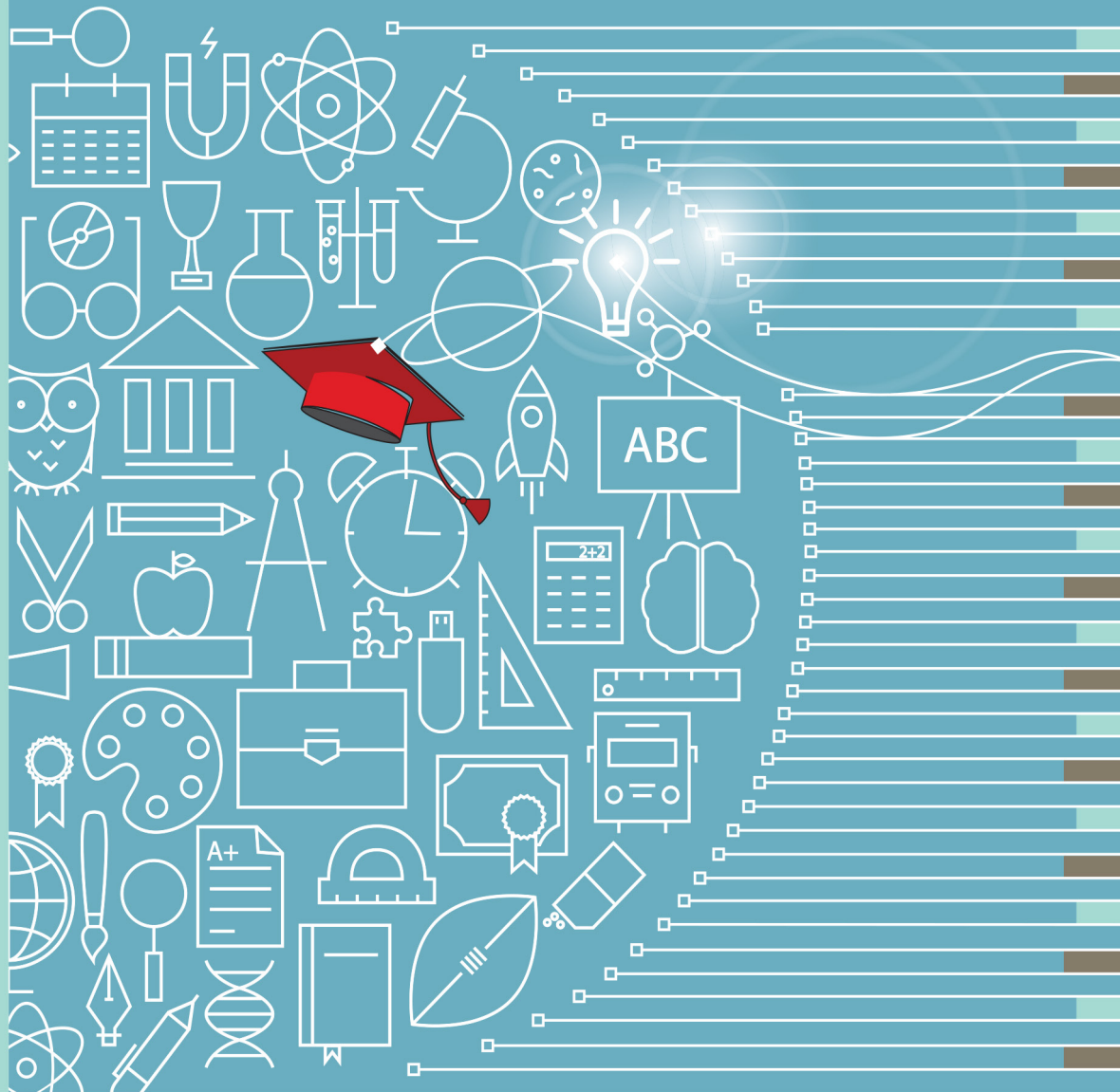




Supporting Entrepreneurship and Innovation in Higher Education in Greece



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Preface

Europe is undergoing a process of deep transformation. Changes in climate, technology and demography as well as the COVID-19 pandemic are transforming our societies and way of life. The EU Member States, as elsewhere, need a strong higher education sector, as an engine of innovation and entrepreneurship and driver of skills and knowledge. As the conditions in which our societies operate are changing, there is broad consensus that higher education institutions have to adapt and contribute to shaping societal transformation.

The potential of Higher Education Institutions (HEIs) has been further confirmed by the COVID-19 pandemic. Across Europe and internationally, HEIs transitioned to new forms of teaching and learning, connected their research to the needs of their communities, and they are now playing a crucial role in recovery plans.

Whilst there is no one-size-fits-all approach to innovation or entrepreneurship, HEIs, businesses and policy makers, working hand-in-hand, is a proven and effective way to succeed and thus respond to societal challenges and people's expectations. Several successful examples of innovation and entrepreneurship are built on collaborations between businesses, the public sector, HEIs and civil society, even though each HEI will have its own path of innovation and entrepreneurship, based upon its own strengths and assets.

HEInnovate, an initiative developed by the EC in collaboration with the OECD, supports HEIs in their journeys through its self-assessment tool, a series of country reviews, and a policy-learning network. It provides a framework for HEIs and policy makers to determine their next steps, and examples of best practice to build on. HEInnovate enables exchanges between HEIs and their stakeholders on how to promote entrepreneurship and innovation with a view to creating societal impacts and sustaining economic growth at local and national levels.

This HEInnovate country review of Greece identifies numerous innovative and entrepreneurial practices in HEIs throughout the country, and adds to the collection of good practices in country reviews. The Greek national higher education (HE) system has promoted the role of HEIs and Research Centres (RCs) within their communities to support sustainability and economic growth. Recent efforts have concentrated on developing research collaborations and partnerships, promoting student exchange, and joint programmes with universities abroad. In turn, these efforts have also attracted internationalisation "at home": for instance, Greek HEIs and RCs have organised events and conferences inviting international researchers to collaborate in their research projects. . In addition, HEIs have increasingly been creating partnerships with actors in their communities, taking the opportunities for new ways of collaborating and exchanging information on the national and international stages.

Going forward, Greece should further mainstream entrepreneurship education within the HE system, allowing formal recognition of academic entrepreneurship and a more expansive definition of the concept. Similarly, Greek HEIs should further develop links with regional smart specialisation strategies to enable economic growth and development and to support the ambition of transforming Greek regions from "moderate" to "strong" innovators. This can also result in further opportunities for collaboration between regional actors. Furthermore, Greece should advance its digital transition, particularly following the COVID-

19 pandemic, by centralising IT services within one department of the HEI and providing further training to develop digital skills. This will help build resilience of HEIs to future shocks. Finally, to capitalise on existing good practices of internationalisation of HEIs, Greece should promote further collaboration with foreign HEIs, by providing financial and human resources to national actors.

The HEInnovate country review of Greece offers insights to policy makers and HEIs on the current developments on innovation and entrepreneurship in both Greece and Europe. The OECD and the European Commission are grateful to the Greek Hellenic Government, notably the Ministry of Education and Religious Affairs for their cooperation and the effective and lasting partnership created through this review.



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A team of international experts also contributed to the drafting of this report. These included: Christos Kolympiris and Angeliki Karavasili; Margherita Russo and Emanuele Murgolo; and Pedro Teixeira and Maria Manatos. Alexander Iosad provided assistance.

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Table of contents

Preface	3
Acknowledgements	5
Abbreviations and acronyms	9
Executive summary	11
1 The Hellenic Higher Education System	15
Introduction	16
State of play in the Hellenic HE system	18
Public research in the Greek higher education system	26
Results of the Higher Education Leaders Survey	28
References	32
Notes	33
2 Entrepreneurship Teaching and Learning	35
Introduction	36
Entrepreneurial education in Greek HEIs	38
Results of the Entrepreneurial Student Survey	43
Recommendations	49
References	50
Notes	52
3 Digital Transformation and Capabilities	53
Introduction	54
Digital infrastructure	56
Digital Teaching and Learning	59
Digital and internationalisation	61
Recommendations	62
References	63
Notes	65
4 Knowledge Exchange and Collaboration	67
Introduction	68
Co-production and dissemination of knowledge	70
KEC in Greece's innovation and regional framework	70
Knowledge exchange in the Higher Education sector	72

Knowledge exchange can be enhanced by addressing HE structural challenges	77
Recommendations	81
References	83
Notes	85
5 The Internationalised Institution	87
Introduction	88
Internationalisation is gaining importance in the higher education agenda	89
Internationalisation: effective approaches for a global expansion	90
Internationalisation has become a priority in Greece's higher education system	94
Internationalisation in Greece is driven by academic and economic rationales	97
Recommendations	102
References	104
Notes	107

FIGURES

Figure 1.1. Deconcentration of population can also affect the HE system	18
Figure 1.2. The Hellenic Higher Education System: a diverse ecosystem of HEIs and RIs	20
Figure 1.3. HEI governance and administration in Greece	23
Figure 1.4. The elements included in the HEI strategy	29
Figure 1.5. Types of entrepreneurial support measures offered in Greek HEIs	30
Figure 1.6. KEC activities offered by HEIs in Greece	31
Figure 2.1. Greece's entrepreneurial framework continues to experience significant weaknesses	37
Figure 2.2. Research on entrepreneurship is increasing in Greece, 1997-2020	39
Figure 2.3. About half of students surveyed had participated in their HEIs' entrepreneurial activities	43
Figure 2.4. Students' view of entrepreneurs is positive	44
Figure 2.5. Students learn more about entrepreneurship through lectures and class discussions	44
Figure 2.6. Students' self-assessment after participating in HEI entrepreneurial activities	45
Figure 3.1. Greece continues to work to reach its European peers in digital transformation	55
Figure 3.2. Greece fares well in infrastructure technology compared with other OECD countries	57
Figure 3.3. Greece ranks among the lowest of EU countries in skills training	60
Figure 3.4. Digital skills in Greece are improving among the employed	61
Figure 4.1. Greek regions' performance on the regional innovation index score	71
Figure 4.2. Greece's regions display a wide variety of RIS3 priorities	75
Figure 5.1. The number of incoming students in Greece remains low	95

TABLES

Table 1.1. HEIs that modified their academic structure in 2018 and 2019	20
Table 4.1. Key definitions for Knowledge Exchange and Collaboration	68
Table 4.2. Regional funding to reduce the innovation gap between regions	72

BOXES

Box 1. Recommendations emerging from the review	13
Box 1.1. HEInnovate Review of Greece	16
Box 1.2. A changing policy context for higher education institutions	25
Box 2.1. Entrepreneurial Teaching and Learning in the HEInnovate Framework	36
Box 2.2. The German EXIST programme to promote HEI-based entrepreneurship	41
Box 2.3. Language used to incorporate entrepreneurial activities in tenure and promotion documents at selected universities	47
Box 2.4. e-Leadership programmes in Algebra University College (AUC) in Croatia	48

Box 3.1. “Digital Transformation and Capability” dimension in the HEInnovate Framework	54
Box 3.2. Joint Information Systems Committee (Jisc)	58
Box 3.3. eCampus Ontario	59
Box 4.1. The Knowledge Exchange and Collaboration dimension in the HEInnovate Framework	69
Box 4.2. Research and Innovation Strategies for Smart Specialisation (RIS3) in Greece	75
Box 4.3. The RIS3 approach of Emilia-Romagna for 2021-2027	76
Box 4.4. Leveraging university collaboration to promote lifelong learning	78
Box 4.5. Smart Specialisation Strategy, Värmland, Sweden	80
Box 5.1. The Internationalised Institution	88
Box 5.2. Four rationales for internationalisation in higher education	89
Box 5.3. National commitment to international higher education	91
Box 5.4. The complexity of internationalisation: An analytical framework	93
Box 5.5. FH Upper Austria, University of Applied Sciences in Austria	99

Abbreviations and acronyms

ACE	Amsterdam Centre for Entrepreneurship
AE	Academic entrepreneurship
AI	Artificial Intelligence
ANVUR	National Agency for the Evaluation of University and Research
AUC	Algebra University College
AUEB	Athens University of Economics and Business
AUTH	Aristotle University of Thessaloniki
CDI	Centre for Digital Innovation
CERN	European Agency for Nuclear Research
CERTH	Centre for Research and Technology-Hellas
CF	Cohesion Funds
CIVIS	European Civic University Alliance
DTB	Digital Transformation Bible
DUTH	Democritus University of Thrace
EAIE	European Association for International Education
EC	European Commission
ECA	European Consortium for Accreditation
ECTS	European Credit Transfer and Accumulation System
ECTS	European Credit Transfer Scale
EE	Entrepreneurial Education survey
EEA	European Education Area
EFSI	European Fund for Strategic Investment
EIB	European Investment Bank
EIF	European Investment Fund
ENQA	Quality Assurance in Higher Education
EPICUR	European Partnership for an Innovative Campus Unifying Regions
EQF	European Qualifications Framework
ERDF	European Regional Development Funds
ERUA	European Reform University Alliance
ESA	European Space Agency
ESA	European System of Accounts
EU	European Union
EUSAIR	EU Strategy for the Adriatic-Ionian Region
EXIST	University-based Business Start-ups
FORTH	Foundation for Research and Technology- – Hellas
GDP	Gross Domestic Product
GEM	Global Entrepreneurship Monitor
GRNET S.A.	Greek Research and Technology Network
GSRI	General Secretariat of Research and Innovation
Gunet	Greek Universities Network
HAHE	Hellenic Agency for Higher Education
HDBI	Hellenic Development Bank of Investments
HE	Higher Education
HEIs	Higher Education Institutions
HFRI	Hellenic Foundation for Research and Innovation

