Department of Teacher Training. The faculties functioning within the framework of UVT offer nationally accredited study programmes at bachelor, master and doctoral level.

The entrepreneurial ecosystems in Timișoara are still at an embryonic stage of development. Skilled individuals show a propensity to look for jobs in multinationals, while opportunities remain limited to raise investments. However, TimisoaraStartups.com reports evidence of over 60 businesses who started via bootstrapping (the majority), as well as early-stage private-equity finance. Various initiatives support entrepreneurial venturing, with a focus on financial support and training. Some of them overlap, which means the overall strategy would benefit from a more structured approach.

In November 2017, the Office of Innovation, Technology Transfer and Intellectual Property was launched at UVT to anchor activities with innovation potential and applied research into the regional economy. This office is frequently involved in local and national initiatives, by organising and promoting workshops and thematic meetups with relevant players in the field of innovation and technology transfer. It does so with a focus on areas such as automotive, IT/Internet of things and industry 4.0.

In November 2017, it launched a Digital Innovation Hub, which aims to coagulate the efforts of the academic environment and the business environment for the promotion and use of new technologies in the context of the 4.0 industry, but also optimising processes and workflows at the level of individual companies.

Following an analysis of needs and international trends related to the creation and training of proactive professionals in automotive, industry 4.0, and in collaboration with the Regional Development Agency, the office has also recently initiated the development of an Innovation Academy to operate in sectors with high smart specialisation potential.

Starting in January 2018, it has engaged in the Start-up Plus Romania initiative. It is aimed at individuals in the developing regions of Romania with the exception of Bucharest/Ifov. Beneficiaries must set up a non-agricultural business.

Other initiatives see UVT at the centre of the local innovation and entrepreneurial ecosystem:

- Created in 2017, SAS-UVT aims to evolve a sustainable mechanism for supporting, developing and encouraging entrepreneurship among students and graduates (in the first three years of graduation). SAS-UVT also run a new project named U-Start, which will offer students a series of impact projects for the community, such as Timișoara Smart City, Social Entrepreneurship, Entrepreneurship in Education, Entrepreneurship cultural.

- Alongside this training programme, UVT has recently launched an investment fund under the general umbrella of the Human Capital Operational Programme 2014-20. Through this programme, UVT funds 200 businesses with grants of up to 40 000 euros. The institution has won European funding of EUR 10 million (plus an additional EUR 2 million from the central government). Aspiring entrepreneurs (including students) can benefit from grants of up to EUR 40 000 through various projects funded via structural funds and run by UVT. For instance, START UP BANAT is an integrated project to support the establishment of non-agricultural enterprises in the urban area of the West Region of Romania. The project proposes entrepreneurial training at the level of the Western Region of 300 people; financing 36 business plans; personalised counselling, and mentoring services for the 36 funded businesses as well as monitoring the development of funded businesses.
- A similar project to support and motivate talented entrepreneurs is SMART Start Up, with a focus on the establishment of new ventures focusing on IT. The project proposes entrepreneurial training for 330 people; internships for businesses for 52 entrepreneurs whose business plans have been selected for funding; personalised counselling and mentoring services for new businesses as well as monitoring the development of funded businesses.
- Minds Hub: UVT encourages and supports the participation of its students in national and international competitions, with particular emphasis on the fields of Informatics, Law, Economics and Physics. This is the first educational hub in Romania, built by the contribution of 34 companies and not less than 10 student associations and clubs in Timișoara. The hub promotes and organises multiple and complex projects through the contribution of student associations.

Training for business development and growth

The link between education and the labour market remains weak, despite recent measures, partially because tertiary education is confronted with one of the lowest attainment rates in the EU (from 19.1% in 2015 to 18.5% in 2016 of the population aged 18-24) (EC, 2018a). As previously mentioned, this may be negatively affected by a buoyant job market and drive to emigration. Paradoxically, the former is related to a very commendable feature of the Romanian HEI system, namely the industry placement experience (often a compulsory feature of the undergraduate degree), which most students undertake. This valuable experience is giving students vital entrepreneurial skills, though the link to immediate job offers is stopping students from acting upon them.

Though entrepreneurial education is examined in more detail in Chapter 3, here specific links between the educational provision and the local business ecosystem are detailed. For instance, through a successful branch of the international Junior Achievement programme (Box 4.3), which is developing the vertical integration of entrepreneurship education from schools to HEIs, concrete projects are emerging which take students on a journey from training, though an entrepreneurial idea development and competition, and to actual business creation. However, most of the several tens of thousands of participants do not end up in entrepreneurial ventures, though they have gained valuable experience from the programme.

Challenges: Relevance of entrepreneurial education

A critical challenge in linking entrepreneurial training and the production of tangible outcomes in business formation remains. A key role here is to develop further students' confidence in their entrepreneurial skills and inspire a high level of motivation in following through on entrepreneurial ventures. These can be addressed by focusing on three key interrelated challenges: enabling enterprise formation (in HEIs, local ecosystem and nationally), focusing on key skills (finance, management, legal) and using mentoring and role models as promoters of continuing development.

Box 4.3. Junior Achievement Romania (JAR)

Founded in 1993, Junior Achievement (JA) is one of the largest organisations active in the field of economic and entrepreneurial education, with programmes being followed in 39 European countries and worldwide. In Romania, JAR programmes are followed annually by more than 200 000 students from over 1 400 educational institutions and are run locally in partnership with the Ministry of National Education, educational institutions and the business community.

The main mission is to connect Schools and HEIs with the real economic environment and authentic experiences of life and professions through the presence of volunteer consultants in class. JAR has worked with companies such as Auchan and Google (Cluj), AstraZeneca (Bucharest), Nokia (Timișoara) and organisations such as the European Institute of Innovation & Technology (EIT).

The programme shares its expertise with different stakeholders, for instance in order to evaluate the entrepreneurial and innovative potential of universities, the Ministry of National Education has collaborated with representatives of JAR to use the HEInnovate tool in universities in Romania. The participation of universities in this self-assessment exercise was free of charge and JAR provided staff and resources needed for implementation (training, advice and free information).

Opportunities: Talented and committed mentors - Interested students

A significant number of talented members of staff, sometimes against their financial interest, public-spiritedly engage in many nationwide and bespoke programmes to develop direct links between teaching entrepreneurial skills on the one hand and supporting students and colleagues in the transition from hypothetical ideas to starting projects on the other. Furthermore, there is a notable interest among students for engaging in entrepreneurial education and training, though formal incentives or even recognition is somewhat lacking.

This could be addressed, for instance by increasing the scope of credit-bearing modules in entrepreneurship, small-scale competitions (with symbolic cash prizes and recognition on CVs) and improving the ease of access to career services highlighting entrepreneurial opportunities. Interestingly, similar opportunities to expand the profile of entrepreneurial training apply when supporting staff in their efforts to engage in entrepreneurial learning and teaching activities. Recognising this type of work in time-allocation and reward and promotion structures, as well as easing the administrative burden of starting new projects, can go a long way to change the climate among the faculty to favour the inclusion of some degree of entrepreneurship teaching into a wider variety of courses.

Developing entrepreneurs

As noted above, developing entrepreneurs by exposing them to “real-life” experiences of business environment is widespread, though mentoring is often patchy and relies heavily on the goodwill of staff and HEI external partners. The OECD study visits offered plenty of evidence for programmes developing entrepreneurial capacity beyond formal training, though how extensive the reach of these provisions is unclear. An example of very good practice is the Innovation Labs Programme, which is providing participants with highly structured and organised business development experience, with professional feedback and extensive mentoring support (Box 4.4).

Box 4.4. The Innovation Labs

The main premise of the nationwide Innovation Labs programme is to support students and young technology enthusiasts in implementing their business ideas at a hackathon and mentoring programmes organised in Bucharest, Cluj-Napoca, Iasi, Sibiu and Timișoara. Entries are open to all five cities participating in this programme. The programme is structured in three stages: Hackathon, Boost Day and Demo Day. Hackathon gives teams a chance to outline clear ideas, to defend them in front of the jury and the public, to get feedback from mentors in ecosystem innovation. The best teams will continue to develop their products in the mentoring programme from March to May, through weekly meetings with top IT and business specialists. Together with mentors, young people will consolidate and test their original prototype to get a functional product. Teams present their final prototypes on Demo Day, in front of the jury, potential investors and partners.

In 2018, 70 teams’ pitches were successful in Bucharest and 40 hackathon ideas were chosen. Of these, 20 entered the mentoring stage. At the same time, 30 pitches were accepted in both Cluj and Timișoara, 20 of them entering the hackathon and 8 the 3-month mentoring programme, covering seven thematic areas: agriculture, cybersecurity, fintech, health and lifestyle, retail, smart cities and smart mobility. Some of those projects and team were also linked to local clusters and multinationals, such as Orange, Société Générale, Tech Lounge, OMV, and Carrefour (University Politehnica of Bucharest) or Continental and Rosenc (Timișoara).

However, more broadly, the extent of the business development encouragement, formal and informal networking and mentoring provision seems to be closely related to the degree of sectoral alignment of the HEI, i.e. they are well developed only where the HEI has clearly identified and established links to the local business community with extensive research and training alignment.

Furthermore, gaining entrepreneurial skills and competencies should not focus exclusively on students but should also be part of staff’s continuing professional development (CPD) programmes. Staff is often more amenable to “learning-on-the-job” programmes and mentoring or workshop-style learning, as more formalised study programmes can be time-consuming and face various cultural prejudices. The OECD study visits showed very little provision of such opportunities for entrepreneurial development for HEI staff, which leaves a significant resource for entrepreneurial and intrapreneurial activity, as well as a critical pool of role models, untapped.

Challenges: Weak links to business, lack of ecosystem awareness

Though the programmes outlined above are gaining traction and deliver significant entrepreneurial development opportunities, these are not always directly applicable to the local ecosystem as they often do not relate to key structural challenges or market opportunities. Technology transfer offices with a well-developed understanding of the local ecosystem can help steer the emerging links to mentors and other routes into the business communities to reflect better the HEI provision and local needs.

Unfortunately, many of the links are relatively superficial, with business partners providing limited insight and HEI limiting itself to the supply of graduates to the industry. Such relationships neglect the entrepreneurial potential and reinforce the dominance of multinational corporations over SMEs within HEI strategic development. In order to stimulate the development of more dynamic clusters of related activities, as proposed in Chapter 5, HEIs need to take on a more pro-active role in developing long-term sectoral alignment with leading local clusters and engage leading entrepreneurs within them to work with students and staff to shape and deliver HEI entrepreneurial development provision.

Opportunities: Entrepreneurial sectoral alignment and engaging HEI staff

Developing closer sectoral alignment with most active local industry clusters (see, for instance, the CLUSTERO network described in Box 4.5) is a straight-forward way to expand the reach of HEIs into the local business ecosystem. During the study visits, it was noted that in many regions, the links between identifying industrial clustering, smart specialisation strategies (S3) and HEI involvement in the local ecosystem were difficult, due to very instrumental and inconsistent use of policy tools, as examined in more detail in Chapter 5. If HEIs are to play a more pro-active role in the local ecosystem, perhaps the place to start is to develop expertise and knowledge in this area and offer support to local stakeholders in shaping their policies.

Box 4.5. The CLUSTERO network

CLUSTERO joins 42 of the most active Romanian clusters (out of 72 recognised by the government) in fields such as textiles, renewable energy, electronics and software, machine building, wood and furniture, and agro-food.