HPC	High-performance computing
HQF	Hellenic Qualification Framework
ICT	Information and Communications Technology
IDEA	Inter-Departmental Entrepreneurial Assignment of the Athens University of Economics and Business
IKY	State Scholarships Foundation
InnovInAgri	Innovation, Entrepreneurship and Technology Transfer Office of the Agricultural University of Athens
IOBE	Foundation for Economic and Industrial Research
IPR	Intellectual property rights
ISCED	International Standard Classification of Education
IT	Information technology
JEREMIE	Joint European Resources for Micro to Medium Enterprises
KEC	Knowledge Exchange and Collaboration
KPI	Key performance indicators
LVE	Living Values Education
NARIC-DOATAP	Hellenic National Academic Recognition and Information Centre
NCSRD	National Centre for Scientific Research "Demokritos"
NDC	National Documentation Centre
NEET	People who are not in employment, education or training
NGOs	Nongovernmental organisations
NOC	Network Operations Centres
NQF	Hellenic Qualifications Framework
NSRF	National Strategic Reference Framework
NTUA	National Technical University of Athens
PhD	Doctor of Philosophy
Polimi	Politecnico di Milano
PRI	Public research institute
QAA	Quality Assurance Agency for Higher Education
R&D	Research and Development
R&I	Research and innovation
RC	Research Centre
RIS3	Research and Innovation Strategies for Smart Specialisation
RTDI	Research, Technological Development and Innovation
SEV	Hellenic Federation of Enterprises
SMEs	Small and medium-sized enterprises
SNF	Stavros Niarchos Foundation
STEM	Science, technology, engineering, and mathematics
STI	Science, technology and innovation
TEIs	Technological Educational institutes
TTOs	Technology transfer offices
UAS	University of Applied Sciences
UoA	National and Kapodistrian University of Athens
UoC	University of Crete
UoWM	University of Western Macedonia
VRIS3	Värmland's Research and Innovation Strategy for Smart Specialisation
YES	Youth Entrepreneurship Summer Programme

Executive summary

Higher education (HE) is a key priority of the reform agenda of the Greek government. Greek HE is governed by the Ministry of Education and Religious Affairs (through a deputy minister for HE). Greece's public innovation system is composed of higher education institutions (HEIs) and national research centres (RCs). The country has 25 HEIs, of which 24 are self-governed legal entities funded by the government. The Hellenic Agency for Higher Education (HAHE) sets quality standards for HEIs that perform periodic internal evaluations and undergo periodic external evaluation to obtain and maintain their accreditations.

Entrepreneurial and innovative practices are increasing in Greece's HE system. While innovation used to radiate outward from Athens, new practices are emerging in the rest of the country. Greek HEIs and research centres are increasingly collaborating with local stakeholders. HEIs and RCs have continued to do so even during the coronavirus pandemic, by expanding their networks across borders, engaging with regional development strategies and promoting entrepreneurship education. The Ministry of Education and Religious Affairs has been instituting reforms to enhance strategic planning, improve international networks – capitalising on the Greek diaspora – and to help HEIs and RCs generate economic and societal value.

The Greek HE system showed resilience throughout the recovery from the global financial crisis of 2007-2008, and more recently, during the COVID-19 pandemic, when HEIs had to adapt quickly to online education. Greek HEIs displayed a good capacity to adapt to shocks despite the structural reduction of financial resources allocated to the HE sector in recent decades.

Additional resources, however, will not be enough to promote entrepreneurship and collaboration in Greek HEIs and RCs. There will be a need for a flexible policy approach reflecting the diversity of Greek regional ecosystems. For instance, some institutions operate in regions whose economic performance is not robust, and where it is difficult to collaborate with stakeholders. Conversely, in other regions, HEIs and RCs have been actively developing local and international networks and collaborations, also leveraging on European policies such as Smart Specialisation Strategy (S3) and the European University.

This report draws upon the HEInnovate framework to analyse the innovative and entrepreneurial practices in the higher education system and institutions in Greece. It was carried out remotely during the coronavirus pandemic, and at a time when the government was implementing a series of reforms in the HE system. The HEInnovate review of Greece focuses on four dimensions: 1) Entrepreneurial Teaching and Learning; 2) Digital Transformation and Capabilities; 3) Knowledge Exchange and Collaboration (KEC); and 4) the Internationalised Institution. This report sheds light on a number of advanced practices, identifies some challenges and provides some recommendations.

Momentum is building in Greece for Entrepreneurial Teaching and Learning. This reflects a general improvement in the framework conditions for entrepreneurship, as the Global Entrepreneurship Monitor (GEM) has acknowledged, and increasing pressure for entrepreneurial finance and research and development (R&D) transfers. Based on these trends, and on the national policy agenda, many Greek HEIs have started providing teaching and learning opportunities in entrepreneurship. As is typical in other European countries, HEIs offer entrepreneurship education both in formal and in informal activities, outside of a structured curriculum. While entrepreneurship education has made its way out of business schools, it

is still not wholeheartedly accepted, and institutional practices tend to rely on a definition of entrepreneurship narrowly focussed on business and management.

The COVID-19 pandemic accelerated the use of digital tools and practices in Greek HEIs, but the transformation is not complete. While, Greece has shown improvement over the past year across a number of indicators that measure the digital transformation, the large share of older staff in the HE system may weigh down on future growth. Greece continues to strive for improvement in areas such as connectivity and digital literacy.

Most HEIs and research centres engage in knowledge co-creation with partners, but activities and performance vary significantly, partly reflecting regional disparities. Some HEIs and RCs are thriving in very dynamic environments, allowing for a virtuous cycle of Knowledge Exchange and Collaboration activities. European, national and sub-national governments have introduced policies to spur innovation and co-creation, in all regions. HEIs and RCs can play a key role in their ecosystems by identifying challenges and engaging with stakeholders to stimulate innovation. For example, by participating in Smart Specialisation strategies,(S3) HEIs can collaborate with regional partners to promote growth and innovation. Several interesting practices of Greek HEIs contributing to the articulation of S3 strategies have emerged recently, demonstrating the potential of coproduction in areas such as culture and agriculture. Furthermore, internationalisation has generated additional opportunities for KEC, including through relationships with researchers and businesses connected to the Greek diaspora.

The importance of the international dimension is reflected in the efforts that Greek stakeholders have made to increase the visibility and the collaboration capacity of HEIs, at a global scale. The internationalisation of Greek HEIs depends on a combination of both external (European) and internal (systemic and institutional) initiatives. The European Higher Education and Research programmes and, in particular, the adoption of the Bologna process, have paved the way for new and diverse forms of internationalisation. These international processes have been the driving force behind some important recent reforms in the Greek HE sector, which have helped the country pick up speed in relation to other European partners. For example, Greek HEIs can now offer education in a foreign language and generate joint programmes with international partners. The government has supported co-operation with international HEIs, including in the EU, in the United States and China. As is often the case, internationalisation has favoured the exchange of new practices in the field of entrepreneurship education. Larger and research-intensive HEIs are more involved in the internationalisation process than smaller ones, as their mandate clearly calls for joining global networks.

The report offers recommendations for policy makers and higher education institutions, as outlined in Box 1 below. The main points can be summarised in four broad messages. First, mainstreaming entrepreneurship education in the Greek HE system requires incentivising academic entrepreneurship formally and adopting a broader definition of entrepreneurship that includes courses in “Leadership” and “Design Thinking”. These activities may also help to improve the general perception of entrepreneurship in HEs. Second, systematically linking HEIs with Smart Specialisation strategies will increase knowledge intensity in regions and create new opportunities for collaboration. A result-oriented approach, based on well-defined key performance indicators (KPIs), can enhance collaboration between universities and industry. The third goal is to promote a more flexible procurement, nationally, to better support Digital Transformation and Capabilities, particularly in smaller-sized HEIs. This may require new governance arrangements that centralise activities, functions and services. Fourth, and finally, momentum for reforms supporting internationalisation of HEIs can be increased by adopting a systematic approach that removes the remaining legal barriers and promotes collaboration with foreign HEIs and by providing national stakeholders with resources, incentives and capacities.

Box 1. Recommendations emerging from the review

The recommendations described below are organised per HEInnovate dimension and broken down into two groups: those for the national authorities and in particular the Ministry for Education and Religious Affairs (policy makers); and those for HEIs.

Entrepreneurial Teaching and Learning

For policy makers

- Explore specific measures to facilitate and reward academic entrepreneurship, formally. This can be done by considering entrepreneurial activities as a criterion for academic promotions, by reducing the teaching load of faculty who are also entrepreneurs, and by allowing part-time contracts for entrepreneurial faculty.
- Create new institutionalised forms of university-industry collaboration that will complement the services of incubators and technology parks. For instance, create the figure of professor of practice, to allow entrepreneurs to teach in HEIs.
- Launch an online platform on HEI-based entrepreneurship. The platform would map all the relevant activities and list a “who’s who” of local experts, serving as the focal point of knowledge dissemination.
- Offer provisions that could attract leading academics on entrepreneurship from outside Greece. Provide these academics pecuniary incentives and also limit their administrative duties.

For higher education institutions

- Open up the curricula to more modules, such as Leadership, Design Thinking and Intrapreneurship, and make them integral parts of the curricula in all programmes on entrepreneurship, in Greece.
- Systematically assess the effectiveness of entrepreneurship teaching and learning activities before and after students have been exposed to them. Involve, in the evaluation, students who were not exposed to entrepreneurship education so that this second group can be used as a benchmark. Evaluation of pedagogies should be used to improve practices or design new initiatives. Outcome variables taken into account in the evaluation should include:
 - entrepreneurial tendencies, including need for achievement, need for autonomy, creative tendency, risk taking, and drive and determination
 - intention (and realisation) to start a firm or act in novel ways within paid employment
 - knowledge and skills acquisition, for example degree of certainty in performing tasks in the categories of marketing, innovation, management, risk taking and financial control.
- Embed internship programmes in the curriculum and extend the duration of internships.

Digital Transformation and Capabilities

For policy makers

- Build on the current role of the National Infrastructures for Research and Technology (GRNET) and the Greek Universities Network (GUnet), to create a central digital transformation body for the HE sector.
- Create dedicated funding for investment in digital transformation including in training to upskill professors and students, and allow for experimentation with new systems or approaches.
- Strengthen quality and KPIs in delivering online courses and exams.

- Allow flexible conditions to make small IT procurements possible, in line with specific digital university strategies.

For higher education institutions

- Align individual institutional strategies with the “Digital Transformation Bible” for 2020-2025.
- Provide actionable trainings and development for digital skills for staff, with a particular emphasis on best practice in digital teaching.

Knowledge Exchange and Collaboration

For policy makers

- Create a legal framework for effective collaboration between HEIs and the business community.
- Develop innovative incentive mechanisms to reward faculties involved in knowledge exchange and collaboration activities.
- Reduce the core-periphery divide within the Greek HE system, by recognising that HEIs on the periphery have to shoulder a heavier burden to encourage innovation in weaker ecosystems.
- Support the bridging role of border regions to promote HEs as innovation intermediaries.
- Scale up the potential of co-creation, and generate synergies and complementarities through ambitious HE agendas that connect with sustainable and inclusive growth.
- Monitor for further alignment towards more effective KEC.

For higher education institutions

- Encourage networking with alumni.
- Diversify opportunities for co-creation for instance by focussing on cultural heritage and agriculture.
- Train for co-creation to establish strategies targeted to the local communities and their problems.
- Create further opportunities for industrial PhDs. Industrial PhDs allow students to pursue their degree in a vocational setting.

The Internationalised Institution

For policy makers

- Continue to raise awareness and to mobilise resources for internationalisation.
- Develop a clear and structured strategy on internationalisation.
- Provide recognition and incentives to the various stakeholders to engage in international activities.
- Promote flexibility and simplification of international activities.

For higher education institutions

- Institutionalise the commitment of HEIs.
- Develop a more structured approach towards internationalisation.
- Adopt a transversal, systemic, approach to internationalisation that generates synergies among different policy areas.
- Build international networks beyond borders. HEIs could enlist the efforts of Greek academics and researchers working abroad by involving them, in flexible ways, in teaching, research and collaboration activities. HEIs should become gateways for internationalisation for their own regions.

1 The Hellenic Higher Education System

This chapter provides an overview of the higher education system in Greece. It highlights the foundations, main actors, legislative framework and emergent practices in the system. The chapter also illustrates the results of the “HEI Leader Survey” – administered to all higher education institutions (HEIs) in the country – which explores the eight dimensions of the HEInnovate framework.

Introduction

Higher Education (HE) has become a top priority in Greece. Higher education institutions (HEIs) are increasingly demonstrating more entrepreneurial and innovative practices throughout the country, contributing to regional growth, inclusion and sustainability. HEIs connect with their networks and communities, investing in the “knowledge triangle” of education, research and innovation.

This report focuses on the potential of Greece to promote innovation and entrepreneurship within its higher education system. To understand the context for those innovation and entrepreneurial practices, this chapter provides a general overview of the Greek higher education system and innovation systems.

Box 1.1. HEInnovate Review of Greece

The HEInnovate Framework

HEInnovate is a guiding framework developed by the European Commission in collaboration with the OECD that aims at supporting HEIs in increasing their innovative and entrepreneurial capacities. To support policy makers and HEI leaders, the OECD and the European Commission jointly collaborate on the HEInnovate Country Reviews.

HEInnovate encompasses eight dimensions:

- Governance;
- Organisational Capacity: Funding, People, Incentives;
- Entrepreneurial Teaching and Learning;
- Preparing and Supporting Entrepreneurs;
- Knowledge Exchange and Collaboration;
- Digital Capacity and Transformation;
- The Internationalised Institution;
- Measuring Impact.

HEInnovate includes a self-reflection tool for HEIs as well as a Policy Learning Network. The third strand work of is the Country Reviews. HEIs do not operate in isolation but collaborate with their community and compete with other HEIs in the same country (and abroad) in a variety of ways. The country reviews were developed to capture and assess these complex interactions and dynamics.