It provides accreditation and supplies members with regular updates on regulation regarding the clusters' activity, sources and possibilities of financing and events. It also provides support and consulting for the establishment, development and collaboration within and between clusters through network formation, and represents clusters' interests in their relations with national and international bodies.

Through cluster performance monitoring and assessment, and offering courses and specific training, it tries to both further develop the entrepreneurial capacity as well as link clusters' members together in symbiotic economic activities.

Furthermore, by engaging HEI staff in shaping local entrepreneurial policy and supporting them in developing sectoral alignment in entrepreneurial teaching and academic research, significant opportunities will arise to also expand and evolve the staff's expertise. Some activities from leading staff will emerge organically from the need for additional professional training and education, while others will relate to the implementation of such

policies and strategies throughout the HEI and will reach staff at all levels. As a way to enable and incentivise participation, it is important that both delivering as well as attending these activities are formally recognised both in the work allocation models as well in HEI promotion and reward structures.

Access to finance

Though surveys indicate that access to finance is not considered the most important problem facing Romanian SMEs by entrepreneurs themselves,³ it has been flagged widely, both in several key pieces of research as well as during the OECD visits. The mapping provided by the Romanian agency for innovation funding found that a large variety of Romanian institutions and organisations offer access to financial capital, such as banks, microcredit institutions, VC funds, business angels, private equity, crowdfunding and European funds (UEFISCDI, 2015). However, the funds do not cover all stages of the innovation process, with an acute lack of early-stage finance. Barriers to access to finance also include the high costs of debt financing and collateral guarantees as well as only small amounts of money invested by private equity and venture capital. Furthermore, the unequal distribution of funds across regions was considered to be a barrier (with the highest density of funds in Bucharest).

This leads to the bootstrapping phenomenon, with entrepreneurs starting their business without support, investing much time and incurring personal debt just to keep the business alive. This includes reinvesting their profit into their business and borrowing money from friends and family. The most recent data collected in Romania confirms this significant trend (EC, 2017). In 2016, over 71% of SMEs financed their activities from their own sources (CNIPMMR, 2016). However, this figure has fallen from its peak at 91% of all Romanian SMEs being entirely self-financed in 2013 (Uritu and Popa, 2015). This is confirmed by GEM 2016 and Gheorghiu, *et al.* 2016, which note that financial support for entrepreneurship is a pressing problem when looking at public sector support measures (EC, 2017).

Challenges: Regulation (anti-corruption, but also anti-business?)

Lack of private equity financing, which currently suffers from low levels of disposable capital and cultural risk aversion, could be tackled by public support schemes. A step in this direction has been made with the introduction of the business angels legislation as, direct public investment might be needed to overcome short-term challenges. Some such programmes have been established, in particular with support from EU funds (Box 4.6); However, it seems that overregulation and bureaucratisation of the HEI system, ostensibly introduced to tackle corruption, is preventing HEI from operating in an environment where they could engage more meaningfully in investing in spin-out and start-up ventures.

Box 4.6. Start-Up Nation

The Start-Up Nation programme provides support to SMEs in accessing non-reimbursable funds. These grants can cover up to 100% of eligible costs but may not exceed RON 200 000 per beneficiary (including VAT for non-paying companies). Eligible costs include equipment, machinery, software, purchase of workspaces, production areas and premises for the supply of services and trade, means of transport. Beneficiaries are micro-enterprises, small- and medium-sized enterprises that fulfil a set of strict criteria (in accordance with Romanian law).

Opportunities: Significant investment opportunities available to HEIs

As the OECD mentions in its report on *Financing High Growth Firms* (OECD, 2011), the creation of a business angels co-investment fund plays a very important role in developing a strong business angel community. The Dutch Seed Instrument – the former Technopartner co-investment scheme – is another example of such an instrument whereby the government has invested alongside business angels and was also successfully implemented in Portugal (Box 4.7).

Box 4.7. International best practice in business angel co-investment fund

In 2009, following persistent lobbying by the few business angels in Portugal, the governments started to develop and implement policies to foster this new form of investment. The launch of the business angel co-investment fund saw 70 investment vehicle (IV) application, representing more than 350 business angels. Finally, more than 260 business angels were certified and 54 IVs were approved (EUR 770 000 per IV).

The government was very surprised by the quantity and quality of the applications, just three years after the effective launch of the IVs and other policies, business angels becoming the main source of funding for start-ups in Portugal. In 2016, business angels were the first option for entrepreneurs looking for equity for their projects. Nonetheless, the business angel community needed this initial government support to develop critical mass.

Another example is the United Kingdom, which has the largest business angel market in Europe. The British government supported business angel networks and national campaigns highlighting the role and importance of business angels. A co-investment scheme with GBP 100 million and fiscal incentives (Seed Enterprise Investment Scheme SEIS) triggered investments in start-ups worth more than EUR 2 billion in 2014.

Source: OECD (2011), *Financing High-Growth Firms: The Role of Angel Investor*, OECD Publishing, Paris, <https://doi.org/10.1787/9789264118782-en>.

It is important to note that many of the institutions visited were under the impression that EU-level state-aid legislation is preventing government investment in nascent enterprises through HEI mechanisms without open-call competition, effectively blocking direct investment in spin-outs and start-ups launched by/from the HEI. However, under General Block Exemption Regulation (GBER), most investments in innovation and R&D are exempt (lowest threshold is EUR 5 million).

Business incubation and acceleration

There is an acute lack of business incubation and acceleration provision across most Romanian HEIs, with deep systemic issues clearly present. Where available, business incubation is by and large managed by technology transfer offices (TTOs) and focuses extensively on the use of space and resources, rather than business support activities. Given the low take up, some HEIs are giving up on incubation after having established it, as they perceive it as an expensive and unproductive activity.

During the OECD study visits, several incubators were found with a very few companies in them and very “frugal” support structures, for instance, senior academics acting as mentors and helping students through their personal networks but receiving no reward. Furthermore, the few companies incubated underwent an unclear process of selection and were often only set up successfully with extensive support from the HEI legal team, as they would not be able to deal with the complex bureaucracy on their own.

There are notable exceptions to these views in the form of several targeted small incubators and accelerators, such as the Spherik Accelerator in Cluj-Napoca (Box 4.8). There are also some structured business acceleration programmes, namely U-start, Start-up Nation and Start-up Plus. They tend to be national programmes that are administered and implemented at the local level and provide some element of financial support which is differentiated by type of programme, mentoring, training and access to local industry-academia networks.

Box 4.8. The Spherik Accelerator in Cluj-Napoca

The Spherik Accelerator in Cluj-Napoca started in 2013. Today, it involves the Liberty Tech Park and a variety of industrial partners (e.g. Google, Amazon, Microsoft, etc.) and funders (KPMG, Fribourg capital and Banca Transilvania) as founding members. Twenty-four companies have so far participated in the programme and the programme won the prize as best accelerator in Romania in 2016 and 2017, awarded by Central European Start-up Awards. The Spherik Accelerator provides mentorship, entrepreneurial education (boot camps), human resources support of various kinds (technical, project management, marketing, etc.) and networking opportunities.

Challenges: Lack of expertise and investment

The main challenges incubators and accelerators programmes are facing is the lack of expertise and investment in their setup and running, leaving many projects without a vision, structure or necessary resources. This leads to poor performance and low interest by entrepreneurs and companies. Attracting talented staff with incubation experience from abroad, examining cases of successful practice and dedicating resources to these projects is vital for a successful turnaround of the current situation. Improvement to framework conditions (regulation, policy, investment) could also make a significant difference (European Court of Auditors, 2014; EC, 2017).

Opportunities: Allocating a “space” to innovate within university

Though sometimes incubators and accelerators are seen as costly investments, their main features can be set up relatively inexpensively within the HEI context. The key aspect is to allocate an “innovation space” at the HEI, perhaps part of a block of offices, where a technology transfer office is co-located with spin-out companies, visiting staff (i.e. entrepreneurs in residence) and meeting/co-working/socialising space. Provision of dedicated space for incubation services was, for instance, the transformative force behind the current success of Ljubljana University Incubator, which was languishing for several years, before a turnaround in 2007⁴ (Box 4.9).

Box 4.9. The Incubator of the University of Ljubljana, Slovenia

The University of Ljubljana in Slovenia, set up the Ljubljana University Incubator (LUI) in 2005 to promote entrepreneurship among students and staff. The incubator offers comprehensive support to start-ups and currently comprises of 18 companies and 6 entrepreneurial groups. The most prominent, such as the companies Zemanta and MountVacation, have succeeded in establishing themselves on Slovenian and foreign markets and in obtaining significant investment.

The incubator provides start-ups with premises, infrastructure and entrepreneurial counselling, as well as aiming to develop channels for efficient and rapid transfer of knowledge and technologies from the centres of knowledge to the economy. Hence, they organise entrepreneurial workshops to promote the establishment of spin-off companies, with additional social events to enable networking and raising entrepreneurial awareness.

So far, LUI has supported 139 start-ups on their entrepreneurial journey, 90% of which survived past the incubation period. Forty-two percent of incubated companies and alumni are already present in foreign markets, particularly in EU countries, countries of Southeast Europe and the United States, and also in Argentina, Canada, China, Iran, Mexico, the United Arab Emirates, etc. and LUI's start-ups are recognised by domestic and foreign investors, having received a total of over EUR 20 million in business development funding. Nine of LUI's most successful start-ups generated more than EUR 1 million of revenues, 2 of them even over 2 million and LUI's start-ups opened up over 400 jobs, mainly in the fields of development and marketing.

On the back of this very successful programme, LUI became a 2016 finalist for Central European Start-Up Award in the category of best accelerator or incubator programme.

Conclusions and policy recommendations

Improve the local environment for entrepreneurship and innovation

The Romanian institutional context does not create a favourable framework to encourage entrepreneurial attitudes. When it comes to shaping the business environment, national institutions present a number of problematic aspects such as a volatile fiscal framework, bureaucracy in starting a business, lack of good governance practices, corruption at the interference of public space with the private one, uncertain rules regarding the establishment and management of intellectual property (IP). These issues persist through the HE system in Romania and reflect in lacking systemic capacity (within and outside of HEI), strategic fragmentation (geographically, politically, organisationally) and, consequently, overall a relatively low entrepreneurial motivation (of students, staff and managers).

However, with academic tradition, a talented workforce and collective determination, the entrepreneurship ecosystem in Romania has the opportunity to improve greatly. There is clearly strength in emerging programmes in support for highlighting the value of entrepreneurship through information sharing and entrepreneurial education, though reliance on multinational corporations for industry engagement and lack of attention to continuing professional development (CPD) for staff is concerning. Also noted are many national and local programmes attempting to support routes to business creation, though

low market awareness, high administrative burden and instrumental use of support mechanisms are detrimental to the success of many start-up and spin-off businesses.

Promote entrepreneurial behaviour and mind-sets in staff and students

The most critical challenges to a successful implementation of an entrepreneurial transformation in HEIs are culturally entrenched over-reliance of traditional HEI-industry relationships, which lead to neglect for entrepreneurial activity or, in some cases, its active obstruction. Some of these issues relate to the wider (national) framework conditions, though others can be addressed locally at HEIs. In particular, drawing upon extensive and active groups of entrepreneurial alumni, HEIs can supplement the “traditional” routes from education into the job market by promoting entrepreneurial role models, who can offer real-world expertise to HEI staff and students. Whether through formal courses, mentoring or through social events, these links can not only cement an HEI role within the local entrepreneurial ecosystem but can open access to the business network and investment opportunities to their staff and students.

Develop technology transfer offices (TTO) as critical HEI gateway to local ecosystem

Emerging from best international practice and noting examples of excellence within Romania, technology transfer offices (TTOs) in HEIs can be developed, with a clear dual role of promoting entrepreneurship within the HEI and liaising with the local business community/ecosystem. The key objectives of TTOs should include:

- One-stop-shop online portal for entrepreneurial information and support.
- Featuring entrepreneurs in residence as mentors.
- Enabling/facilitating more entrepreneurial/creative industry placements.
- Providing staff CPD on entrepreneurship.
- Running incubation/acceleration programmes.
- Working with the local authority, business organisations, chambers of commerce, etc. in developing effective strategies for developing local ecosystem (including smart specialisation).
- Linking academic research to local businesses through events, networks (alumni).
- Developing HEI strategic insight into internal and external policy and operations development.

Engage world leaders and identify and deploy best practice approaches

Many of the above proposals have already been promoted in Romania but practical capacities to deliver on this vision are currently limited. However, these could be strengthened by improving the overall framework conditions, as proposed in the recent Horizon 2020 Policy Support Facility (PSF) report (EC, 2017), and by engaging further (through knowledge exchange, visits, recruitment, etc.) with internationally recognised best practice examples for a joined-up and comprehensive entrepreneurship development and support programmes within HEIs. For instance, consulting with European partners (both EU institutions as well as other HEIs) on accessing and deploying EU funding for

entrepreneurial activities at Romanian HEIs could significantly expand entrepreneurship and research commercialisation activities.

Notes

¹ These are: Policy (developing an IT system, monitoring the performance of the ecosystem, developing a Romanian entrepreneurship agency); Culture (entrepreneurship award, entrepreneurship education, transparent policies involving stakeholders, entrepreneurship-friendly regulation); Human Capital (upgrading entrepreneurship education in HEI, non-PhD people teaching at HEI, attracting talent from abroad, start-up visa); Support (non-financial support for start-ups/SMEs, incubators/TTOs, incubator voucher scheme, international accelerator, updating incubation law); Finance (amending business angel law, supporting business angel networks, accreditation/certification of business angels, business angel co-investment schemes, VC co-investment, funding for counter-guarantee scheme, tax incentive for investors), Markets (connectivity, smart procurement).

² Under the Competitiveness Operational Programme, 44 calls have been launched at the time of writing (90% of the total). In 2018, 9 calls were launched, of which 3 for Priority Axis 1 (PA1) (“Research, technological development and innovation in support of economic competitiveness and business development”) and 6 for Priority Axis 2 (PA2) (“Information and communication technology for a competitive digital economy”). In 2019, the managing authority plans to launch the calls for CLOUD and for research infrastructure, as a follow-up to the last modification of the operational programme (OP). Other calls in the pipeline include innovative clusters (PA1) and e-health, e-education, NGN, e-commerce and cybersecurity (PA2). 69.1% of the PA1 allocation and 42.5% of the PA2 allocation has been contracted. Over 20% of the total programme allocation has been paid. EUR 59.3 million were launched under 2 Financial Instruments developed within the OP, comprising a sharing loan portfolio and a risk capital facility.

³ Entrepreneurs ranked access to finance with a score of 6.1 (on a scale of 1 to 10), which is a higher score than the EU average of 4.7, but a larger number of Romanian SMEs rank finding customers (28% of SMEs), availability of skilled staff (18%) and costs of production of labour (13%) and regulation (12%) as more problematic than access to finance (11%). The surveyed Romanian firms largely rely on credit lines and overdrafts (relevant for 61% of SMEs, while the EU average is 54%). Bank loans as start-up financing option feature somewhat less in Romania than in other EU states (relevant for 39% of SMEs in Romania and for 49% for the EU-28 average). Responses of around 500 participating Romanian firms show that Romania leads all EU-28 countries with respect to using “other loans” as one of the finance channels analysed (18% of SMEs have used other loans in Romania and the indications are that a further 16% find them relevant as source of funding) SAFE Survey (EC, 2015b).

⁴ Brilej (2006) finds that the LUI has no firms and no space beyond managers’ offices, while Zakrajsek (2010) notes 13 incubates and 12 alumni, after the incubator managed to acquire a single dedicated space for incubation services and companies’ offices.

References

- Branču, L. et al. (2012), “Study on student’s motivations for entrepreneurship in Romania”, *Procedia-Social and Behavioral Sciences*, Vol. 62, pp. 223-231.
- Brilej, A. (2006), *Podjetniski inkubatorji v Sloveniji*, http://www.cek.ef.uni-lj.si/u_diplome/brilej2628.pdf.
- CNIPMMR (2016), *Carta Alba a IMM-urilor in Romania, 2016*, <http://cniipmmr.ro/2016/07/11/celde-al-14-lea-raport-de-cercetare-al-cniipmmr-carta-alba-a-imm-urilor-din-romania/>.
- Deloitte (2016), *Best is Yet to Come: Romania CFO Survey 2016*, <https://www2.deloitte.com/content/dam/Deloitte/ro/Documents/about-deloitte/cfo-survey-romania-2016.pdf>.
- EC (2018a), *Country Report Romania 2018*, European Commission, <https://ec.europa.eu/info/sites/info/files/2018-european-semester-country-report-romania-en.pdf>.
- EC (2018b), *Education and Training Monitor 2018*, European Commission.
- EC (2017), *Specific Support to Romania – Start-ups, Scale-ups and Entrepreneurship in Romania*, European Commission, <https://rio.jrc.ec.europa.eu/en/policy-support-facility/specific-support-romania>.
- EC (2016), *The Romanian Entrepreneurial Ecosystem. Background Report*, European Commission, <https://rio.jrc.ec.europa.eu/en/library/romanian-entrepreneurial-ecosystem-background-report>.
- EC (2015b), *Survey on the Access to Finance of Enterprises (SAFE)*, European Commission, <https://ec.europa.eu/docsroom/documents/14321>.
- European Court of Auditors (2014), “Has the ERDF successfully supported the development of business incubators?”, <https://www.eca.europa.eu/en/Pages/DocItem.aspx?did=27792>.
- Eurostat, https://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=urt_bd_size&lang=en.
- EVCA (2013), *Tax Benchmark Study 2012*, http://www.evca.eu/uploadedFiles/Benchmark2012.pdf?dm_i=1GLS,1K23D,827W8K,5C4G8,1.
- Fraser, J. (2010), “Academic technology transfer: Tracking, measuring and enhancing its impact”, *Industry and Higher Education*, Vol. 24(5), pp. 311-317.
- Gheorghiu, R. et al. (2016), *European Research and Innovation Observatory Report on Romania. RIO Country Report 2015: Romania*; EUR 27846 EN; doi:10.2791/782805
- Global Entrepreneurship Monitor (2016), *Country Profile: Romania*, <http://www.gemconsortium.org/country-profile/103>.
- Invest Europe (2016), *Central and Eastern Europe Statistics 2016*.
- Isenberg, D. (2013), *Worthless, Impossible and Stupid: How Contrarian Entrepreneurs Create and Capture Extraordinary Value*, Harvard Business Review Press.
- Manpower Group (2018), *2018 Talent Shortage Survey. Solving the Talent Shortage: Build, Buy, Borrow and Bridge*, [https://go.manpowergroup.com/hubfs/TalentShortage%202018%20\(Global\)%20Assets/PDFs/MG_TalentShortage2018_lo%206_25_18_FINAL.pdf?t=1538083307070](https://go.manpowergroup.com/hubfs/TalentShortage%202018%20(Global)%20Assets/PDFs/MG_TalentShortage2018_lo%206_25_18_FINAL.pdf?t=1538083307070).
- Ministry of Education of Romania (2018), *Background Report for the HEInnovate Country Review*, unpublished.

- Marques, P. and K. Morgan (2018), “Social innovation in question: The theoretical and practical implications of a contested concept”, *Environment and Planning C: Politics and Space*, Vol. 36(3), pp. 496-512.
- OECD (2013), *Commercialising Public Research: New Trends and Strategies*, OECD Publishing, Paris, <https://doi.org/10.1787/9789264193321-en>.
- OECD (2011), *Financing High-Growth Firms: The Role of Angel Investor*, OECD Publishing, Paris, <https://doi.org/10.1787/9789264118782-en>.
- UEFISCIDI (2015), *The Romanian Entrepreneurial Ecosystem. An Exploratory Study*.
- Uritu, D. and A.-E. Popa (2015), “Romania Financing Sources for Romanian SMEs in the Context of Knowledge-Based Economy”, Proceedings of the 9th International Management Conference, 4-5 November 2015.
- World Bank (2017), *Doing Business Index 2017*, <http://www.doingbusiness.org/en/reports/global-reports/doing-business-2017>.
- Zakrajsek, G. (2010), *Vpliv inkubatorjev na podjetnistvo in gospodarsko rast*, ftp://www.ediplome.fm-kp.si/Zakrajsek_Gorazd_20101001.pdf.

Chapter 5. Knowledge exchange and collaboration: Interactions between Romanian HEIs and the surrounding ecosystem

In most countries, higher education institutions have been increasing their volume and value of knowledge exchange in OECD countries. More and more, stakeholders consider HEIs as important actors that should engage with the economy and society to become drivers of inclusive and sustainable development, especially in their ecosystems and communities. Several Romanian universities represent a good practice in their capacity to work with local stakeholders. There are however several challenges, including: large economic imbalances among regions, some of which are the least developed in the EU; a bureaucratic central system of control; and the weak local innovation ecosystems. These limit the overall volume and value of knowledge exchange across Romanian universities, whose “third mission” focusses on technology transfers. This chapter discusses the cultural and institutional challenges within the Romanian Higher Education system and provides international example of and policy recommendations.

Knowledge exchange and Romanian higher education institutions, an overview

Universities throughout the European Union (EU) and OECD countries are increasingly encouraged or required by national policies and funding programmes to increase their volume and value of knowledge exchange. A range of important continuing and new drivers are focusing new attention on the performance of innovation systems overall. The performance of individual institutions, especially universities, is also under increasing scrutiny.

But the definition, use and analysis of performance metrics, both quantitative and qualitative, is complicated by new conceptual understandings of knowledge exchange. The old linear and spatially blind model of technology transfer is being overtaken by more nuanced understandings of ever more complicated systems and relationships of the flow of knowledge between industry, research institutions and the national and local levels of government. The importance of place and of strong institutions as a determinant of performance of knowledge exchange is increasingly understood, especially in lagging regions (OECD, 2017; 2011).

Romanian universities are working with local stakeholders in this new context amid ongoing acute challenges of economic geography. The agglomerating forces of its capital city-region continue to dominate over other regions, some of which remain some of the least developed in the EU. The effects of ageing, compounded by historically high levels of outward migration, has delivered severe demographic pressures, which have heavily affected local communities and especially many universities. The emerging (and still weak) local innovation ecosystems and the lack of strong national and regional public institutions each directly limit the level and complexity of demand for university services.

Universities are seen by stakeholders as institutions that need to support local economic growth in addition to what some see as their former traditional core functions of teaching and research. Both these new requirements demand a better understanding of their local economy and communities, but also how they interact with and provide collaborative leadership in partnership with local and private stakeholders.