The HEInnovate Review of Greece

The HEInnovate Review of Greece is rooted in the priorities of the Hellenic national authorities, focusing on four key dimensions: 1) Knowledge exchange and collaboration; 2) Digital transformation and capabilities; 3) the Internationalised Institution; and 4) Entrepreneurial Teaching and Learning. Eight HEIs and three public research centres were interviewed as case studies for the review. They include:

- National and Kapodistrian University of Athens (UoA)
- University of Western Macedonia (UoWM)
- University of the Aegean/Democritus University of Thrace (DUTH)
- National Technical University of Athens (NTUA)
- Foundation for Research and Technology-Hellas (FORTH) and the University of Crete (UoC)
- Aristotle University of Thessaloniki (AUTH)

- Athens University of Economics and Business (AUEB)
- National Centre for Scientific Research “Demokritos” (NCSR)
- Centre for Research and Technology-Hellas (CERTH)

Due to the COVID-19 pandemic, the OECD and EC team were not able to visit Greece after the kick-off meeting in March 2020. The rest of the assessment was conducted through video interviews with the experts, and through a survey of HEI Leaders.

Despite two global crises, Greece is swiftly bouncing back

The 2007-2008 global financial crisis had significant socio-economic impacts worldwide, across policy sectors including higher education. In the aftermath of the global financial crisis, Greece’s GDP fell by a quarter from 2008 to 2016 (OECD, 2020_[1]); in 2015, the annual expenditure per student by higher education institutions in Greece on average was 26.5%.¹ Nevertheless, as of 2017, the Greek economy bounced back, recording a 1.9% growth rate in 2018 (OECD, 2020_[1]). According to the Commission’s 2021 spring forecast, real GDP in Greece is forecast to grow by 4.1% in 2021 and 6.0% in 2022 (EC, 2021_[2]).

Greece contained the effects of the pandemic effectively (OECD, 2020_[1]). Economic resources shifted towards tourism-related sectors, allowing island regions to buffer the effects of the crisis in terms of employment and incomes (OECD, 2020_[1]). Notably, the level of readiness and the immediate response of the Greek HEIs was high. In a very short time, HEIs used the methods and tools of online education to continue academic functions during the spring semester of the academic year 2019-2020, with a minimum of disturbance. Classes were taught at a distance, except for laboratory courses and clinical exercises.

While the crises exposed some weaknesses in the economy and higher education system, the country was quick to bounce back and establish reforms for the legal framework and governance of the HE system. Critical reforms of the HE system are being introduced, building upon realistic HEI strategy and exploiting the potential of funding opportunities offered by the National Strategic Reference Frameworks and the Recovery and Resilience Fund. Greece can continue to capitalise on its management of the pandemic, and make higher education shine through new practices, platforms and tools.

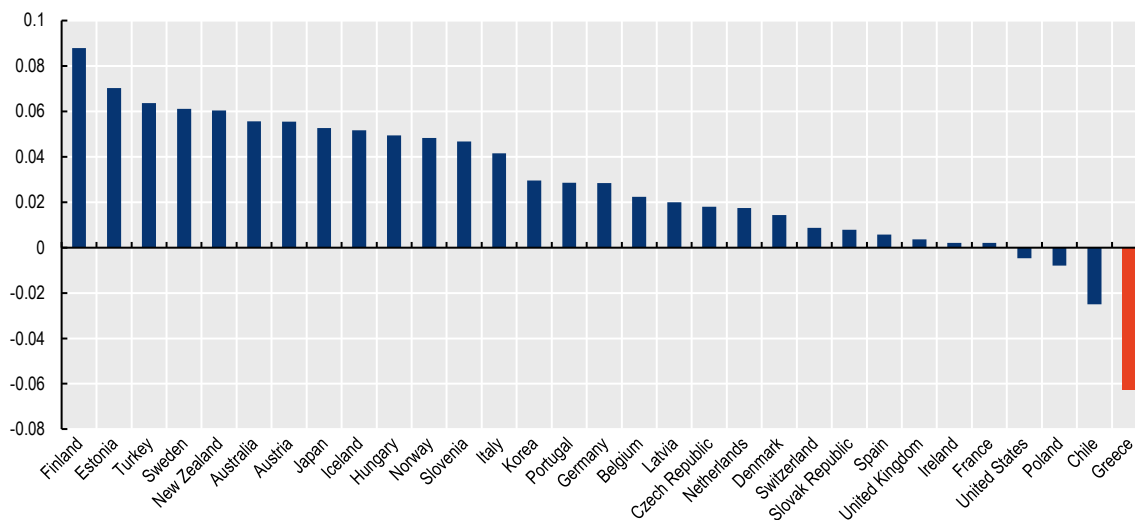
An urban-rural divide features Greece, but new trends are emerging

While it is a relatively small country, Greece has a complex topology and demographics. Its HEIs are scattered across a mix of mainland and islands. Greece’s unique geographical characteristics define its distribution of people and resources. A relatively higher percentage of the population than the OECD average lives in low-density and rural areas with little access to cities (OECD, 2020_[1]). Almost 1 in 2 people live in one of the two metropolitan centres: Athens and Thessaloniki (OECD, 2020_[1]). Between these two extremes, medium-sized towns are at risk of significant loss of population (OECD, 2020_[1]). Greeks of working age have been leaving central regions (Figure 1.1). In addition, between 2000 and 2019, Greece lost half a million people to outgoing migration (OECD, 2020_[1]). Since the migrants were largely of working age, this exacerbated the ageing of the population. The decrease and distribution of the population is at risk of affecting regional economies. These risks translate into less interactions between actors, reduced mobility, reduced skills development and fewer opportunities to boost the innovation and entrepreneurial agenda.

Participation in higher education also grew at a faster rate than public expenditure in higher education. While this is below the OECD average, the share of students in higher education, aged between 18 to 24 years, increased across all Greek regions over the period 2008 to 2012 (OECD, 2020_[1]).

Figure 1.1. Deconcentration of population can also affect the HE system

Change in working-age population disparity among TL3 regions, selected OECD countries, 2006-2016 (in percentage points)



Note: The indicator is defined as the ratio between the standard deviation and the mean of the distribution of working-age population (15-64) across TL3 (NUTS3) regions within the same country. The bars indicate the percentage point change in the indicator between 2006 and 2016. The values for Turkey correspond to the period 2008-2016.

Source: Calculations based on OECD (2018^[3]), *OECD Regional Statistics (database)*, <http://dx.doi.org/10.1787/region-data-en>.

The national landscape of Greek higher education has evolved in recent years. Many characteristics and features are a result of policy reforms and updates policy makers have introduced to optimise the presence of universities, technical institutes and research bodies with the socioeconomic indicators at hand.

State of play in the Hellenic HE system

Higher education is a top priority on the education agenda and one of the main missions for the Greek state, as enshrined in the Greek Constitution. Universities are self-governed legal entities of public law. While they enjoy full self-administration and academic freedom, they are subject to the supervision of the state, which supports them financially. All universities must conform to quality standards set by the Hellenic Agency for Higher Education (HAHE), perform periodic internal evaluation and undergo periodic external evaluation to obtain and maintain their accreditation² (Pisiotis and Ruszthy, 2020^[4]).

The provisions of Law 4 485/2017 specify the primary constitutional requirements for higher education.

As part of their educational mission, HEIs provide quality and comprehensive education in line with the trends of modern science, technology and the arts, as well as international scientific practice. To fulfil their mission, HEIs are organised and operate under rules and practices that ensure compliance with the following principles:

1. freedom in research and teaching
2. research and scientific ethics
3. quality of education
4. the quality of their services, the efficiency and effectiveness of their personnel, resources and infrastructure management

5. transparency in all their activities
6. the impartiality of their governing bodies in the exercise of their duties and in the making of individual and collective decisions
7. meritocracy in the selection and promotion of their staff
8. gender equality and respect for all differences.

Landscape of the Hellenic Higher Education System

The current geography of the Hellenic Higher Education System, as a result of the recent (2018-2019) mergers of HEIs, includes:

- the university sector, comprising 24 institutions
- the technological sector, which includes one Institution: the Higher School of Pedagogical and Technological Education.

Greece's HE system offers specialities in a variety of disciplines, ranging from engineering, manufacturing and construction to business administration and law and arts and humanities.

Enrolled students study engineering, manufacturing and construction (21.77%), followed by business administration and law (20.34%). Arts and humanities come next (13.45%), followed by social sciences, journalism and information (12.57%), natural sciences, mathematics and statistics (9.44%), health sciences and welfare (7.66%), education (4.68%), agriculture, forestry, fisheries and veterinary (4.02%), ICT (3.36%) and services (2.71%). The difference with the EU average is shown in the preferences of Greek graduates on health sciences and welfare, which rank in the sixth place, while in the rest of the EU, they are placed in third place. In graduate studies, male undergraduate students outnumber females, but the situation is reversed in postgraduate studies.

In the period 2018-2019, Greek authorities reorganised the HE sector, aiming to consolidate Greek higher education through the merging of technological Educational institutes (TEIs) – which provided education in a variety of professional and vocational domains with a focus on applied sciences, technology, and art – with universities (Pisiotis and Ruszthy, 2020^[4]). These mergers were implemented without prior due diligence, evaluation and accreditation by the Hellenic Higher Education Authority, as is currently required (Εκπαίδευσης, 2019^[5]).

The EC (2019) noted that the lack of prior evaluation could blunt the positive impact of this reform. Furthermore, the reform could exacerbate skills mismatches by expanding the availability of degree-level qualifications, despite research suggesting that Greece already has an oversupply of highly qualified workers (Pisiotis and Ruszthy, 2020^[4]).

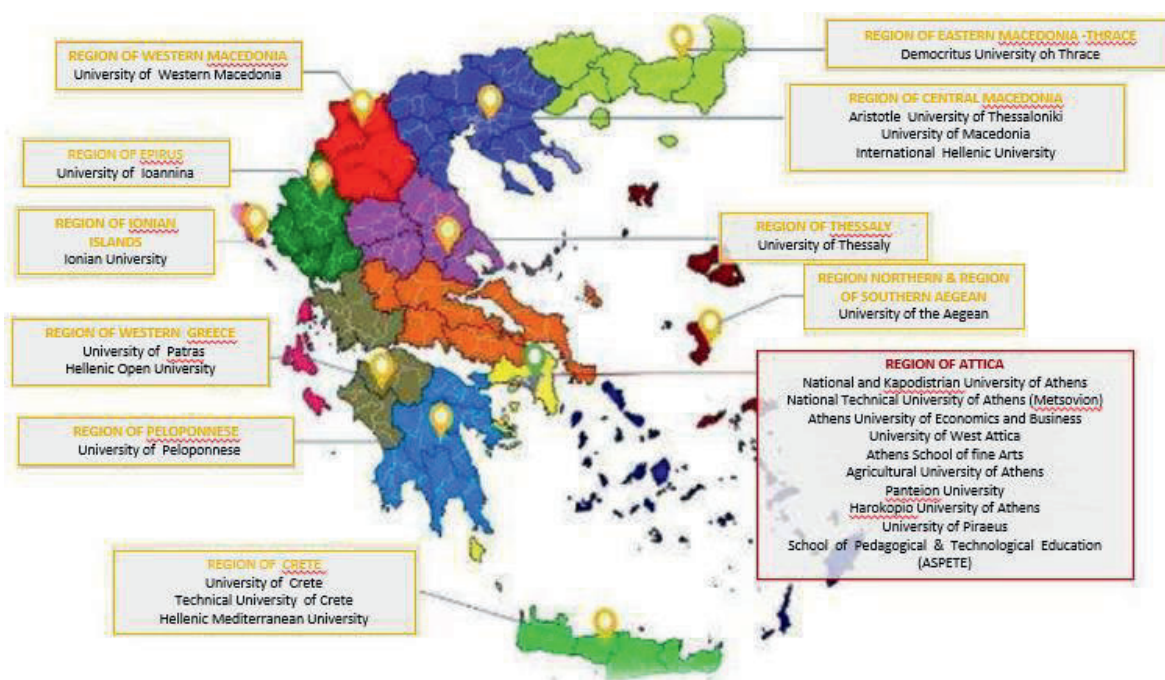
These changes led to the elimination of the technological/applied sciences higher education sector and to the creation of large new (post-merger) HEIs, struggling to manage academic staffing and administrative support for the newly founded departments. Eleven of the 25 HEIs have modified their organisational structure, complying with reforms, to incorporate 16 former technological sector institutions (Table 1.1).

In total, 427 departments, offering corresponding programmes of studies, operate in Greek HEIs. Of these 427, 158 are new departments, which have set up new programmes of studies. All new programmes will be evaluated and accredited within the next few years, by the competent HAHE. In late 2019, 69 five-year undergraduate programmes, falling under Article 46 of Law 4 485/2017, were operating, leading to the acquisition of integrated master's titles (HAHE, 2020^[6]).

However, the operation of certain new university departments created after the merging of the Technological Institutes (TEIs) has been suspended (Law 4 653/2020). This is the case for all the above-mentioned Universities, except for the University of Western Macedonia.

Figure 1.2. The Hellenic Higher Education System: a diverse ecosystem of HEIs and RIs

Public higher education institutions and research institutes in Greece, 2019



Source: HAHE (2020^[6]), *Annual Report of the Quality of Higher Education, Athens, Greece (Greek report)*, https://www.ethaae.gr/images/%CE%95%CE%9A%CE%98%CE%95%CE%A3%CE%97%CE%91%CE%94%CE%99%CE%A0_2019.pdf.