Senior leaders within many Romanian universities increasingly recognise these new roles. There is often genuine strategic and personal commitment. Some innovative new approaches are being taken forward at the local level, including some good efforts to deliver forms of Smart Specialisation. Private firms contributing to the HEInnovate review offered good qualitative evidence of positive relationships with their local university, especially in relation to the supply of skilled labour for larger international firms which have invested in the country.

The overall volume and value of knowledge exchange across Romanian universities, though, currently and stubbornly remain very low compared to other OECD and EU countries. Some of the factors, which limit the ability or willingness of Romanian universities to deliver knowledge exchange are well understood and evidenced elsewhere across members of the European Union and the OECD. Other limiting factors can be addressed primarily at the national level.

Individual ministries of central government need to and can work much more collaboratively to address the important challenges of incoherent policies for innovation, fragmentation of design and delivery of publicly funded programmes. New incentives and motivations are needed at the local level and these can only be managed or devolved from the national level. New, more co-ordinated and better-funded approaches to Smart

Specialisation at the regional level (e.g. agritech) are both needed and a continuing positive opportunity.

The new importance of knowledge exchange

Knowledge exchange is a concept whose importance has risen sharply in recent years (OECD, 2017). Increased global socio-economic linkages and competition for international competitiveness have driven stronger public policy interest towards instruments to strengthen productivity and innovation. In advanced countries, most innovation, including more firms adopting existing and improved technologies and the commercialisation of new products and processes, is funded and driven by private firms but a strong role for publicly funded research, especially in universities, is also seen as an essential component.

The EU Strategy 2020 calls for member states to support public and private investments into research and development so that the gross level of investment reaches 3% of gross domestic product (GDP). Some EU member states have reached this target but the majority have not; the average for all member states has remained at approximately 2%, whilst the figure for Romania is much lower (Chapter 1). Of particular interest is the need to stimulate investments by business in research and development (R&D).

High-level relationships between the state as a whole, firms, taxpayers, universities and students had been broadly stable and understood for many years across many OECD and EU member states. But the global recession and the subsequent significant cuts to public funds have seen nation states re-examining both the cost and outcomes of many of its delivery agencies and important public services, including universities.

Changing understandings of knowledge exchange

Older understandings of knowledge exchange emphasise a linear model of innovation. New scientific discoveries, including those emanating from university research, are developed across a continuum or “levels” of “technology readiness” until they are then adopted by firms which then develop the technology further, through prototyping and pilot testing, and into new products and processes that can be brought successfully to commercial markets. The model very much emphasises the role of science and technology and it assumes there are internal motivations and rewards systems in place which “push” the developing product towards the market. Marques and Morgan (2018) note that, although the linear model was “buried” decades ago by eminent scholars, “the fact remains that the model is alive and well in the worlds of policy and practice”.

Moreover, Marques and Morgan (2018) note the continuing relevance of a “regional innovation paradox”. This paradox notes that the regions with the greatest need for (and financing of) innovation are also the regions with the lowest capacity to make the best use of these funds. This is due to weak absorptive capacity and the lack of demand from firms in the region. They argue the solution is to invest in mechanisms (systems, institutions, etc.) which can exchange wider forms of knowledge more effectively. Investment is also needed to build demand by local firms for research and also to improve their ability to absorb and commercialise new technologies. Such investments would begin to establish stronger innovation ecosystems at the local level.

Knowledge exchange and the civic university

Knowledge exchange and the notion of the “civic university” (Goddard et al., 2017) embodies a more nuanced understanding of knowledge flows in complex patterns within

these innovation ecosystems. Traditional universities with a “hard” boundary between itself and its local economy and community find it difficult to deliver this more sophisticated form of knowledge exchange. The primary focus of management remains on the “core functions” of teaching as measured by national and international rankings; and on research, measured by “excellence”. Knowledge exchange is seen as a “third mission” including the connections with external stakeholders.

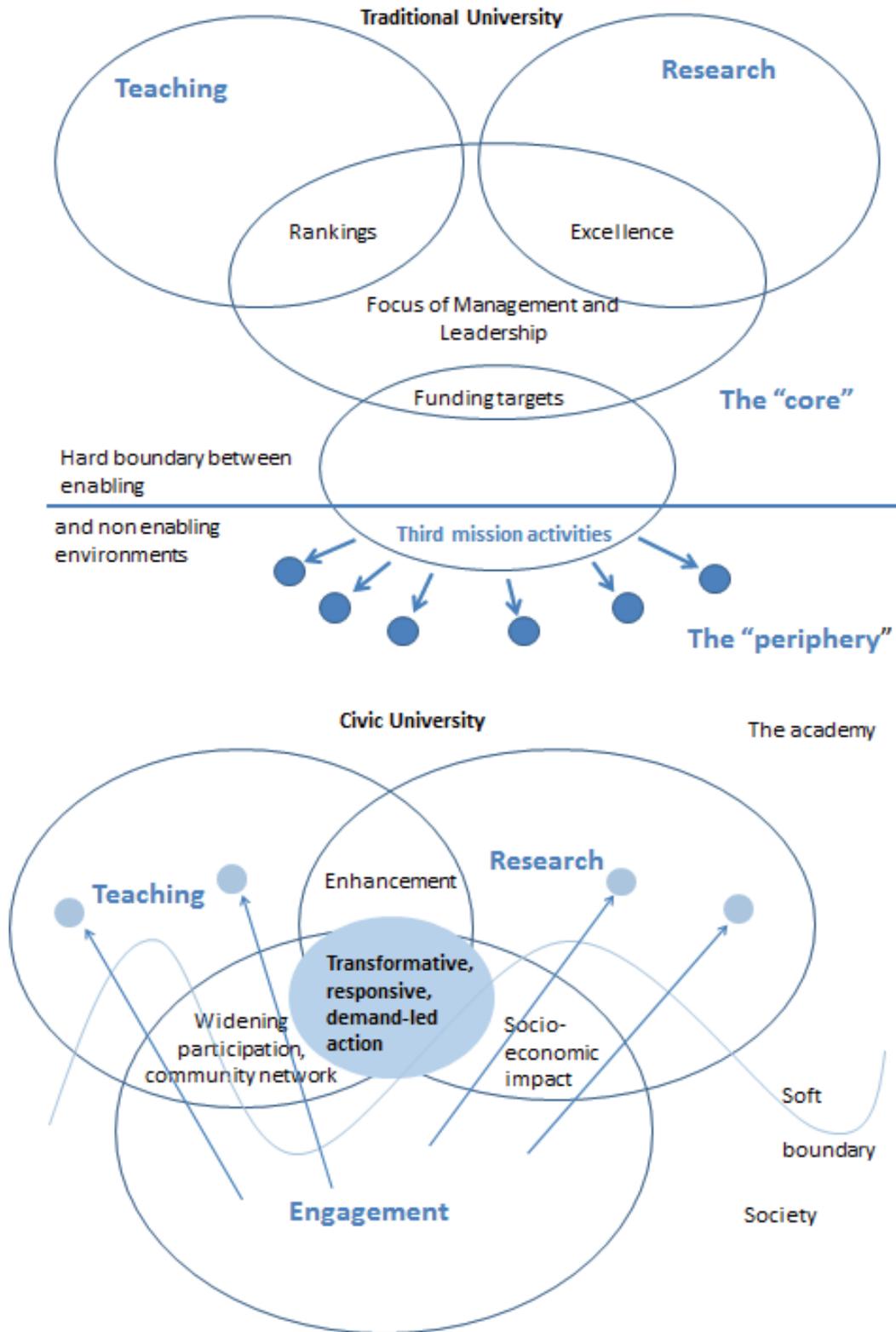
The concept of a civic university identifies opportunities for knowledge exchange that cover a range of disciplines and activities that widen out much further than “technology push activities”. Critically, it also understands that knowledge can be exchanged from outside agencies into the university; and being embedded and active within the community provides a university the opportunity to do research within the local community that has direct relevance locally. Such an understanding has implication for the internal structures of a university and how it interfaces with the outside world. It requires “transformative, responsive, demand-led” cultures and managerial capacities underpinned by strong leadership (Goddard et al., 2017). It requires universities to “reach out” to local organisations in ways understood properly by external stakeholders but also to provide new solutions to make it easier for external agencies to “reach in” to what can be seen from the outside as unfathomable and complex university structures.

The model of a civic university is not easy to deliver in practice, even in places where overall resources are more abundant, where strong institutions and partnerships are established, and where hard and soft infrastructures are already well developed. Knowledge exchange is very often unfunded, or where funding does exist, it tends to be available only on fixed terms and on a competitive (therefore, unplanned) basis. There are few people within universities for whom knowledge exchange is their own personal “core business”. Traditional universities have traditional faculties based upon traditional disciplines, e.g. engineering. Working on an interdisciplinary or multidisciplinary basis is both increasingly necessary and required by external funding agencies and/or stakeholders. This requires more flexible, inclusive structures supported by strong matrix management.

The number of external organisations wanting to work with the university can often exceed internal capacities. Instability in local institutions, especially directly elected municipal government, where repeated changes in political leadership can cause difficulties in maintaining long-term strategic direction and much-needed personal relationships. Whereas traditional forms of technology transfer can lead to more easily identifiable and more immediate forms of outputs (e.g. numbers of new products brought to market), working with local stakeholders on more intangible issues are not as likely to demonstrate such immediate and identifiable outputs, such as the “grand societal challenges” of ageing, climate change, waste/water management, demographic migration, energy use, carbon reduction, etc. (Goddard et al., 2017).

Operational issues can also be difficult to overcome. There is often a “gap” between the aspirations of the strategic leadership of universities and individual academics lower down the hierarchy who can sometimes be unaware of or do not understand those aspirations, or who are unable to prioritise the necessary actions because of more short-term/acute pressures from elsewhere, some of which relate to attracting more immediate amounts of income for teaching or research.

Figure 5.1. The traditional vs. the civic university



Source: Based on information provided by Professor John Goddard, Newcastle University, UK.

Many external stakeholders find it difficult to understand what universities do in practice, how they are governed and what limitations are placed on them by financial or other regulations. They find it difficult to find the right person to contact for any specific issue. Cultures, languages and jargon can be very opaque to outsiders even when the right contact is made. Such challenges emphasise the important role of “boundary spanners”. Boundary spanners are individuals who can work comfortably and effectively across and within institutions. These are people who are socially sophisticated and diplomatically skilled, able easily to translate cultures and languages. Boundary spanners have the confidence to forego their own institutional loyalties and priorities for wider, longer-term aspirations that can benefit the whole place in which a range of partners are based.

Knowledge exchange: Measuring performance

Irrespective of the model of knowledge exchange adopted, public agencies will seek to compare performance in knowledge exchange of overall systems of higher education and of individual universities themselves. The work of the MacMillan et al. (2016), for the former Higher Education Funding Council for England, provided useful commentary on measuring and managing the performance of universities in knowledge exchange. The MacMillan Group argued that one-size-fits-all policies and approaches to the analysis of performance in knowledge exchange just do not work. Specific approaches are needed, which require the characteristics and cultures of each institution and the local socio-economic environment to be taken into account. Some countries have developed systematic surveys to capture some forms of knowledge exchange (Box 5.1).