Table 1.1. HEIs that modified their academic structure in 2018 and 2019

University	Institutions incorporated (whole or some departments)	Reforming law
University of West Attica	Technological Education Institutions of Athens and Piraeus	Law 4 521/2018 (Government Gazette: A' 38/02.03.2018)
Ionian University	Technological Education Institutions of the Ionian Islands	Law 4 559/2018 (Gov. Gaz.: A' 142/03.08.2018)
University of Ioannina	Technological Education Institution of Epirus	Law 4 559/2018 (Gov. Gaz.: A' 142/03.08.2018)
University of Thessaly	Technological Education Institutions of Thessaly and Central Greece	Law 4 589/2019 (Gov. Gaz.: A' 13/29.01.2019)
Agricultural University of Athens	Technological Education Institution of Central Greece	Law 4 589/2019 (Gov. Gaz.: A' 13/29.01.2019)
National and Kapodistrian University of Athens	Technological Education Institution of Central Greece	Law 4 589/2019 (Gov. Gaz.: A' 13/29.01.2019)
International Hellenic University	Technological Education Institutions of Thessaloniki, Eastern Macedonia & Thrace, Central Macedonia	Law 4 610/2019 (Gov. Gaz.: A' 70/07.05.2019)
Hellenic Mediterranean University	Technological Education Institution of Crete	Law 4 610/2019 (Gov. Gaz.: A' 70/07.05.2019)
University of Western Macedonia	Technological Education Institution of Western	Law 4 610/2019

University	Institutions incorporated (whole or some departments)	Reforming law
	Macedonia	(Gov. Gaz.: A' 70/07.05.2019)
University of Peloponnese	Technological Education Institutions of Western Greece and Peloponnese	Law 4 610/2019 (Gov. Gaz.: A' 70/07.05.2019)
University of Patras	Technological Education Institute of Western Greece and Peloponnese	Law 4 610/2019 (Gov. Gaz.: A' 70/07.05.2019)

Source: HAHE (2020^[6]), *Annual Report of the Quality of Higher Education, Athens, Greece (Greek report)*, <https://www.ethaae.gr/images/%CE%95%CE%9A%CE%98%CE%95%CE%A3%CE%97%CE%91%CE%94%CE%99%CE%A0%2019.pdf>.

System structure

Greece has established the National Qualifications Framework for all levels of education, namely, the Hellenic Qualification Framework (HQF),³ and applies a three-tier degree system to higher education. Greek HEIs apply the European Credit Transfer and Accumulation System (ECTS) to all three levels of higher education studies, with earned credits being cumulative and transferable, and grant diploma supplements.⁴ When referring to higher education in Greece, data refers to International Standard Classification of Education (ISCED) levels 6-8 and not to ISCED levels 5-8, which is standard for international reporting of higher education figures.

Admission to the first level of studies of Hellenic HEIs requires the successful participation in national matriculation exams: the “Pan-Hellenic” admission examinations take place annually in the months of May and June. Graduates of Greek upper secondary schools (*Lykeion*) and vocational upper-secondary schools (EPAL in Greek) or equivalent schools from abroad are eligible to participate. Special provisions with beneficial quotas for the admission of special groups of students, such as international students, affiliated students from Cyprus, candidates of Hellenic origin, candidates from social or economic vulnerable groups, are in place. All candidates are required to possess a very good command of the language of instruction (Greek).

Law 4 763/2020 provides, under conditions, graduates of Vocational Training Institutions (IEK) as well as of “Post-Secondary Year-Apprenticeship Class”, access to university departments relative to their vocational training specialisation, after passing qualification exams organised by the Greek HEIs. The number of new students each HEI welcomes each year is determined by the Ministry of Education, which assigns first-time students directly to higher education departments, taking into consideration their performance in the national university admission exams and their study preferences. While the system is considered fair and transparent, it produces study mismatches and inefficiencies, since quite often neither students nor universities satisfy their preferences (EC, 2019^[7]).

The Greek Higher Education is public at all levels. The first level of studies is offered free of charge to all Greek/European and international students, with the exception of studies at the Hellenic Open University, which requires a financial contribution per module, and the newly established foreign language programmes of study, addressed to international students. All educational processes, services and material (books and notes) are offered for free to all undergraduate students. Student support mechanisms are available in the form of scholarships, merit-based grants and family allowances. According to EU data, around 1% of students received a needs-based grant in 2018/19. Until recently, the language of teaching for undergraduate programmes was exclusively Greek, a provision to secure equal access opportunities to higher education.

Degree structure

In Greece, studies are divided into three cycles. Within the first cycle of studies, the majority of Greek undergraduate programmes of studies require a workload of 240 ECTS (EC/EACEA/Eurydice, 2020^[8]), needed to be acquired in the course of 4 years of study. Each academic year's educational activities correspond to 60 credits. The duration of the undergraduate degree programmes for most disciplines is 4 years but engineering, dentistry, pharmacology, agronomics, forestry, veterinary medicine, and certain art departments (music studies and fine arts) are 5-year programmes (240 ECTS-300 ECTS) and medicine has 6-year programmes.

Some programmes lead directly to a second-cycle degree, as in the case of the programmes offered by the departments of a) architectural engineering, b) civil engineering, c) mechanical engineering, d) rural and surveying Engineering, e) chemical engineering and f) electrical engineering and computer engineering of many HEIs and those of the National Technical University of Athens. Successful completion leads to the award of an integrated master's degree in the specialisation offered by each department, corresponding to level 7 of the National and European Qualifications Framework. More than 20% of the total of students enrolled in first- and second-cycle studies in Greece are enrolled in such programmes (EC/EACEA/Eurydice, 2020^[8]).

Postgraduate studies lead to the award of a Postgraduate Diploma of Specialisation (master's degree). Postgraduate programmes of studies accept graduates of Greek universities or accredited HEIs from abroad, recognised as equivalent to Greek HEIs. Admission requirements and processes, selection criteria and tuition fees are determined by the internal regulation of the postgraduate programme. Courses last at least one calendar year, with two years being the most common duration. The 90 ECTS workload model predominates, with postgraduate programmes of studies offered by Greek universities (about 45% of programmes), followed by the 120 ECTS model (about 38% of programmes), with a minority offering 60-75 ECTS programmes (marginally 10%) or other schemes (5%) (EC/EACEA/Eurydice, 2020^[8]). Most postgraduate programmes require students to submit a master thesis at the end of their studies. The combined workload of first- and second-cycle studies corresponds to 330 ECTS (EC/EACEA/Eurydice, 2020^[8]).

Though postgraduate educational programmes are mainly offered in Greek, an increasing number of these programmes are offered in English, or other languages. Knowledge of one or more foreign languages, apart from Greek, is an essential prerequisite for participation in the postgraduate programmes. Aiming to move toward the internationalisation of higher education in Greece, many postgraduate programmes have established collaboration with foreign universities, awarding joint degrees (see Chapter 5 on Internationalisation).

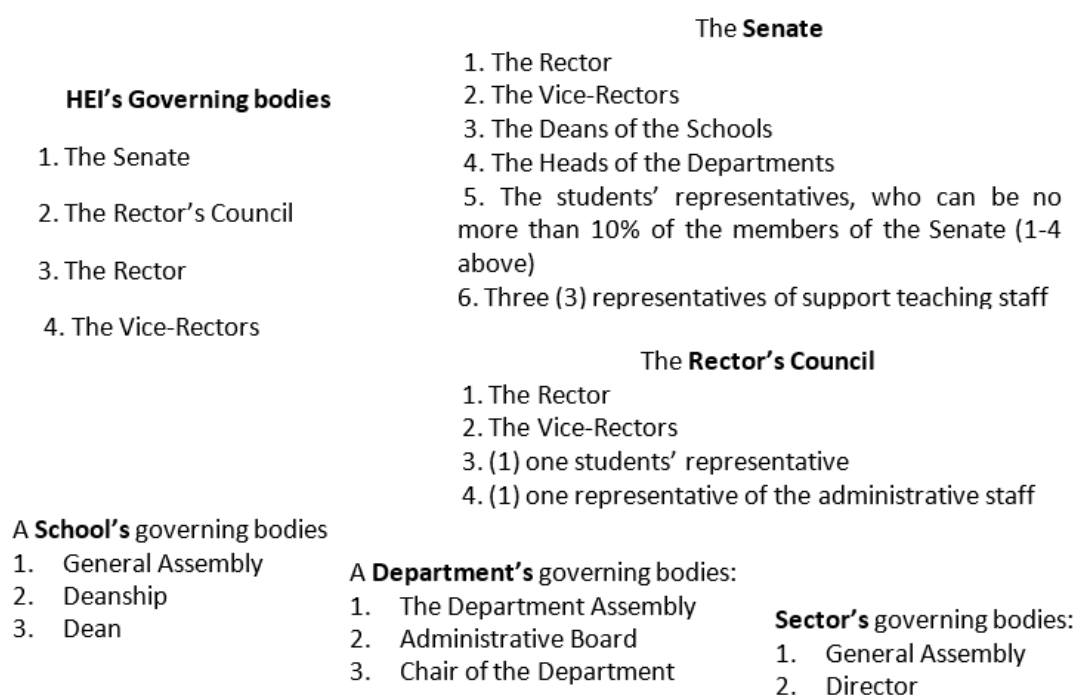
Doctoral studies lead to the award of a doctorate (PhD). The general goal of doctoral studies is high-level specialisation in strategic areas of knowledge and the promotion of fundamental research in various scientific fields, with a view to strengthening the country's scientific base. In the case of universities that offer postgraduate courses, it is essential to have a postgraduate diploma to obtain a doctoral degree (with the exception of applicants who meet certain prerequisites). The departments themselves establish the admission requirements.

Governance and main actors

Higher education institutions in Greece enjoy administrative autonomy. The HE system is characterised by a wide range of actors that provide legal and administrative support and guidance to HEIs. For instance, the Hellenic Higher Education Authority (HAHE) is an independent administrative authority with a central role in the Hellenic Higher Education System, and its mission is to ensure high quality in higher education. HAHE was established by Law 4 653/2020 as the successor to the Hellenic Authority for Quality Assurance and Accreditation in Higher Education (HQA), which had been operating since 2006. Besides quality

assurance, HAHE contributes to the formation and implementation of the national strategy for higher education and to the distribution of financial and human resources to HEIs (see detailed information in the “Quality Assurance” part of this report). HAHE is a member of the European Association for Quality Assurance in Higher Education (ENQA) and co-operates with all European institutions on HE matters (the European University Association, the European Association of Institutions in Higher Education, the European Quality Assurance Register for Higher Education, the European Students’ Union, etc.).

Figure 1.3. HEI governance and administration in Greece



Source: Ministry of Education and Religious Affairs (2021^[9]), *Background Report*, Unpublished.

Other bodies that implement higher education policy include:

- The **Hellenic National Academic Recognition and Information Centre** (NARIC–DOATAP in Greek), which was founded by Law 3 328/2005 (*Gov. Gaz.*: A80/01.04.2005) and is supervised by the Ministry of Education and Religious Affairs. The Hellenic NARIC is the sole agency in Greece responsible for the academic recognition of degrees awarded by foreign HEIs. It is also responsible for providing information about educational systems and the accreditation of Greek and foreign HEIs and titles, domestically and abroad.
- The **State Scholarships Foundation** (whose Greek initials are IKY), the National Scholarship Organisation was founded in 1987, grants scholarships and contributes to the empowerment of the Greek scientific community, by assessing the needs of each age, carefully studying, planning, announcing and implementing scholarship programmes and financial support for all cycles of studies. It is responsible for the administration, co-ordination, implementation and dissemination of European Union (EU) Programmes for Education (1987 Erasmus, 1990 Lingua, 1995-1999 Socrates I, 2000-2006 Socrates II-Lifelong Learning Programme 2007-2013). In 2014, IKY was appointed as the national agency for the new EU Erasmus+ Programme until 2020. For the period 2021-2027, IKY is the competent national agency for the Erasmus+ programme in the field of education and training.

- **The National Organisation for the Certification of Qualifications and Vocational Guidance** (EOPPEP, 2021^[10]) operates under the supervision of the Ministry of Education and Religious Affairs. It is the statutory body for the development and implementation of the Hellenic Qualifications Framework (NQF) in correspondence with the European Qualifications Framework (EQF) and it is the National Co-ordination Point for EQF in Greece (NCP).
- **The Youth and Lifelong Learning Foundation**, runs programmes and projects on lifelong learning and youth, and student welfare, and is the competent national agency for the Erasmus+ programme in the field of Youth and Sport (Youth & Lifelong Learning Foundation, 2021^[11]).
- The Rectors' Council, which is not a legal entity but constitutes an important stakeholder, conveying the views and needs of HEIs, as expressed through their leadership.

Recent policy measures of the HE system

Before the major reforms in higher education were initiated, previous policy measures were reversed. The process of establishing 38 new departments across different universities in Greece, following the merger of technical education institutions with universities, was suspended in 2019 (EC, 2020^[12]), so the additions could undergo evaluation and proper accreditation processes by the re-established HAHE and be incorporated in their universities' strategic planning.

A simplified framework for operating the universities' research centres allows for simplification of administrative procedures and facilitates the financial management of funded research projects and postgraduate programmes in Greek universities. Meanwhile, the research centres are required to include accountability and transparency in their internal regulations code.⁵

Measures to support HEIs in sustaining strategic management and excellence, such as the incorporation of Centres of Excellence in HEIs strategy, and performance-based funding for 20% of the total public funding budget, were introduced by Law 4 653/2020. Aiming to strengthen strategic planning, legislation introduced the expectation for HEIs to design and implement four-year action plans and establish institutional development agreements with the Ministry of Education and Religious Affairs (EC, 2020^[12]). Funding for the universities will be partly based on performance criteria, such as internationalisation, absorption of graduates in the labour market and the ratio of new entrants to graduates. Universities will be invited to select the group of indicators that will determine 20% of their funding. The first funding agreements under the new conditions are expected to be applied from 2022 onwards (EC, 2020^[12]).

Aiming to enhance the provision of high-quality tertiary education and underpin academic excellence, Law 4 777/2021 introduced significant structural changes, such as:

- *Establishment of a maximum duration of studies in tertiary education.* Law 4 777/2021 foresees that university students be expected to complete the first cycle of studies within eight academic semesters. An extension of 4 or 6 academic semesters is allowed (depending on the duration of the respective undergraduate programme), after which students will be permanently expelled, losing their academic status. Special provisions exist for students with health problems, special needs, full-time workers and distinguished athletes, who will be allowed to pursue part-time undergraduate studies.
- *Introduction of a minimum admission base:* Candidates who take the National Admission Examinations (Panhellenic exams) will henceforth need to achieve a mark equal to or higher than the admission base, i.e. the lowest acceptable mark set for the school/department/programme of studies to which they apply. The range of the admission base will be established by the competent school/department and will be established by a Ministerial Decision of the Minister of Education and Religious Affairs.

- *Aiming to boost internationalisation of higher education*, a top priority for the following years, Law 4 692 (Gov. Gaz. 111a/12-06-2020), allowed Greek HEIs to offer undergraduate study programmes taught in a foreign language, charging tuition fees to international students (either EU or non-EU) who have completed the last two years of their secondary education abroad. Law 4 692/2020 also broadened the scope of foreign language programmes of study by introducing the dual academic specialisation programmes, which lead to a first-cycle degree with specialisation in two academic disciplines (double-major degrees). Under the same law, HEIs' ability to collaborate with other Greek and international HEIs to offer joint foreign language programmes of studies was enacted. In addition, HEIs were permitted to introduce "Units for the Support of International Students" to their organisational charts.

From 2019-2021, Greek authorities advanced the reforms in a broad range of education policy issues, including those that helped manage the pandemic. Notably, these include:

- Provisions for enhancing autonomy by strengthening the accountability and transparency framework; including a university funding system based on objective and performance criteria, a component of which refers to research activity and outcomes.
- Law 4 777/2021 provisions on security of university premises (an aim pursued for the first time and in a comprehensive way), which directly affect the freedom of teaching, research and learning. In the long run, the aim is to ensure the role and smooth functioning of universities, which will establish a sense of trust in the academic community.
- A new system for admission to universities aimed at ensuring the conditions for successful studies, as well as timely completion, with students who consciously choose their studies in areas that fall within their inclinations and interests. This system provides that each university department set a minimum admission base for incoming students. As students focus on desired fields of study, this will lead to enhanced performance, and linkage of the degrees with the labour market.

Box 1.2. A changing policy context for higher education institutions

Fast-changing global transformations have significantly changed Europe's socio-economic challenges. From the response to the global pandemic, and the political ambitions of a more resilient, greener and digital EU, Europe continues to strive to become the world's first climate-neutral continent, while boosting Europe's recovery and preparedness for future crises. Higher education institutions are at the core of the recovery and twin-transition, which can only be met by a boost of structural changes, new approaches to teaching and learning, and strengthening HEIs' role in innovation ecosystems as a driver for change. To this end, the European community has launched initiatives including:

- NextGenerationEU and the Recovery and Resilience Facility, supporting the recovery and providing unprecedented investments in skills, higher education, research and digitalisation.
- The European Green Deal, aiming to transform the EU into a modern, resource-efficient and competitive economy, ensuring no net emissions of greenhouse gases by 2050, economic growth decoupled from resource use and no person and no place left behind. The European Green Deal is also the lifeline out of the COVID-19 pandemic. One-third of the EUR 1.8 trillion investments from the NextGenerationEU Recovery Plan and the EU's seven-year budget will finance the European Green Deal.
- The EU's digital strategy aims to make sure that the digital transformation works for people and businesses, while helping to achieve its target of a climate-neutral Europe by 2050. It will strengthen its digital sovereignty and set standards, rather than following those of others – with a clear focus on data, technology and infrastructure.

In 2020, the Commission adopted a number of Communications to give political orientations to Member States, which are also highly relevant for the HEIs. These include communications on the European Education Area (EEA), the revitalised European Research Area and the new Digital Education Action Plan.

Source: EC (2021^[13]), *Recovery and Resilience Facility*, https://ec.europa.eu/info/business-economy-euro/recovery-coronavirus/recovery-and-resilience-facility_en (accessed on 13 July 2021); EC (2021^[14]), *A European Green Deal*, https://ec.europa.eu/info/strategy/priorities-2019-2024/european-green-deal_en (accessed on 13 July 2021); EC (2021^[15]), *A Europe Fit for the Digital Age*, https://ec.europa.eu/info/strategy/priorities-2019-2024/europe-fit-digital-age_en#actions (accessed on 13 July 2021).

Public research in the Greek higher education system

Innovation

According to the Regional Innovation Scoreboard 2021, four Greek regions featured in the top 10 fastest-growing European regions between 2014 and 2021 (EC, 2021^[16]). The considerable growth means that Greece qualifies as a moderate innovator.

At the same time, the country participates in many transnational research and technological bodies (the European Space Agency, or ESA; the European Agency for Nuclear Research, or CERN; and the European Molecular Biology Conference/Council, or EMBC-EMBL, etc.) and European initiatives, from which it can derive significant benefits. Thanks to such collaborations, its human resources and its excellence in critical technological sectors, Greece has attracted investment that could potentially reshape its economic profile.

The Greek Research, Technological Development and Innovation (RTDI) System shows strengths, such as good performance in co-financed EU Framework Programmes, a substantial Greek representation in international research networks and projects of the European Roadmap for Research Infrastructures. In addition, there is a strong Greek research community abroad, as well as highly educated human resources within the country, along with pockets of excellence in public research and academic institutions and the private sector. As for scientific publications, its performance is good (above the EU average).

R&D intensity patterns follow mostly the presence (or absence) of active public research bodies, either universities or public research centres (for example in Epirus and the North Aegean). Greece is one of the countries that have adopted a national target for R&D intensity since 2003. The national R&D intensity target has now been set at 1.2 % of GDP.

Public research

Public sector research is conducted mainly in HEIs and public research institutes (PRIs). HEIs operate under the supervision of the Ministry of Education and Religious Affairs, while PRIs operate under the supervision of the General Secretariat of Research and Innovation – GSRI (formerly the General Secretariat of Research and Technology – GSRT). As of July 2019, the GSRI operates in the Ministry of Development and Investments – moving from the Ministry of Education and Religious Affairs – a governmental choice indicative of a determination to ensure that public research forms stronger ties with the market and industry.

Public research funding system

University research performance in Greece is reasonably good. As noted earlier, universities are responsible for the majority (~80%) of Greece's research output and research citations (Foundation for Economic and Industrial Research (IOBE, 2017^[17]; OECD, 2018^[18]).⁶ Several universities appear in many of the main world university rankings systems (which focus on measures of research performance).

During the economic crisis, core research funding to universities was reduced but was compensated for by an increase in research funding through the National Strategic Reference Framework (which prioritises the strategic and economic value of the research it funds). This meant that, in total, government funding of research in higher education rose slightly between 2011 and 2013, when the downturn was at its height. Research funding from international investments fell by around 4% over that time.

In 2016, the government made a strategic investment in science and research, with the creation of the Hellenic Foundation for Research and Innovation (HFRI) as a funding and evaluation agency for investigator-led research, for postdoctoral fellowships and doctoral scholarships. The HFRI is funded in the government budget and through loans from the European Investment Bank.

The Greek government has a four-tier research funding system (OECD, 2018^[18]):

- capability funding through the core funding for universities and research institutes
- blue sky research funded through the new HFRI
- research programme funding on applied topics of strategic importance to Greece, mainly through the National Strategic Reference Framework (NSRF) and with some additional project funding from other government budgets and from municipalities
- support for the acceleration of the commercialisation of research through government equity investment funds and low-interest loans.

Under this funding framework, the government's share of the funding of research declines as a project matures and approaches the transfer and commercialisation stages, and as risk reduces.

These funding streams are complemented by funds from the State Scholarships Foundation (IKY), which was established to offer grants for postgraduate study, both in Greece and abroad. IKY also funds postdoctoral research fellowships and provides grants for students undertaking research degrees.

R&D expenditure

The goal of the EU2020 strategy for the R&D intensity index is to achieve investment in R&D at 3% of the EU GDP. The R&D expenditure is recorded as fixed capital expenditure in the country's GDP, according to the revised European System of Accounts, or ESA 2010.

Total R&D expenditure in Greece in 2018 amounted to EUR 2 179.31 million, an increase of EUR 136.24 million (6.7%) compared to 2017. As a result, the R&D intensity index rose by 0.05 percentage points, reaching 1.18%, from 1.13% in 2017 (MetricsEKT, 2018^[19]).

The higher education sector, which in 2018 consisted of 20 public universities and 14 public Institutes of technological education, was second in RTDI expenditure. Expenditures in the field of higher education (HES sector) in 2018 amounted to EUR 618.58 million, accounting for 28.4% of total government expenditures in the country and showing an increase of 7.2% compared to 2017. The share of expenditure in relation to GDP gradually rose from 0.27% in 2011 to 0.34% in 2018 (MetricsEKT, 2018^[19]).

As for the sources of funding for R&D expenditure, the following were recorded (MetricsEKT, 2018^[19]):

- The financing from companies allocated for R&D expenditures, regardless of the sector, amounts to EUR 926.23 million in 2018, an increase of 1.5% compared to 2017, of which EUR 52.36 million (5.6%) was directed to higher education. State financing of R&D expenditures amounted to EUR 883.33 million, an increase of 15.2% compared to 2017.

As for the major individual sources that make up the state funding, the data are as follows:

- The regular, budget-financed R&D expenditures amounted to EUR 629.87 million in 2018, an increase of 7.0% compared to 2017.
- The NSRF-financed R&D expenditures amounted to EUR 149.80 million in 2018, an increase of 107.0% compared to 2017.

HEIs attract funds through competitive research, sourcing about 15.5% of the total expenditure from abroad, while they also attract funds from the business enterprise sector, approximately 8.4% of their total R&D expenditure. Finally, HEIs manage to generate their own funding – a 6.6% share of the total R&D expenditure.

GSRI Research Centres derive over 60% of their sourcing from the government – although it is not clear what the level of their own funding is, which is also included in this share. GSRI research centres manage to attract 34% of their R&D expenditure from abroad and 3.5% from the business sector.

Human capital and employment in public R&D

Greece is performing well in terms of increasing its employment rate (European Commission, 2020) in fast-growing, innovative enterprises and knowledge-intensive activities.

The number of researchers and R&D personnel increased in the period 2013-2018, especially in business and the public research sector. The majority of R&D personnel in Greece are active mainly in HEIs and public research bodies. Although employment in research and development is increasing, the loss of more than 350,000 skilled workers in human capital constitutes a major challenge for the Greek research and innovation system.

At the same time, however, the loss of specialised human resources (brain drain) is a major challenge for the Greek research and innovation system. Greece has also been negatively affected by the global trend of increasing student mobility, since it has one of the highest output rates and one of the lowest input rates.

The total number of PhD holders has tripled by comparison with 2000, and today amounts to approximately 44,000 – that is 2% of all higher education graduates (NDC, 2020^[20]). In 2018, 1,624 new PhDs graduated from Greek universities.

Results of the Higher Education Leaders Survey

As part of the HEInnovate country reviews, senior representatives from HEIs in Greece were invited to answer questions on each of the eight dimensions of the HEInnovate Framework. The HEI Leaders Survey does not replicate the HEInnovate Self-Assessment tool. The survey focuses on gathering factual descriptions of practices in HEIs and RIs.

The response rate in Greece was high, and 24 HEIs in Greece participated in the HEI Leaders Survey. Five of the respondents had used the HEInnovate Self-Assessment in the past.

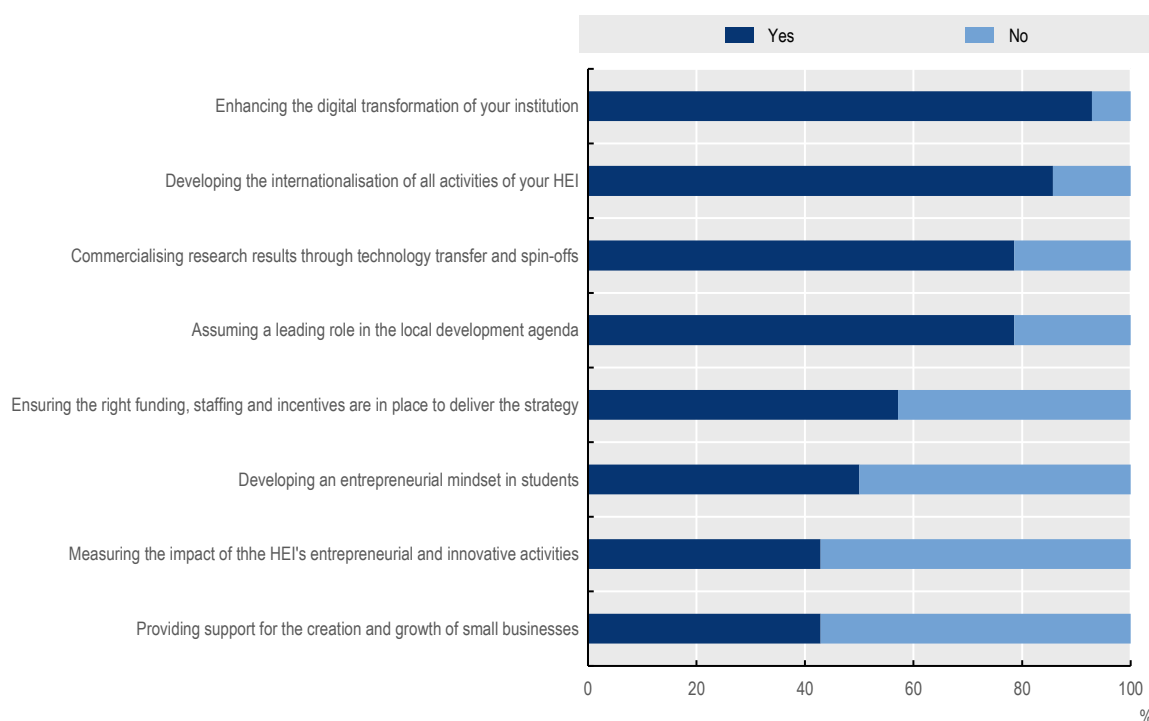
Leadership and Governance

This dimension is defined in the HEInnovate Framework, as strong leadership and good governance are crucial to developing an entrepreneurial and innovative culture within an HEI.