A fair application of the model in Romania, therefore, needs to take into account fully the very specific conditions that are evident in the wider national political and economic geography as well as, importantly, qualitative intelligence gathered during the HEInnovate process, through semi-structured interviews with senior university leaders, academics, students and local firms.

Box 5.1. The Higher Education-Business Community Interaction Survey (HE-BCI)

The HE-BCI survey is collected every year by the Higher Education Statistics Agency for England. It collects financial and output data related to knowledge exchange each academic year and has been running since 1999.

The annual survey reports provide information on a range of activities, from business and public or third sector involvement in research (in both contracted and collaborative research), to consultancy and the commercialisation of intellectual property. It also explores other activities intended to have direct societal benefits such as the provision of continuing professional development and continuing education courses, and the provision of, for example, lectures, exhibitions and other cultural activities.

Knowledge exchange and Romanian HEIs

University structures and knowledge exchange

The structure of some Romanian universities relates back to economic history and previous forms of government. These forms are very heavily focused on traditional approaches to the hard sciences, including technology, engineering and information and communications

technology (ICT). For example, the Transilvania University of Brasov alone boasts 7 different engineering faculties.

Comprehensive universities deliver a wider range of learning including arts, humanities, social sciences, etc. These universities appear to be less engaged at the moment in knowledge exchange, but their wider focus may provide more opportunities in the future as understanding of the concept widens to include important strategic issues such the grand societal challenges.

Both forms of university have fairly standard internal organisational structures with an emphasis on a range of vertical faculties, with relatively less emphasis on horizontal governance and weaker corporate centres. They also limit the ability of universities to deliver interdisciplinary and multidisciplinary research that is increasingly required by public stakeholders and private firms.

Regardless of their scope and structures, Romanian universities do recognise the need to communicate more effectively with local stakeholders. The Technical University of Cluj-Napoca plays an active role in working with strategic leaders from other sectors and institutions. It has a dedicated Department for Relations with Enterprises.¹ It has signed collaboration agreements with over 200 firms. An informal association of leaders from important local firms come together on a regular basis to advise the rector. The advisory panel has no formal status and is largely a mechanism to discuss opportunities to co-ordinate strategic direction and opportunities for a collaborative effort. Nevertheless, this form of soft power represents an example of multi-level governance in which more and more universities are becoming involved, either at their own initiative or at the request of local stakeholders.

Universities across Romania, though, can do more to make it easier for firms and other external partners to understand who they should contact specifically if they wish to discuss their own particular research needs. All universities have websites and most have technology transfer offices within which, or through which, it is possible with some searching to find names of researchers and their contact details but the terminology and structure of the websites appear designed more for an internal audience rather than external customers with little or no prior knowledge of the university and how it operates. Universities can quickly and easily better market their capabilities through websites and other forms of communication which are more customer-orientated and which help external stakeholders reach into the university.

Commitment of senior leaders to knowledge exchange is pivotal in inward investment

Senior leaders within many local universities across Romania increasingly recognise the importance of knowledge exchange. There is often genuine strategic and personal commitment even if there is frustration at the perceived or real barriers which prevent further progress.

Private firms often provide good evidence of positive relationships with their local university, especially in relation to the supply of skilled labour for larger international firms who have invested in the country. Interestingly, the name of one multinational firm was cited repeatedly as a research partner in most universities which contributed directly to the review. In total, over 19% of spending on research and development in Romania is financed from abroad, more than that achieved in Austria, Belgium, Croatia, Denmark, Germany, Hungary, Italy, the Netherlands and the United Kingdom.² This data confirms that some

universities in Romania are delivering significant amounts of knowledge exchange. It also reflects a relative lack of local demand.

Evidence was offered by some universities of their active role in helping to attract inward investment. The Technical University of Cluj-Napoca reported it had many separate discussions with a prospective inward investor before that firm chose to invest in the local area. Universities are supplying skilled labour especially to firms in the manufacturing and ICT sectors where persistent labour shortages are evident, particularly in Transylvania.³

Limitations of traditional cultures at lower levels of university hierarchies

Even if senior leadership teams have new and wider aspirations, traditional institutional approaches at lower levels of seniority within the university continue to see the functions of teaching and research as being of primary importance, and knowledge exchange continues to be relegated to third place. Cultures and systems reward research and teaching above knowledge exchange. Such cultural attributes generally appear most evident within older members of senior leadership teams with memories of past forms of government. The cultural gap between generations is very wide in places.

Promotion criteria remain, in particular, dominated by contributions to peer-reviewed journals (the higher ranking, the better) and the preparation and submission of new patents, even if there is a widespread advance acknowledgement that either of these inputs only very rarely is then commercialised at any later stage. Personal tax incentives have been introduced to support academics to do more work with businesses but no new additional funds have been provided to universities.

Cultures of working with the private sector

Building the confidence of senior academics to work with the private sector is critical. Senior academics often caution against working with local businesses, often claiming that a clear (national) legislative framework does not yet exist. This nervousness is certainly understandable, especially when knowledge of EU state aid frameworks and regulations appears very low. Few respondents have heard of the De Minimis rule or the General Block Exemption Regulation (GBER). This new regulation which applies automatically in every EU member state provides a simple and far more flexible approach to the management of lower levels of approved forms of state aid; indeed, the GBER provides a number of provisions which offer clear guidance and new opportunities for universities.

Institutional capacities matter for knowledge exchange

The ability of a university to deliver knowledge exchange depends not only on its strategic direction or on its own organisational structures and cultures. It depends also on its overall institutional capacities, especially in leadership and critically, also, in those same characteristics of other local and regional institutions and partnerships.

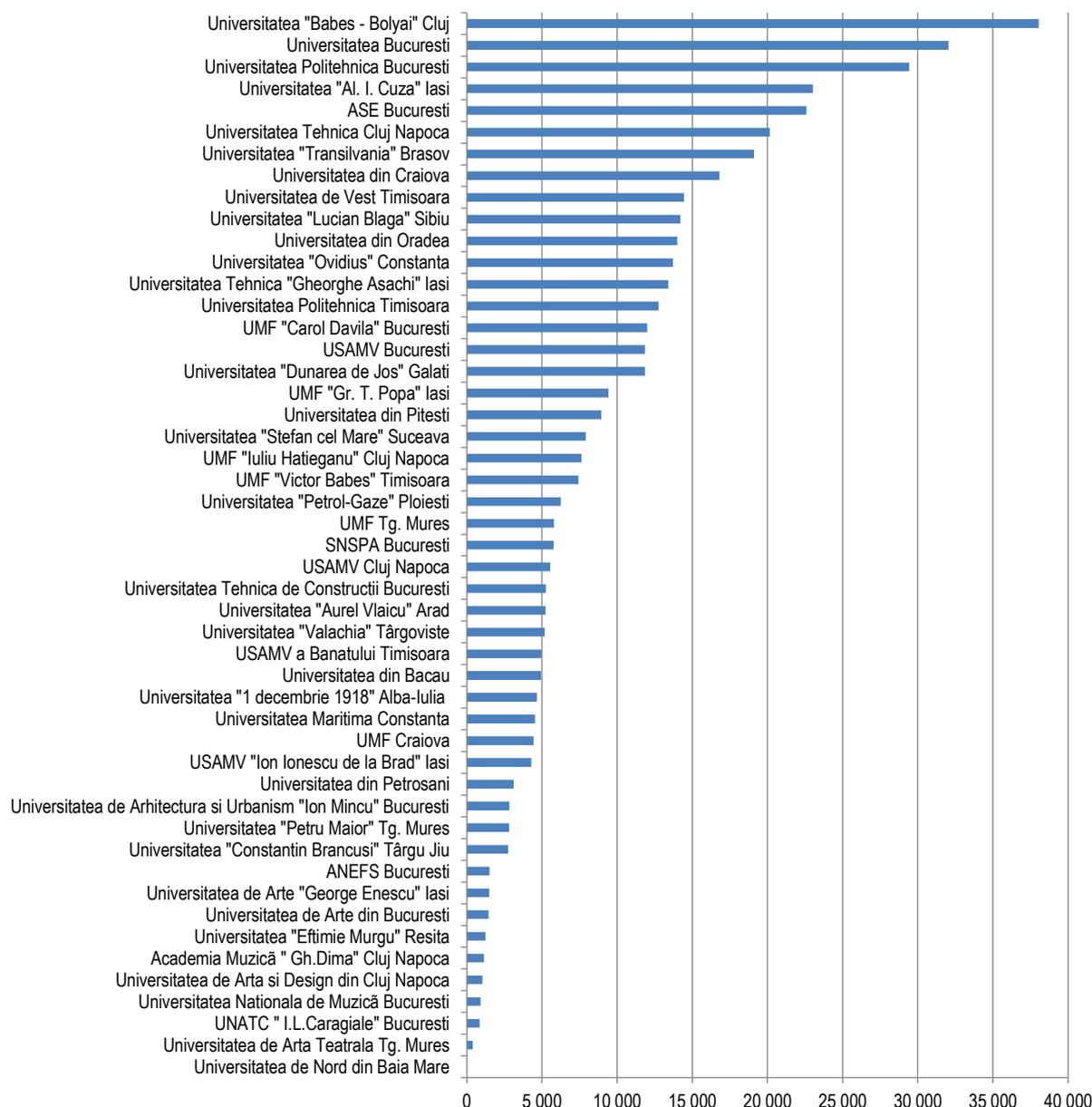
Leadership is critical. There are examples of rectors and other members of senior leadership teams who demonstrate strong personal and collective leadership, providing vision and focus to their own institution but also to local stakeholders. The quality of leadership more generally could be developed if universities were given more autonomy within a less restrictive centralised planning system. Leaders given more “own resources” with which to work in a more flexible manner at the local level could develop their own solutions to local opportunities. Modernisation of the system of appointment of rectors could consider the need to build longer-term relationships of trust and confidence with external stakeholders.

Universities in Romania are heavily undercapitalised and have few flexible assets or liquid resources of their own other than for teaching and research. There is no ongoing funding source other than European Structural Investment Funds (ESIF) dedicated to funding institutional capacity building for knowledge exchange. Technology transfer offices (TTOs) where they exist are very small, sometimes only employing one or two people. TTOs themselves are often funded by other forms of EU funding, e.g. as part of the Enterprise Europe Network.

Size matters

The small scale of these TTOs reflects both the scale of funds available, perhaps also the level of demand from external partners and firms and, of course, the overall size of many universities. A majority of state universities have less than 10 000 students (Figure 5.2); about one-third have less than 5 000 students, both very small in size by international standards.