Out of 24 participating institutions, 14 HEIs, representing half of respondents, indicated that a strategy was in place. The most common elements were: commercialising research results through technology transfer and spin-offs; developing the internationalisation of all activities of your HEI; enhancing the digital transformation of your institution (Figure 1.4).

In addition, only four respondents reported that non-academic stakeholders were included in the HEI's governing board. Among these institutions, two involve national and regional stakeholders, and three involve students.

Figure 1.4. The elements included in the HEI strategy



Source: Authors' elaboration based on the HEI Leaders Survey of Greece (OECD, 2021^[21])

Organisational Capacity: Funding, People, Incentives

The organisational capacity of an HEI drives its ability to deliver on its strategy. If an HEI is committed to carrying out entrepreneurial activities to support its strategic objectives, then key resources such as funding and investments, people, expertise and knowledge, and incentive systems need to be in place to sustain and grow its capacity for entrepreneurship.

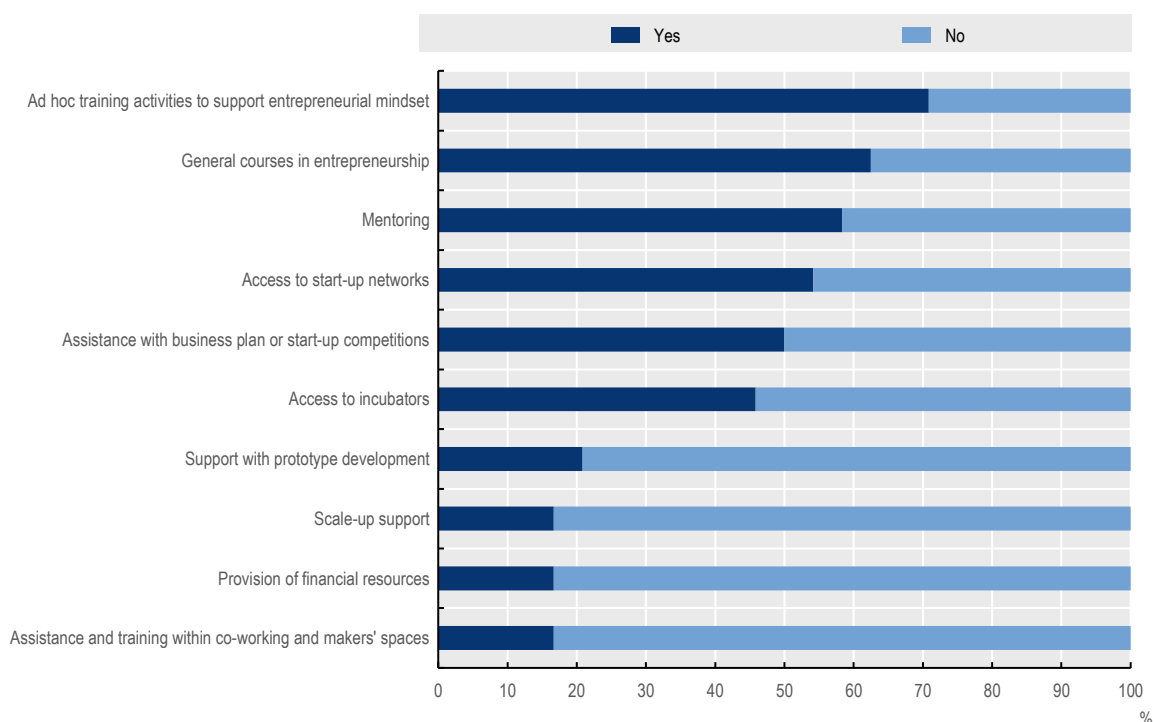
On average, 58% of respondents dedicated professionals that support innovation and entrepreneurship. Dedicated staff and structures were mainly focused on entrepreneurial skills (67%). Only seven respondents (29%) reported providing staff incentives for their involvement in commercialising research, supporting entrepreneurship or teaching entrepreneurship in addition to their standard job responsibilities.

Preparing and Supporting Entrepreneurs

HEIs can help students, graduates and staff consider starting a business as a career option. For those who decide to proceed to start a business, or other type of venture, targeted assistance can then be offered in generating, evaluating and acting upon the idea, building the skills necessary for successful entrepreneurship, finding relevant team members and obtaining access to finance and effective networks.

In Greece, mentoring (58%), general courses in entrepreneurship (63%) and *ad hoc* training activities to support an entrepreneurial mindset (71%) are the measures most cited by HEIs (Figure 1.5).

Figure 1.5. Types of entrepreneurial support measures offered in Greek HEIs



Source: Authors' elaboration based on the HEI Leaders Survey of Greece (OECD, 2021^[21])

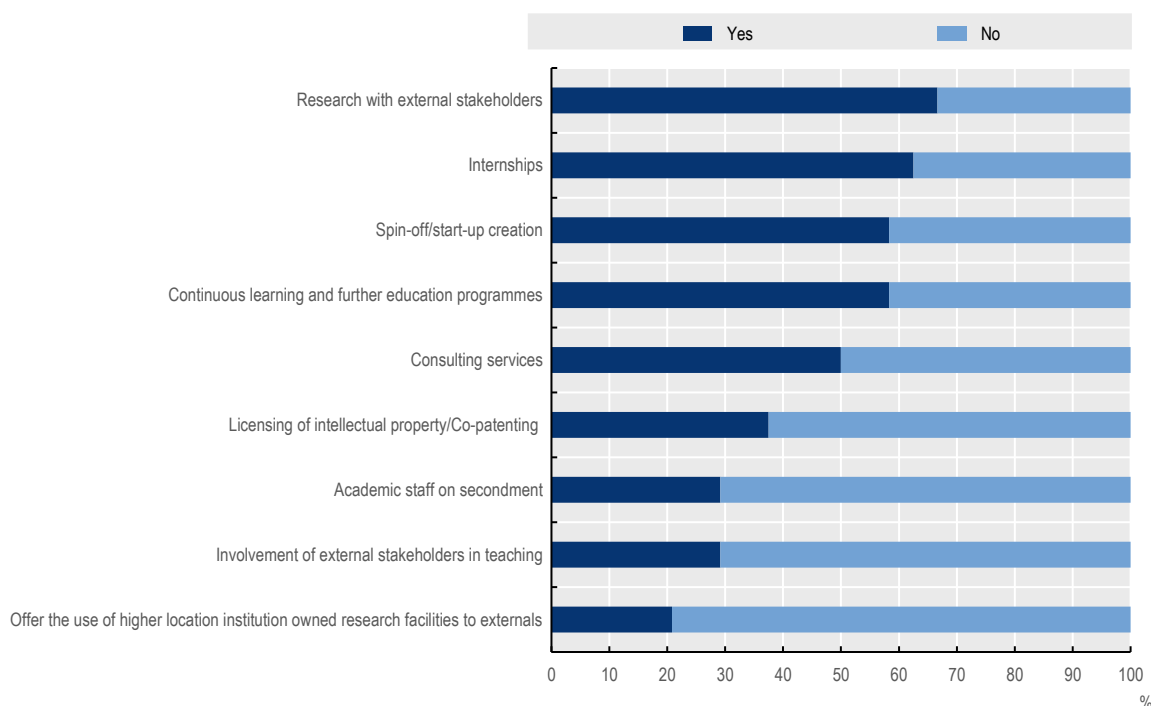
Knowledge Exchange and Collaboration

Knowledge exchange is an important catalyst for organisational innovation, advancing teaching and research, and local development. It is a continuous process, which includes the “third mission” of an HEI, defined as the stimulation and direct application and exploitation of knowledge for the benefit of the social, cultural and economic development of society.

When asked the effectiveness of the HEI in supporting local development, on a scale of 1 to 5 (1 = limited impact, 5 = strong driver of regional prosperity), 19 HEIs responded. Eight institutions stated they had a high impact; eight other respondents reported they had a moderate impact; and only three institutions reported they had little to no impact on regional prosperity.

The three most common KEC activities in HEIs are spin-off/start-up creation (58%), internships (63%), and research with external stakeholders (67%) (Figure 1.6).

Figure 1.6. KEC activities offered by HEIs in Greece



Source: Authors' elaboration based on the HEI Leaders Survey of Greece (OECD, 2021^[21])

Digital Capacity and Transformation

HEIs are already deploying digital technology, but at varying rates of uptake and integration. HEIs should make the most of the opportunities presented by digital transformation and consider digital technology a key enabler.

Of 24 institutions, 19 (almost 80%) reported that the HEI's investment in digital technology/systems would increase after the COVID-19 pandemic. In terms of where the investment would be, 79% of HEIs reported investing in the development of the digital skills of staff and of new digital platforms. Only 33% of respondents intend to invest in the conversion and reorientation of teaching content.

The Internationalised Institution

Internationalisation is the process of integrating 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. It introduces alternative ways of thinking, questions traditional teaching methods, and opens up governance and management to external stakeholders.

In Greece, only eight out of 24 respondents reported having recruitment policies and practices to attract international staff. Nevertheless, 79% of respondents reported that they had taken part in international research collaborations both outside and in the EU. Only two respondents reported that they had an office or worked on a campus abroad.

In addition, half of the respondents said that internationalisation has affected their approach to entrepreneurship and innovation. Among different experiences, the utilisation of best practices of others and adapting them to the university's specific needs was noted as a way that internationalisation has influenced the HEI's entrepreneurship and innovation agenda.

Measuring Impact

Entrepreneurial/innovative HEIs need to understand the impact of the changes they bring about in their institution. An entrepreneurial/innovative HEI combines institutional self-perception, external reflection and an evidence-based approach.

On average, 44% of respondents reported that knowledge exchange and entrepreneurial support activities were evaluated, 38% externally and 50% internally. However, 25% of HEIs reported that such activity was not evaluated.

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Notes

¹ Based on OECD Education Indicators Database: <https://doi.org/10.1787/888933940474>.

² “Updated responsibilities: the law includes supporting more national-level strategic planning, support and oversight of the new procedures for institutional planning, institutional development agreements, and performance-based institutional funding. It also introduced new evaluation and accreditation procedures, particularly for recently merged academic units and institutions, to ensure that they meet the necessary standards to award degrees for all three cycles. Finally, HAHE will also undertake thematic evaluations of the sector, with planned themes to include internationalisation, gender equality, access for people with disabilities, labour market transitions and the development of e-learning digital skills among students and staff. HAHE has administrative autonomy.”

³ The Hellenic Qualification Framework (HQF) has an eight-level framework that unites non-formal and formal qualifications aligned with the appropriate levels from the National Organisation for the Certification of Qualifications and Vocational Guidance (EOPPEP in Greek) and for qualifications granted by higher education institutions (HEIs), according to the Hellenic Authority for Higher Education (HAHE). EOPPEP co-operates with HAHE on quality in higher education and represents Greece in the European network for Quality Assurance in Vocational Education and Training (EQAVET). HAHE is responsible for drafting the

Qualifications Framework for Higher Education, based on HQF qualification types and level descriptors, which were developed by EOPPEP.

⁴ In referring to higher education in Greece, data refers to ISCED levels 6-8 and not ISCED levels 5-8, the standard for international reporting of higher education figures.

⁵ Amendment of Law 4608/2019 (A' 66) (Hellenic Development Bank and Attraction of Strategic Investments and other provisions): https://www.kodiko.gr/nomologia/download_fek?f=fek/2019/a/fek_a_167_2019.pdf&t=0467623c393fa64b1de57aeb3553e2d1.

⁶ For more information, please visit <http://report08.metrics.ekt.gr/el/chapter2.3>.

2 Entrepreneurship Teaching and Learning

Entrepreneurship education reaches beyond academic pedagogy. It gives higher education institutions (HEIs) the opportunity to generate interdisciplinary curricula and engage with external stakeholders, which can provide students real-life experiences. This chapter discusses entrepreneurial teaching and learning practices in Greece. It analyses the current state of play of entrepreneurial teaching and learning in Greek HEIs. The chapter then outlines the main characteristics and challenges of entrepreneurial education, and concludes with policy recommendations for policy makers and representatives from higher education institutions. The chapter also illustrates the results of the “Entrepreneurship Education” survey – administered to students of HEIs in the country – which explores the HEIs’ teaching and learning practices from the students’ perspective.

Introduction

Entrepreneurial teaching and learning in Greek HEIs is gaining ground. An increasing number of HEI-based initiatives promote entrepreneurship, offering more courses related to entrepreneurship across universities and, importantly, across programmes of study. Some of these initiatives have led to the development of successful spin-offs and start-ups. FoodOxys, a spin-off company of the University of Thessaly, for example, aims to ensure nutritional wellness on an individualised basis. It is the result of many years of work, presented in more than 180 papers in world-renowned scientific journals, by a team of distinguished researchers in the fields of nutritional biochemistry and human metabolism. The company, which, in a “brain gain” effort, has distributed part of its shares to young researchers (graduates of the university’s Department of Biochemistry and Biotechnology), has raised EUR 250 000 in pre-seed funding from Uni.fund (under the EquiFund Investment Platform). In addition, ResQ Biotech, a spin-off of the National Hellenic Research Foundation, was one of the only 44 recipients of the prestigious spin-off prize 2020 awarded by Nature Research. Merck and RTsafe and Magos (Magos, 2021^[1]) were among the top five start-ups in the Startup Business and Growth Programme latest innovation contest (STARTUP3, 2021^[2]).

These positive trends open new options for the Greek higher education system, such as generating creative activities to develop entrepreneurial mindsets of students outside the classroom. Entrepreneurial education is not limited to learning about entrepreneurship; it involves learning for and through entrepreneurship. The ways in which HEIs can deliver entrepreneurial education within their institution are expanded in the HEInnovate Framework (Box 2.1).

Box 2.1. Entrepreneurial Teaching and Learning in the HEInnovate Framework

The HEInnovate Framework defines entrepreneurial teaching and learning as involving exploring innovative teaching methods and finding ways to stimulate entrepreneurial mindsets. It is not just learning about entrepreneurship; it is also about being exposed to entrepreneurial experiences and acquiring the skills and competences for developing entrepreneurial mindsets.