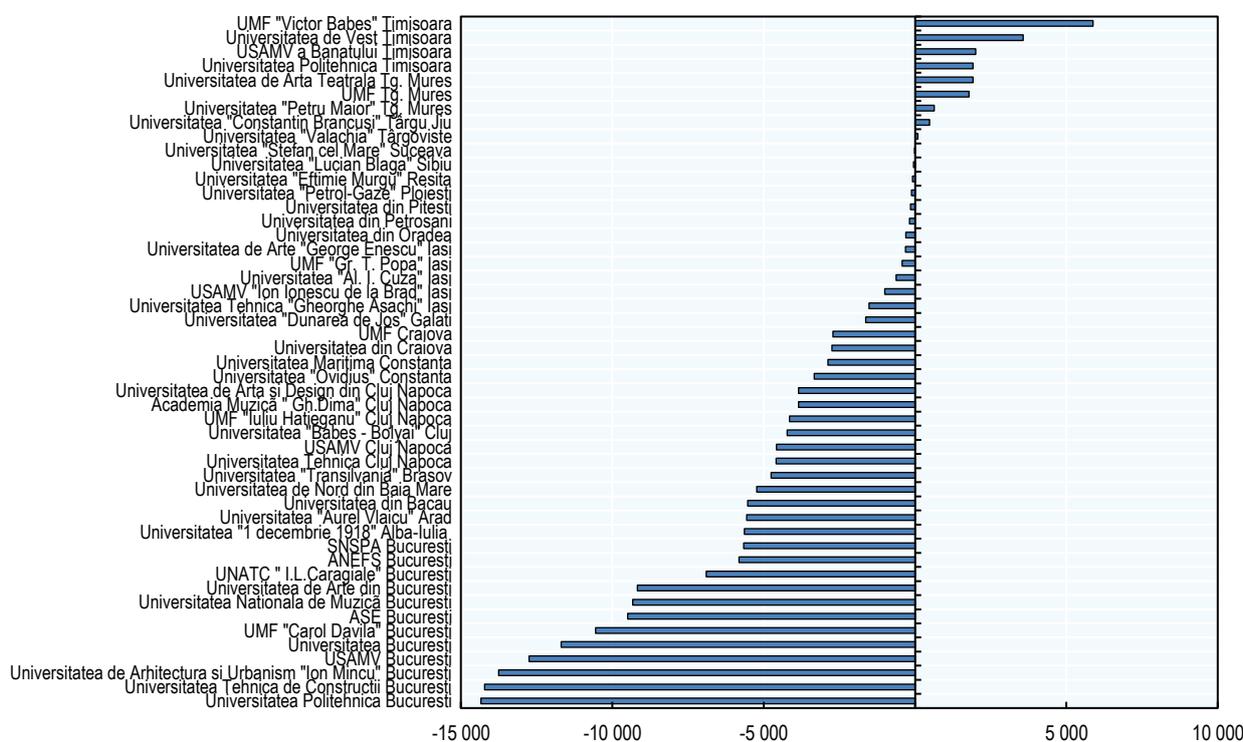
Figure 5.2. Total number of students at state universities 2017/18



Source: Ministry of Education of Romania (2018).

But this distribution of size of university by number of students and, by generalised extension, their capacity to engage in knowledge exchange, hides how falling numbers of students has dramatically impacted the entire capacity of the higher education system. Almost one-third of all state universities have lost more than 5 000 students in less than 10 years (Figure 5.3).

Figure 5.3. Change in number of students at state universities



Source: Ministry of Education of Romania (2018).

Smaller universities elsewhere can deliver good volumes and values of knowledge exchange. Officials in these universities often need to make good use of membership and involvement in collaborative networks which share and spread best practice in knowledge exchange, both nationally and internationally. Such networks other than the national committee of rectors are not immediately evident within Romania, demand for which could perhaps be limited by the size of the country, its weak transport infrastructure and the costs and time associated with travelling to national events seen as of secondary importance.

Institutional capacity for European Structural Investment funding

The European Union has a key role in funding policies for science and innovation in Romania. Romania has been allocated EUR 30.84 billion of ESI funds over the period 2014-20. The national government must supply EUR 5.63 billion, for a total investment of EUR 36.47 billion. These large and important funds are to be invested in 11 priority fields, including a mandatory minimum allocation on research development and innovation.

Funding for this field is available within Priority A1 of the (national) Competitiveness Operation Programme. This funding is managed by the ministry for research and innovation. Funding for research and development is also available within Thematic Objective 1 of the Regional Development Operational Programme. The Regional Development Operational Programme is a single programme, the content of which applies similarly in all regions of Romania; it is only the amount available to each region that varies depending upon economic performance. This fund is managed by the Ministry of Regional Development and Public Administration. Many EU member states with large allocations

of ESI funding find it difficult for a number of reasons to meet spending targets even when faced with financial penalties for slow rates of spend.

The scale of ESI funding currently available to universities to invest in knowledge exchange is a very significant but time-limited opportunity. Universities who seek to use this funding need a very specific institutional capacity to manage the financial and technical risks associated with these funds, even when levels and rates of grants are high, as in Romania. The task requires detailed knowledge of EU regulations which govern these funds. Management of ESI funds requires a rigorous approach to project design, procurement, delivery and the management of finances, especially when projects or activities are designed to benefit private firms.⁴

The a-spatial and centralised design of a single Operational Programme for Regional Development for all the regions of Romania, rather than individual Operational Programmes for all regions as in some other member states, at the decision of the central government and/or the European Commission, suggests a perceived or real lack of institutional capacity at both the national (managerial) level and the subnational (delivery) level. The new programme period from 2021 onwards provides a renewed opportunity to support knowledge exchange in ways, which respect the specific circumstances of each region.

Institutional capacities and attitudes to manage ESI funding at the local level are very mixed. The West University of Timișoara has a strong team of knowledgeable senior officers who understand fully the underlying regulations and who can, therefore, manage and mitigate the risk that is inevitably involved in the use of these monies. At the other end of the spectrum, there are universities who have made a conscious decision not to seek ESI funds because of the perceived complexities and risks. Similar negative approaches have been adopted by some universities in the other EU member states, especially within universities capable of accessing other forms of investment or loan finance, but the scale of the opportunity of ESI funds in Romania cannot be allowed to go to waste.

The opportunity of boundary spanners

Some academics suggested that they would very much like to work more closely with local firms but these aspirations are thwarted by the number of hours each week they are expected to teach. Little time, it is claimed, remains to take forward the research to which they are also required to contribute and to further their personal career. Elsewhere, academics report that they have taken up second jobs to supplement their low wages at university. These second jobs sometimes involve the delivery of project-based activities elsewhere in the university, often funded by the ESI or other EU funds. Other second jobs are based within local firms or local municipal bodies. Such working arrangements appear largely unmanaged but could be developed further systematically as a positive opportunity.

In some cases, HEIs in Romania offer good examples: a senior manager at Transilvania University of Brasov, also employed at a senior level within Consiliul Local Al Municipiului Brasov (City Hall), spoke of good efforts in identifying the research needs of the City Hall to influence the research activities and to promote joint working with the university. Importantly, local research needs identified as part of this process focused on *grand societal challenges* that are of importance to the real lives of local people, rather than the narrow focus on technology and engineering firms elsewhere.

This classic case of *boundary spanning* at work can provide a good template for others elsewhere. Central ministries can consider how best to widen and develop such

arrangements, and how to develop human resource strategies within universities to ensure that boundary spanners do not see their wider career prospects harmed; indeed, such forms of working could be considered as a positive alternative route to promotion.

Spatially blind policies give control and are easier to deliver

Nevertheless, many national policies for research, development and innovation across the OECD and EU member states are spatially blind. A number of explanations can be identified. Systems of higher education, including the design and management of funding programmes for research, are often a function of the central government. Such central control gives ministers and senior civil servants the policy levers they need to effect change across the country in a standardised and systematic way. It also overcomes the need to make difficult decisions about the spatial distribution of resources. In particular, centrally managed programmes of research funding that are based on competitions, where funds are allocated on the basis of “excellence” explicitly and deliberately avoid those difficult decisions of spatial targeting.

Place does matter for knowledge exchange

Concepts of economic geography (Box 5.2) increasingly recognise that place is an important and essential consideration when understanding the dynamics of economies, firms and of private and public institutions. Local firms and institutions are by definition located somewhere and the wider environment within which they are based inevitably impacts upon their own performance and the ways in which institutions communicate and interface with each other. Institutions which are located in larger and richer places can benefit from stronger demand for their services, and from the availability of skilled labour. Other institutions in smaller and poorer places are relatively more important to the future success and sustainability of the local economy, so they have a different type of role to play.

Further, economic activity is not standardised across the country. Local economies feature different economic specialism because of history and local hard and soft assets. A strategy which focuses on one section of the economy will have an impact in one place but not in the other. Similarly, different universities do different things and they relate in different ways to their local economy. Knowledge exchange in one place can therefore look and feel very different in other places. It is the universities and the firms with whom they work who have a stronger understanding of what works and what does not work in their local place and it is they who best understand why centralised policies that do not consider the issue of place do not work.

Box 5.2. An introduction to the new economic geography

The school of New Economic Geography seeks to explain an apparent contradiction in the behaviour of firms. Traditional free market economics would suggest that all other things being equal, firms faced with rising costs of production will move production to other places where overall costs are lower. This seeks to explain why major international manufacturing firms have moved production overseas, including into the Western regions of Romania. In the long run, this would lead to a levelling out of production and its associated costs. The march of globalisation of trade, technology and trading standards, the establishment of the Internet and the abundance of relatively cheap global transport of freight, led economists to believe that distance was no longer an obstacle to production and trade. Goods could be made in abundance in the developing world and shipped quickly and cheaply for sale at low cost in Western economies. In this context, the world was said to be “flat” and distance did not matter.

The world is spiky, not flat

But economists began to observe that production was beginning to agglomerate in the large urban centres. Rather than production levelling out, cities are becoming bigger, more productive and prosperous even when costs of production and the diseconomies of being located in those urban centres continued to rise. Meanwhile, productivity in other small places has fallen and the size of secondary towns has decreased. Disparities of production, productivity (and therefore wealth) have therefore not narrowed but have widened across nations and regions.

Universities and agglomeration

New Economic Geography seeks to explain these apparently contradictory phenomena by focusing on the interaction between the firm and the place in the knowledge economy, and critically, how knowledge flows within urban centres. Firms are prepared to pay the additional costs of production of being based in urban centres because it gives them more immediate access to thick, dense and complex markets for goods, services, customers, labour and, critically, ready access to highly skilled people and new ideas. The concept notes that new ideas travel more efficiently between people when they meet face to face, when they identify and bring forward new solutions working together rather than seeking to innovate across huge distances using the Internet. Knowledge exchange is therefore seen very much as a human process rather than a technical transfer across distance. Most universities tend to be based in large urban centres and their role in these complex patterns of knowledge exchange is increasingly critical, not just in their ability to supply highly skilled labour and to research new solutions, but as a provider of an environment, and as a provider of cultural activities that attracts younger and more diverse people to the city centres.