The dimension is identified as have the following four characteristics:

1. The HEI provides diverse formal learning opportunities to develop entrepreneurial mindsets and skills.
2. The HEI provides diverse informal learning opportunities and experiences to stimulate the development of entrepreneurial mindsets and skills.
3. The HEI validates entrepreneurial learning outcomes, which drives the design and execution of the entrepreneurial curriculum.
4. The HEI co-designs and delivers the curriculum with external stakeholders.

Source: HEInnovate (2021^[3]), *Homepage*, <https://heinnovate.eu/en> (accessed on 28 May 2021).

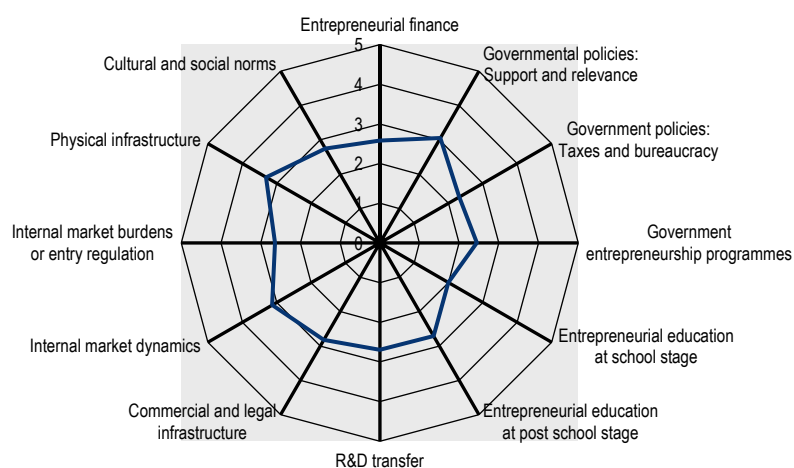
The state of entrepreneurship in Greece is improving

Macro picture of entrepreneurship

As of 2020, 97.4% of firms in Greece employ up to nine employees, and one in four has an R&D department (Caloghirou et al., 2021^[4]). A number of metrics, such as failure rate and ease of starting a company, have improved in recent years (Bosma et al., 2020^[5]). The Global Entrepreneurship Monitor (GEM) confirms

improving trends in terms of entrepreneurial framework conditions. For example, physical infrastructure is relatively strong, scoring 3.5/5. Nevertheless, entrepreneurial finance scores 2.5/5 and R&D Transfer scores 2/5 (Figure 2.1). The Global Innovation Index paints a similar picture, showing that Greece is lacking in creative input and business sophistication, while performing relatively well in terms of human capital.

Figure 2.1. Greece's entrepreneurial framework continues to experience significant weaknesses



Note: Ratings: 1 = highly insufficient, 5 = highly sufficient, most recent.

Source: Authors' elaboration based on the (GEM, 2021^[6]) Entrepreneurial framework conditions data, Greece Country Profile. <http://gem-consortium.ns-client.xyz/economy-profiles/greece/policy>

Current policy initiatives

The last main pillar of the entrepreneurial ecosystem in Greece narrates the policy side. Within it, the main national effort is Elevate Greece, the official platform and leading resource for in-depth information on the Greek Start-up Ecosystem (Elevate Greece, 2020^[7]). Elevate Greece includes the following activities: a) mapping entrepreneurial activity by developing a database of start-ups in Greece; b) track start-ups' progress using Key Performance Indicators, which should allow targeted policy interventions when applicable; c) initiate entrepreneurial prizes; and d) engage in the attraction of entrepreneurial finance, in part by offering generous tax breaks for angel investors investing in the Greek entrepreneurial ecosystem.

After the expiration of the JEREMIE (Joint European Resources for Micro to Medium Enterprises) funds investment period (2007-2013), the Greek government collaborated with the European Investment Fund (EIF) in a public private partnership: EquiFund, a fund-of-funds programme through which more than EUR 400 million is expected to be invested in the Greek market, to boost entrepreneurship and creating a lasting impact on local businesses. Funds are provided by the European Union and the Hellenic Republic; the scheme will also be financed by the EIF and the European Investment Bank (EIB), through the European Fund for Strategic Investment (EFSI). EUR 200 million is provided by national funds, EUR 60 million from the EIF and EUR 40 million from the EIB. The remaining amount is to be funded by the private sector. Investments via EquiFund are directed to companies with an establishment or branch in Greece, in the form of equity financing, complemented by the investors' support for access to knowledge, connections in the local start-up ecosystem and guidance on how to make the most of the teams' and founders' potential. EquiFund investments are scaled along three separate windows, each involving a different set of funds, directing their investments at specific areas of the market: the innovation window, funding pre-seed and seed stages through four funds, for an aggregated target size of EUR 133 million; the early-stage window, funding seed and series A stages through two funds for an aggregated target size

of EUR 82 million; and the growth stage window, funding scale-up and expansion through three funds for an aggregated amount of EUR 210 million (Foundation, n.d.^[8]).

In March 2021, a new fund-of-funds, AccelerateTT, established by the Hellenic Development Bank of Investments (HDBI) was announced. It has invited proposals for the establishment and management of Venture Capital Funds. Investments of the new funds will be directed towards seed capital and technology transfer, ultimately enabling and speeding up the promotion and transfer of research to the market, while each investment will not exceed EUR 300 000 per start-up enterprise. This programme aspires to cover the entire funding chain of Greek start-ups with extroverted characteristics and significant scalability prospects. The investment schemes that will be selected will invest through equity participation and/or convertible bonds and/or rights-bearing bonds, in innovative, scalable start-ups that maintain an establishment in the Greek territory at the time of investment. Total public funding through HDBI is EUR 60 million, and through the establishment of venture capital funds, the final available amount will be leveraged by the participation of private investors. Total equity, leveraged and directed to start-ups, is expected to exceed EUR 120 million (HDBI, 2021^[9]).

A EUR 60 million fund targeting start-ups experienced losses due to COVID-19. These will be distributed as subsidies, soft loans and other means. Finally, plans have been designed to create innovation hubs in Athens and in Thessaloniki, which will be hosting R&D departments of established corporations, incubators, spin-offs and other stakeholders of the entrepreneurial ecosystem. Greece is already attracting significant, rapidly developing companies, which have chosen it to locate part of their operations. Pfizer's Centre for Digital Innovation (CDI), part of the Pfizer Digital global network, is already operating in Thessaloniki, and with the second hub the pharmaceutical company is planning to establish in the city, the total investment is expected to exceed EUR 100 million. In 2018, Tesla Inc., the US electric vehicle manufacturing company, set up Tesla Greece, a local research and development subsidiary, based at the Lefkippos Technological Park, on the grounds of the Demokritos National Centre for Scientific Research in Athens. In Thessaloniki, Cisco's International Centre for Digital Transformation and Digital Skills started operating in the autumn of 2020 and is developing its co-operation with local and international partners. In spring 2021, the company signed a Memorandum of Understanding to establish the International Maritime Technology and Innovation Centre on the island of Syros, with ONEX Neorion Shipyards and the Prefecture of the South Aegean.

Significant funds, through the National Structural Funds Programme, were to be available to HEIs and research centres by the end of Spring 2021, to support the development of innovation capabilities, entrepreneurial teaching and learning, incubation centres and technology transfer offices, in a collaborative effort between the Ministry of Education and Religious Affairs and the Ministry of Development and Investments. The two ministries have set up two complementary funding programmes, to support innovation in higher education throughout the spectrum of its development: from teaching and practical learning and familiarisation activities, to the full deployment of services to support knowledge and technology transfer and intellectual property management. A total of EUR 30 million will be sourced in these activities in the next three years.

Entrepreneurial education in Greek HEIs

As outlined in Chapter 1, by constitutional law, tertiary education is provided only by publicly owned institutions in Greece. These institutions are split into the following categories: 1) comprehensive universities, such as Aristotle University of Thessaloniki, which offer degrees across disciplines; 2) specialised universities, such as Athens University of Economics and Business; 3) technical institutions, which have been merged recently to form comprehensive universities; and 4) research centres, such as the Centre for Research and Technology-Hellas, which do not grant degrees but conduct research, often in collaboration with universities.

The private sector offers an alternative pathway for high school graduates, as foreign universities operate in Greece through franchising schemes with Greek partners: these are the so-called “colleges”, which organise both undergraduate and postgraduate programmes of studies.

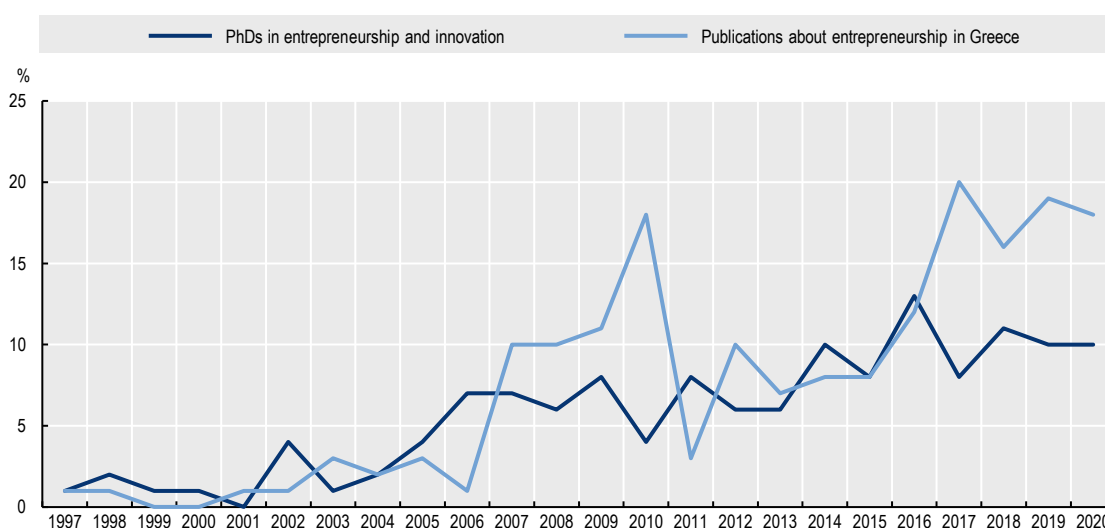
After an accreditation process, graduates of these colleges, under Directive 2005/36/EC of the European Parliament and of the Council of 7 September 2005 on the recognition of professional qualifications, may be granted the same professional rights as those of a Greek public university graduate, and thus have the right to be employed in the public sector. On the other hand, degrees from colleges are not recognised academically. That means for example, that a BSc. college graduate cannot be admitted into a MSc. programme of a Greek public university. In the present chapter, the focus is on entrepreneurial teaching and learning in public universities. However, to offer a more comprehensive picture, noteworthy practices from private colleges are included.

Entrepreneurial education is gaining momentum in Greece

Entrepreneurial teaching and learning is gaining momentum in Greece. The number of relevant courses offered is increasing, and HEIs are launching formal structures, such as technology transfer offices (TTOs) to support entrepreneurship. HEIs promote awareness of entrepreneurship within the student community and overall entrepreneurship is starting to become an integral part of higher education in Greece.

Although still in its emerging phase, the increasing relevance of entrepreneurship among HEIs in Greece is evident. Doctoral dissertations in entrepreneurship and innovation are steadily increasing, but they remain small both in absolute number (averaging 10 per year since 2015) and as a percentage of the total number of dissertations in Greek HEIs (an average of 0.6% per year since 2015). The number of publications paints a similar picture: published research on Greek entrepreneurship is growing but remains limited (Figure 2.2). Nonetheless, the increase in the relevance of entrepreneurship is relatively homogenous across institutions. This supports the system-wide increase in entrepreneurial efforts, as proxied by the intensity of research on entrepreneurship. Given this overall context, entrepreneurial education in Greece takes four main forms, outlined below.

Figure 2.2. Research on entrepreneurship is increasing in Greece, 1997-2020



Note: PhDs in entrepreneurship and innovation: numbers refer to the percentage of PhDs in entrepreneurship and innovation/total number of PhDs awarded in Greece.

Source: Author's calculations, based on data retrieved from (EKT, 2021_[10]) Greek National Archive of PhD Thesis (<https://www.didaktorika.gr/eadd/?locale=en>).

HEIs offer classes, seminars, mentoring and similar initiatives on entrepreneurship

Entrepreneurship-related courses, across institutions, are offered as part of undergraduate curricula in different programmes, including entrepreneurship-dedicated programmes, mainly at the graduate level. Aristotle University of Thessaloniki, for example, lists 27 courses related to entrepreneurship, with 2 507 students enrolled. Offering classes across programmes is noteworthy, since it gives students in different disciplines, such as engineering or medicine, an early exposure to entrepreneurship.

In many cases, these seminars and events are part of a systematic process, such as a series of thematic seminars, or constitute the “educational part” of an entrepreneurship competition.

The IDEA project (Inter-Departmental Entrepreneurial Assignment) of the Athens University of Economics and Business brings together students from all departments of the university to form entrepreneurial teams and focus on specific areas. Students are trained through workshops and seminars such as business planning, market research and pitching, and are then invited to present their final ideas in a formal ceremony, where they are validated by a scientific committee and given an award by the Rector.

Entrepreneurship and thematic student innovation competitions comprise a large part of the non-typical learning activities that complement entrepreneurial teaching and learning in Greek HEIs. They usually last 4-8 months and constitute an early acceleration process for new entrepreneurial ideas, often as the introductory part to the larger system of the incubation process of the university. Thematic competitions are organised, often at an academic department level, such as the Green Tech Challenge of the National Technical University of Athens. Entrepreneurship competitions are organised by many universities at an institutional level, such as those of the Hellenic Open University, the Athens University of Economics and Business, the Hellenic Mediterranean University and the “Aegean Start-ups” competition of the University of the Aegean. “Ennovation”, a competition organised at a cross-university level, invites entrepreneurial ideas on innovation, new technologies, global-scale competitiveness and sustainable development, and is run by a network of 19 universities in Greece and two in Cyprus, with the organisational support of the Athens University of Economics and Business. Shorter, intensive programmes in a similar vein are being organised, such as Start-up Weekends themed “Entrepreneurial Journalism”, organised bi-annually by the department of Communication, Media and Culture of the Panteion University and the Blue Hackathon of the University of the Aegean.