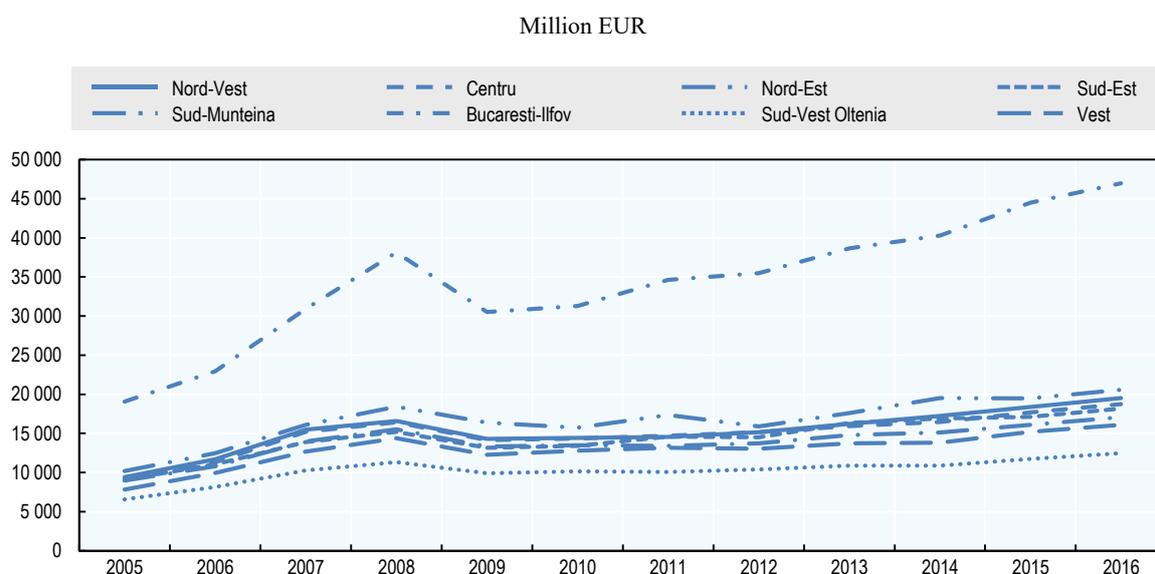
Source: World Bank (2009), *World Development Report 2009: Reshaping Economic Geography*; OECD (2012), *Promoting Growth in All Regions*, OECD Publishing, Paris, <https://doi.org/10.1787/9789264174634-en>.

In Romania, there is a university presence in every one of the 38 counties of the country with the exception of Giurgiu, Tulcea, Botosani and Vaslui, the last 2 being located in the less developed North East region. But the dominance of Bucharest-Ilfov is represented within this supposedly evenly distributed system of higher education. More than a quarter (26.7%) of all state students and over half (56.5%) of all students at private universities study in the capital city-region. This large university capacity and student body are an important force supporting the further agglomeration of the capital-city-region. It is also widening the disparities with other regions.

Agglomeration in Romania and its universities

It is not surprising, therefore, to note that the capital city-region outperforms all other regions significantly in gross expenditure on R&D as a percentage of GDP (Figures 5.4 and 5.5). This analysis is important as it shows that a one-size-fits-all approach of a national a-spatial policy for R&D does not represent the economic geography and the higher education system of the country.

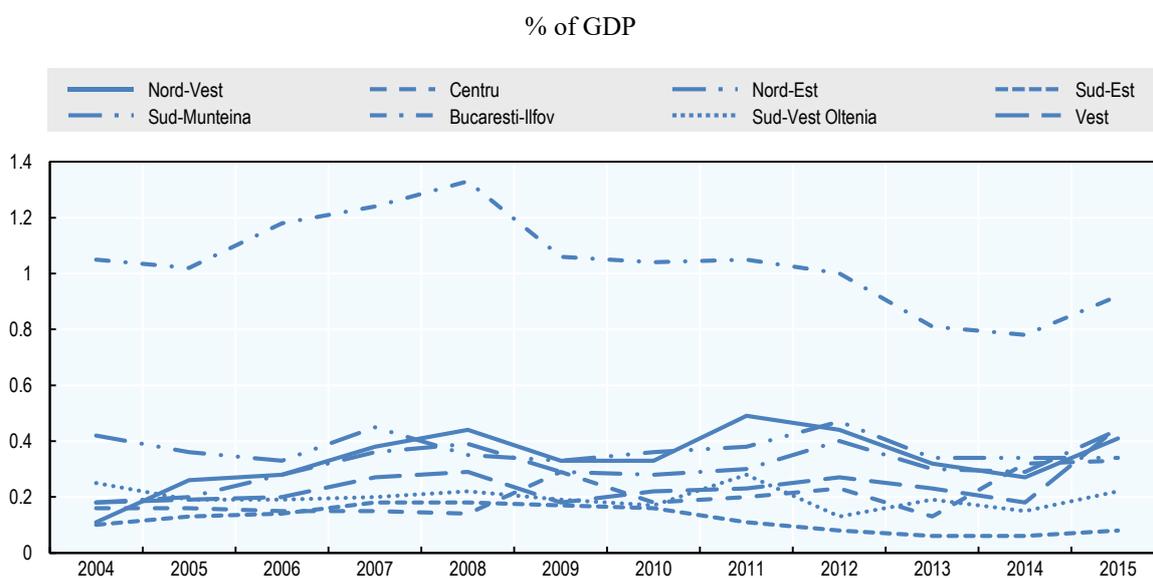
Figure 5.4. GDP in Romanian regions



Source: Eurostat, regional data <https://ec.europa.eu/eurostat/cache/RCI/#?vis=nuts2.economy&lang=en>

Universities as anchor institutions

A basic understanding of the role of universities as anchor institutions identifies the extent to which the relative scale of their activity drives increasing demand for goods and services in the local economy. Universities employ many, sometimes thousands, of both high- and low-skilled local workers. Students and academics spend their cash in local shops. They are major sources of income for local markets in arts, culture and sports. Capital investment drives the local construction and maintenance industries. Universities are fixed in their location and, unlike many other industries, their capital is largely immobile. Universities in recent years have been stable institutions helping local places to manage economic shocks and downturns, and be more resilient through economic cycles. They are therefore viewed by local partners as crucial anchor institutions (Box 5.3).

Figure 5.5. Gross domestic expenditure on R & D (GERD), by region (NUTS 2)

Source: Eurostat, regional data <https://ec.europa.eu/eurostat/cache/RCI/#?vis=nuts2.economy&lang=en>

Box 5.3. Examples of Romanian universities that act as anchor institutions in their regions

The Stefan cel Mare University of Suceava

The Stefan cel Mare University of Suceava (USV) is located in Bucovina, which is part of the Nord Est region, one of the most deprived regions in Romania as well as in the European Union. USV, established in 1963, combines education (bachelor's, master's, doctoral and postdoctoral programmes) and research (in the fields of economics, technical sciences, engineering and IT, natural sciences, humanities and health). Despite being in one of the most economically deprived regions in Europe, USV is the top-ranking Romanian university in terms of number of patents and inventions, which, jointly with educational activities, profile the USV as a leading actor in the regional ecosystem and cross-border collaboration with the Republic of Moldova, Romania and Ukraine. At the same time, other actors are supportive of the USV's initiatives. The business sector is showing its willingness to partner with the university in the efforts to revitalise the region, as well as local government (e.g. by providing an in-kind scheme of support – free transportation for students, providing a building for students' dormitories, as they cannot directly finance university's activities).

Due to its reputation in research in the fields of technical sciences, engineering and IT, and educational programmes, USV plays a role in attracting foreign companies because it is willing to share knowledge, assist in networking with local institutions, businesses and people: a good example of this lies in Capgemini opening a third location in Suceava, Romania.

In light of the rural vs. urban divide in Romania, the case of USV is important as more than half of students come from rural areas (52%), a significantly higher share than the Romanian average in higher education institutions (31%).

The New Keele Deal

Keele University is a campus university based in England, just outside Newcastle-under-Lyme and the wider urban conurbation of Stoke-on-Trent. Stoke and Staffordshire are statistically one of the less developed places across the United Kingdom. The New Keele Deal is a plan for GBP 70 million of investment by Keele University, Staffordshire County Council, Stoke-on-Trent City Council, Newcastle-under-Lyme Borough Council, University Hospitals of North Midlands NHS Trust and the Stoke-on-Trent and Staffordshire Local Enterprise Partnership to exploit the potential of Keele University's world-leading research and facilities.

The university itself has already secured over GBP 30 million in ESI funding from the current 2014-20 Operational Programme. Through the New Keele Deal, this investment will help to tackle low productivity and grow a positive culture of innovation and research within the region, delivering a significant number of higher value jobs for the next 20 years, improve local health and healthcare, and inject innovation into the heart of the local business community to allow them to be more globally competitive. This will all be achieved whilst saving around 4 000 tonnes of CO₂ per year – putting the region at the heart of the UK's transition to a lower carbon economy.

Source: Keele University (2017), *The New Keele Deal: A Unique Partnership and Plan for Sustainable, Long Term Economic Growth*, <https://www.keele.ac.uk/business/newkeeledeal/New-Keele-Deal-Summary-Document-September-2017.pdf>.

Over time, there has been an increasing understanding of the interdependencies between a university and its local place/economy. Graduates from more embedded universities provide a highly skilled workforce in response to the demands of employers. Student housing and accommodation for academics also impacts directly on local property and housing markets. Academics in these institutions work with local firms to undertake research, drive innovation, develop new technologies and contribute towards higher productivity. Indeed, local firms articulate and drive demand for new programmes of research, and that research leads to new teaching and vice versa.

A more sophisticated framework, therefore, recognises the role of the university as a collaborative actor in the local state, with soft and fuzzy boundaries between it as an institution and the wider environment, other local institutions, the business community and wider civic society.

Romanian universities as anchors

A striking feature of qualitative contributions to this HEInnovate review was the extent to which interviewees defined the purpose and the geographical focus of their own local university as being their own local and regional economy. Universities are more focused on developing their own approaches to knowledge exchange that best fit their local circumstances. In some places, this is focused on administrative boundaries. In others, it is focused on historical and traditional boundaries, even if some of these have fuzzy boundaries, e.g. Bucovina and Transylvania. Interviewees generally did not offer their own local priority as a contribution to national priorities. Central ministries need to consider how to build awareness and understanding of national strategies and how to build more

positive perceptions of both themselves and their policy instruments. European documents and strategies may provide useful reference frameworks (Box 5.4).

Box 5.4. EU Guide to Connecting Universities to Regional Growth

The European Commission published in 2011 a guide to Connecting Universities to Regional Growth. To maximise the effectiveness of universities in contributing to regional growth, the guide provides an analysis of their possible roles and presents a range of delivery mechanisms. It explores how to overcome barriers, build capacity and implement partnerships and leadership processes to interconnect the partners in regional innovation systems.

These issues are illustrated by practical examples and case studies taken from a range of sources and policy documents. It is not an academic publication but a practical tool with recommendations, part of a series of guides prepared in the framework of the Smart Specialisation Platform set up by the EC for providing methodological assistance and practical guidance to national and regional policymakers involved in designing and delivering innovative strategies for smart specialisation. It is intended to facilitate discussions between the stakeholders.

Source: European Union (2011).

The city of Cluj-Napoca provides a good case study of universities as anchor institutions. The city hosts 6 state universities with a total of over 75 000 students living within a wider population of over 300 000. These student numbers are increased by the size of the academic, professional and administrative staff at each of the universities. The city boasts two state theatres, two opera houses, botanical gardens, a philharmonic house, a range of museums and art galleries. It has a range of cultural organisations including a Confucius Institute. There is an extensive programme of cultural and music events held throughout the year. Such attractions are critical for building an environment conducive to wider forms of knowledge exchange with the local community and also for attracting skilled workers and inward investors, particularly to the engineering and ICT sectors. It is inconceivable that such a wide range of attractions could be supported at this scale without the active engagement of students and university staff, in providing support for content, organisation and customers for these events. At the European level, possibilities for peer learning and policy dialogue exist and Romanian universities can take further advantage of that (Box 5.5).

Box 5.5. University-city co operation – EUniverCities

EUniverCities is a European network, officially launched in 2012, in which medium-sized cities and their universities work together (in so-called tandems) to improve co operation. The network brings together cities and universities with an economic, social and technological profile. It embodies the recognition of the importance of technology, innovation and knowledge for society. Furthermore, the network enhances the visibility of knowledge cities within Europe. The network's aim is to exchange and spread knowledge, expertise and experience with regard to city-university co operation across urban Europe. Participating cities include Aalborg, Aveiro, Exeter, Ghent, Lausanne, Linköping, Lublin, Magdeburg, Malaga, Norrköping, Parma, Tampere and Trondheim.

Source: EUniverCities (n.d.), EUniverCities Network, <http://eunivercitiesnetwork.com>.

Smart Specialisation and Romanian HEIs

There is no official or single definition of Smart Specialisation. The concept emerged from 2009 onwards from the Knowledge for Growth Expert Group established by the European Commission (Foray, David and Hall, 2009; McCann and Ortega-Argilés, 2015). Smart Specialisation requires strategies to invest in innovation to reflect properly important path-dependencies and existing hard and soft assets of local and regional economies (“embeddedness”), together with a stronger awareness and understanding of trends in global trade, including connections of different value chains (“connectedness”).

Far from being a more traditional approach to the prioritisation of specific sectors or clusters, the concept should also include the application of key enabling technologies which can build resilient links across these classifications (“related diversity”) and, in particular, the use of an entrepreneurial process of discovery driven by the collaborative leadership of the innovation ecosystem within each functional economic geography, including, as an essential element, the research and intelligence available within local and regional universities. DG REGIO at the European Commission commissioned the Smart Specialisation Platform⁵ at the Joint Research Centre in Seville to publish a single, detailed and more accessible guide to six stages inherent within that process (known as the RIS3 Guide) (, 2012). It is suggested an updated guide may be in production by DG REGIO.

Smart Specialisation and lagging regions

The concept of Smart Specialisation as applied generally across the EU is not without its critics, especially when applied in lagging regions. Marques and Morgan (2018) provide a challenging critique, based in good part on the case of Romania: they state the concept has been founded on a number of “heroic assumptions” which often do not materialise in practice. They then argue that the state, at both the national and local levels, and the quality of wider governance may not be “smart enough” to meet the tough challenges of a more sophisticated approach to Smart Specialisation.

The way in which the regulation framework that governs ESI funds has embedded Smart Specialisation is not optimal. Critically, although the concept is very much focused on identifying the specific opportunities of previously identified administrative territories (places), it does not require strategies to have a specific spatial element.

This regulatory weakness may negatively affect the co-ordination of policy and funding programmes across all member states. The impact on Romania is compounded by the scale of the ESIF allocated and also by the way in which different central ministries have adopted vertical management responsibility for different operational programmes.

Smart Specialisation in Romania

Healy (2016) reports on an “impressive” process of consultation that led to the development of a national Smart Specialisation Strategy for Romania focused on the priority fields of;

- Bio economy
- information and communications technology (ICT), space and security
- energy, environment and climate change
- eco-nanotechnology and advanced materials
- health.

As with other nationally driven Smart Specialisation strategies elsewhere in the EU, this national strategy for Romania has, like the NSRDI, no spatial focus. It was unsurprising, therefore, given the high brand recognition given to the concept, when all the regions of Romania began work on their own regional strategies. This initiative was led by the North East Regional Development Agency, an institution that had previously shown institutional capacity, having previously benefitted from experience working within European regional networks. The four priority domains in the North East region are:

- agro-food
- biotechnologies
- ICT
- clothing and textile.

Building synergies between regional and national approaches to Smart Specialisation

Senior leaders within universities contributing to this review demonstrated both wide awareness and support for the broad concept or brand of Smart Specialisation. The approach adopted is often more in line with more traditional approaches to clusters or sectors. It often dispenses with some of the more academic approaches associated with a purist interpretation. And, as in many other places, local partnerships find it difficult to make difficult decisions, including within the list of genuine priorities backed by hard evidence, others which appear to be the result of lobbying by local elites. For example, the Technical University of Cluj-Napoca sits on the Board of 13 local cluster organisations.

However, the practical experience of Smart Specialisation at the local level in Romania does demonstrate that universities are aware that they need to engage with external stakeholders, both firms and other local institutions, on an ongoing basis to determine collectively a limited number of priority areas as their institutional focus for knowledge exchange. It is seen as a more focused approach than simply responding reactively and in an uncoordinated fashion to a disparate range of incoming external demands. Healy (2016) identifies signs of an emerging role being played by research actors, particularly universities, in the ongoing process at the local level of Smart Specialisation.

The current conditionality in the regulations which govern the ESI funds may well be updated in the next Multi-Annual Financial Framework to reflect upon the lesson learnt in the current programme period. But the need for partnership-based approaches at the local and regional levels to use the evidence base to identify priority areas for research, development and innovation is very likely to continue. This will require a continued contribution from universities both in terms of providing that evidence but also in the delivery of support to those firms in the chosen fields. The European Commission has over past decades gradually encouraged a growing percentage of ESI funds to be used for those purposes and that trend is also likely to continue. The brand of Smart Specialisation provides an ongoing opportunity for universities to engage in these processes.

Conclusions and policy recommendations

This assessment of the performance of the Romanian system of higher education in delivering knowledge exchange using the HEInnovate model demonstrates that, overall, volumes and values remain low. Performance is limited by cultural and institutional issues within both the system and individual universities. Some demand for traditional forms of technology transfer is evident in places but low overall, with a focus currently only on incoming inward investors of large scale, often categorised as being in the sectors of engineering, manufacturing and ICT. The difficult economic geography of Romania, with widening disparities of performance at the regional level and differential but critical levels of depopulation, coupled with the growing dominance of an agglomerating capital-city region, all remain structural issues of fundamental importance.

But other changes can be considered. Universities are nominally independent but very heavily regulated by a bureaucratic central system of control. Devolving new incentives, motivations and rewards to the local level, helping to build institutional capacities and partnerships, can only support real desires at that level to build upon current performance in knowledge exchange.

A number of different central ministries can work much more closely together and in closer partnership with representatives and collectives of local stakeholders engaged in knowledge exchange, especially universities, research institutes, regional development agencies and business representative organisations.

Such new partnerships can:

- Better understand why and how innovation ecosystems are changing both at the national and local levels as a result of globalisation, agglomeration and other drivers, especially demographic pressures and migration, and how these changes are impacting upon the market for higher education generally and, specifically in knowledge exchange.
- Better understand how wider government policies impact both directly and indirectly the performance of both universities and their local places in knowledge exchange, and how these policies can be better co-ordinated with other “place”-based policies and programmes of other government departments and agencies, especially where these are decentralised.
- Promote new concepts and building wider demand for knowledge exchange, maintaining but widening its application beyond traditional forms of “technology push” towards larger firms and more participative programmes, which also address

wider societal needs in partnership with other stakeholders, and especially the growing number of SMEs and firms in the service sector.

- Consider how the current objective of modernising university administration can be used to build on a planned basis through time levels of “own resources” within universities, which can act as incentives and rewards for performance in knowledge exchange, and how the system of appointing rectors and in promoting staff elsewhere in the university can be modernised to motivate and reward behaviour, and to build longer-term strategic relationships between university leadership teams and all relevant local external stakeholders, private and public.
- Develop a systematic and collaborative approach to the collation and open publication of performance in knowledge exchange at the subnational and institutional levels, including quantitative indicators of values and volumes of both contracted and collaborative research, but also qualitative narratives from local stakeholders about local socio-economic conditions and levels of demand from external stakeholders for different and widening forms of knowledge exchange.
- Develop and lead national or regional, real and/or virtual networks of best practice in “boundary spanning”, technology transfer offices, procurement and state aids (especially GBER) to build confidence in working with other sectors. The technical assistance element of the ESIF programmes can be used to largely fund such networks where it helps the administration of those funds.
- In line with the wider circular principles of the ongoing process of Smart Specialisation, review the continuing relevance and coherence of the different strategies at different levels of geography, with a view to preparing a refreshed and fully funded action plan approach in anticipation of the next Multi-Annual Financial Framework.

Notes

¹ <https://crmse.utcluj.ro/>.

² <http://ec.europa.eu/eurostat/tgm/table.do?tab=table&init=1&plugin=1&language=en&pcode=tsc00031>.

³ A business representative in another region, though, strongly challenged this focus on the manufacturing and IT sectors, suggesting instead that future growth will be dependent on the small but growing service sector where more small firms are being established.

⁴ Or organisations which act as if they were a private firm.

⁵ <http://s3platform.jrc.ec.europa.eu/home>.

References

Chioncel, M. and J.-C. del Rio (2018), RIO Country Report 2017: Romania, EUR 29169 EN, Publications Office of the European Union, Luxembourg, <https://doi.org/10.2760/4105>.

EC (2011), *Connecting Universities to Regional Growth: A Practical Guide*, European Union https://ec.europa.eu/regional_policy/sources/docgener/presenta/universities2011/universities2011_en.pdf

- EC (2012), *Guide to Research and Innovation Strategy for Smart Specialisation*, Joint Research Centre-IPTS, Seville.
- EUniverCities (n.d.), *EUniverCities Network*, <http://eunivercitiesnetwork.com>.
- Goddard J. et al. (eds) (2017), *The Civic University: The Policy and Leadership Challenges*, Elgar, London.
- Foray, D., P.A. David and B. Hall (2009), “Smart specialisation: The concept”, in *Knowledge for Growth: Prospects for Science, Technology and Innovation*, EUR 24047.
- Healy, A. (2016), “Smart specialization in a centralized state: Strengthening the regional contribution in North East Romania”, *European Planning Studies*, Vol. 24(8), pp. 1527-1543, <https://doi.org/10.1080/09654313.2016.1184233>.
- Keele University (2017), *The New Keele Deal: A Unique Partnership and Plan for Sustainable, Long Term Economic Growth*, <https://www.keele.ac.uk/business/newkeeledeal/New-Keele-Deal-Summary-Document-September-2017.pdf>.
- MacMillan, T. et al. (2016), *University Knowledge Exchange (KE) Framework: Good Practice in Technology Transfer*, http://www.hefce.ac.uk/media/HEFCE.2014/Content/Pubs/Independentresearch/2016/University.KE.framework.Good.practice.in.technology.transfer/2016_ketech.pdf.
- McCann P. and R. Ortega-Argilés (2015), “Smart specialization, regional growth and applications to European Union Cohesion Policy”, *Regional Studies*, Vol. 49(8), pp. 1291-1302, <https://doi.org/10.1080/00343404.2013.799769>.
- Marques, P. and K. Morgan (2018), “The heroic assumptions of smart specialisation: A sympathetic critique of regional innovation policy”, in A. Isaksen et al. (eds), *New Avenues for Regional Innovation Systems-Theoretical Advances, Empirical Approaches and Policy Lessons*, https://doi.org/10.1007/978-3-319-71661-9_1.
- OECD (2017), *The Knowledge Triangle – Enhancing the Contributions of Higher Education and Research to Innovation*, OECD Publishing, Paris.
- OECD (2012), *Promoting Growth in All Regions*, OECD Publishing, Paris, <https://doi.org/10.1787/9789264174634-en>.
- OECD (2011), *Regions and Innovation Policy*, OECD Reviews of Regional Innovation, OECD Publishing, Paris, <https://doi.org/10.1787/9789264097803-en>.
- World Bank (2009), *World Development Report 2009: Reshaping Economic Geography*, World Bank, <https://openknowledge.worldbank.org/handle/10986/5991>.



More information:
<https://heinnovate.eu/en>