Mentoring networks often make up part of a university’s ecosystem to support the development of entrepreneurial ideas, as in the University of Ioannina and the Athens University of Economics and Business.

The Career Day for Start-ups offers students a unique learning experience of working in start-up companies to acquire a hands-on understanding of the specifics of developing a new, innovative, business. Such events are organised on an annual basis by the Career Office of the University of Patras and also by the Athens Centre for Entrepreneurship and Innovation of the Athens University of Economics and Business, in collaboration with the National Technical University of Athens and the Innovation, Entrepreneurship and Technology Transfer Office of the Agricultural University of Athens (InnovInAgri). Apprenticeships in Start-ups are offered as a distinct stream by Greek HEIs, as at the University of Ioannina.

HEIs also organise events on entrepreneurship open to the wider public. The University of Western Macedonia offers seminars to any interested party, provides mentoring services, and organises student visits to incubators, technology parks and research centres. Similarly, Aristotle University of Thessaloniki, through its Career Services Office, has offered 14 seminars in the last three years and organised a number of workshops. The Aegean Startup, the digital accelerator of innovation and entrepreneurship of the University of the Aegean, offers similar services, with a focus on the Aegean area. Such efforts, which go beyond formal training, are important as a means to generate spill-overs to wider communities. They are thus linked to the so-called “third mission” of universities, in the sense that they generate an (economic) impact parallel to contributions in teaching and research.

Box 2.2. The German EXIST programme to promote HEI-based entrepreneurship

The EXIST – University-based Business Start-ups programme was established in 1998 and run by the German Federal Ministries of Education and Research and later on of Economics and Technology. Its explicit goal was to support and promote start-up creation by students, faculty and graduates of German universities. The underlying rationale for the programme is that entrepreneurship support includes a number of intertwined actors embedded in entrepreneurial ecosystems, and that all contribute to start-up creation and growth. Volkmann and Grünhagen (2014_[11]), analyse this approach under the heading Start-up Support in a Wider Sense. The programme included four phases, each meant to gradually strengthen HEI-based entrepreneurship: EXIST I (Model Regions), which ran from 1998 to 2001; EXIST II (Transfer), which ran from 2002 to 2005; EXIST III (Specific Projects), which ran from 2006 to 2011; and EXIST IV (Entrepreneurial Universities), which ran from 2010 to 2018.

Source: (OECD/European Union, 2019_[12]) Volkmann, C. and M. Grünhagen (2014_[11]), “Integrated support for university entrepreneurship from entrepreneurial intent towards behaviour: The case of the German ‘EXIST’ policy programme”, in A. Fayolle and D. Redford, *Handbook on the Entrepreneurial University*, Edward Elgar, Cheltenham, pp. 225-247.

HEIs establish institutional structures to boost entrepreneurship

Greek HEIs have opened new doors to promote entrepreneurship. For instance, Aristotle University of Thessaloniki and the Agricultural University of Athens both have a formal technology transfer office (TTO), tasked with the commercialisation of research via patents, spin-offs, licensing and forging ties with industry. Aristotle University’s TTO is the oldest in the country, having led to 12 spin-offs since 2017 and 75 patents. The National Centre for Scientific Research “Demokritos” has a liaison office that is effectively a TTO (NCSR, n.d._[13]). Similarly, the Foundation for Research and Technology-Hellas, in Crete, also has a TTO that is part of the PRAXI Network (FORTH, 2020_[14]). This was initiated by the Foundation for Research and Technology-Hellas in 1991 and acts as a bridge for SMEs to build cross-border technological co-operation. Besides standard services that TTOs offer, such as IP protection guidance, it also offers boot camps for aspiring entrepreneurs. For example, Aristotle’s TTO organises events with Texas A&M University.

The National Technical University of Athens (NTUA) and the University of Crete are also in the process of establishing a TTO. Indeed, within this broader effort of NTUA to boost technology transfer, it has signed a memorandum of collaboration with the Hellenic Development Bank to support academic entrepreneurship (NTUA, 2021_[15]).

HEIs develop business incubators that provide space, consulting services and access to business networks for start-ups, some of them originating in academic research. For example, in 2014, the National Technical University of Athens launched the in*vent ICT incubator, with a focus on the ICT sector. As stated formally on its website,¹ “the programme was designed with the vision to help develop a new generation of entrepreneurship and technological development, through the creation of new and sustainable businesses”. In its first two cycles, the incubator accepted 53 of the more than 100 proposals it received, and incubator-graduated teams have raised more than EUR 1 million as of today. The third cycle supports 16 start-ups. The National Centre for Scientific Research “Demokritos” launched Lefkippos, its business incubator, in 1992 (Lefkippos, 2019_[16]). Lefkippos is located in Attica Technology Park and hosts technology-based companies in fields such as energy, life sciences, ICT and advanced materials. It offers a number of services to incubator firms besides office space. These include access to laboratory equipment, business support, networking events with Demokritos’ researchers, information days on fundraising opportunities, and mentoring or consultancy on good practices, and so on. Since 2018, Tesla Greece has been located at the Demokritos NCSR facilities since 2018 (Ekathimerini, 2018_[17]). Similarly,

the Centre for Research and Technology-Hellas (CERTH), a research institute, has five institutes in tech-based fields, including chemical processes and information technology. It has also offered incubator services since 2000 and is presently hosting six companies. CERTH has spun off 13 companies since 2007, averaging two spin-offs per year since 2016, although not always through its incubator programme.

Entrepreneurship education offers HEIs a chance for collaboration with stakeholders

HEIs in Greece also work with their surrounding industry. Collaborations of this sort feed into technology transfer and knowledge spill-overs and can boost entrepreneurial attitudes. Here are some examples:

- The PRAXI Network provides “Information, mediation and support to SMEs and research institutions in innovation, technology transfer, research collaboration, internationalisation and extroversion, and the exploitation and integration of research results into the production process”. The network began in 1991 as a partnership between the Foundation for Research and Technology-Hellas (FORTH) and the Hellenic Federation of Enterprises (SEV), with the mission to link industry with academia. This strategic alliance of the research and industrial world of Greece was reinforced in 1995, when the Federation of Industries of Northern Greece joined the partnership. Since then, the Association of Industries in Thessaly and in Central Greece and the Federation of Enterprises and Industries of the Peloponnese and Western Greece have also joined.
- The Stavros Niarchos Foundation (SNF) Industrial Research Fellowship Programme at the National Centre for Scientific Research “Demokritos” offers fellowships to Demokritos researchers, at the doctoral, postdoctoral and adjunct researcher level, to develop commercial applications of their research by working with companies. The following quotes from SNF’s website illustrate the scope of the programme and its goals:

“They leave the lab to collaborate with multinational companies and their leaders, learning to work in accordance with real-world needs and the pressing deadlines of the market. They see theory turn into practice and their research translated, in many cases, into real products.

“For the past four years, through the SNF Industrial Research Fellowship Programme for doctoral, postdoc and adjunct researchers at Demokritos and in collaboration with 61 Greek and multinational corporations, something that had been missing in Greece has appeared: a link between academic research and the market. Each of the 74 fellows, from a variety of fields including nanotechnology, telecommunications and nuclear and radiological sciences, has had the opportunity, for the first time in their research career, to step out of the laboratory, to work with companies, and to help them provide solutions to real-world problems and needs.”

- The University of Patras has set up the UPatras IQ Industrial Doctoral Programme to support four-year, industry-oriented doctoral programmes. These involve collaboration between the university, a private company or industry based in Greece and a fellow doctoral candidate. The initiative grew out of the Patras Innovation Quest (Patras IQ), whose goal was to help turn scientific achievements into innovative products and services, and linking research in academic institutions with industry and the market. Patras IQ is a joint initiative of the University of Patras and the Chamber of Achaia, with participation from the Ministry of Development and Investments, the Ministry of Education and Religious Affairs, the University of Patras, the Hellenic Open University, the Prefecture of Achaia and the Chamber of Achaia.
- Under EquiFund, Uni.fund is a venture capital firm that chiefly targets university-based entrepreneurship. Uni.fund makes pre-seed investments of up to EUR 250 000 and seed investments of up to EUR 500 000. It has 25 start-ups in its portfolio, some of them university spin-offs such as Cyrus, a Demokritos spin-off, FoodOxys, a spin-off of the University of Thessaly, and PLiN Nanotechnology S.A., a spin-off of the Aristotle University of Thessaloniki.

- Aristotle University of Thessaloniki has also built ties with industry, including a) guest lectures by (local) entrepreneurs, b) collaborations with industry players, such as the Uni.fund and Metavallon, and c) hosting Career Fairs through its Career Services Office, to introduce employers to students and graduates.

Private colleges promote entrepreneurship

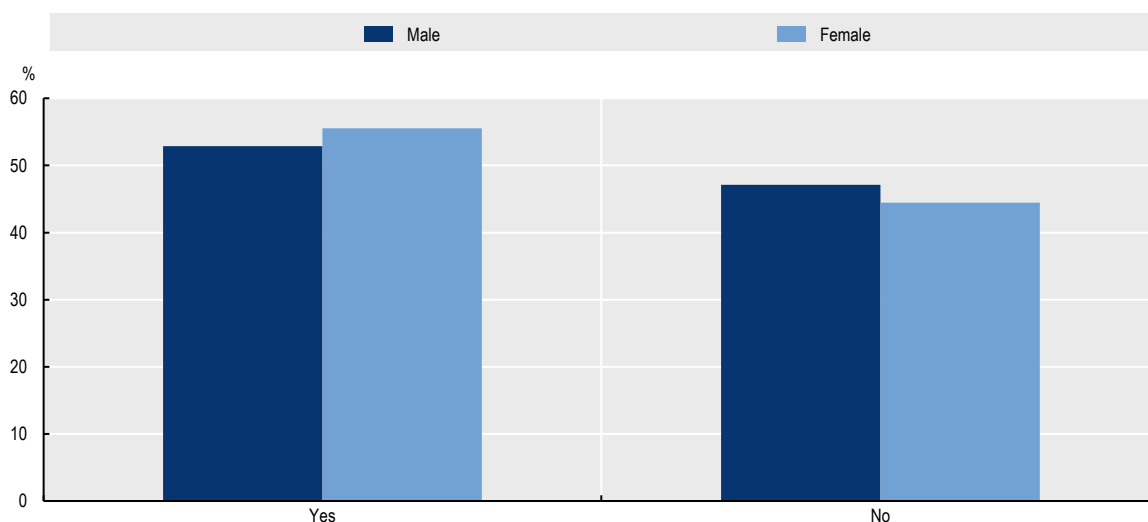
Private colleges are also active in promoting entrepreneurship through teaching, organising events and ties with industry. VentureGarden,² for example, is a free entrepreneurship education programme offered by Alba Graduate Business School, the American College of Greece (ACG) in Athens and the American College of Thessaloniki (ACT), the tertiary division of Anatolia College.

Results of the Entrepreneurial Student Survey

The HEInnovate Review of Greece introduces a novel feature, the Entrepreneurial Education (EE) survey. This surveyed students of Greek HEIs, giving them the opportunity to contribute directly to the analysis of the Review. As of June 2021, 649 students studying in Greek HEIs had responded to the survey.

Of the respondents, 43% identified as male, and 55% as female (11 respondents did not specify); 78% were older than 21 and 27% were 21 years old or younger. About half had already participated in their HEIs' entrepreneurial activities (56% of whom were born before 2000 and 49% born on or after 2000) (Figure 2.3).

Figure 2.3. About half of students surveyed had participated in their HEIs' entrepreneurial activities



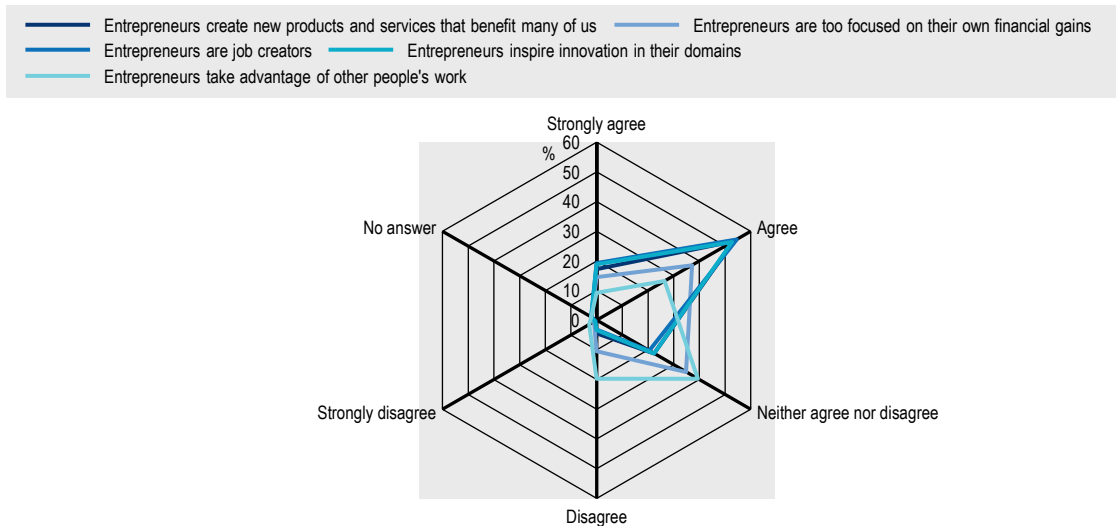
Source: Author's research, based on the Entrepreneurship Education Survey (OECD, 2021^[18]).

The EE survey for students aims to shed light on students' views on entrepreneurial practices. In Greece, the results indicate that entrepreneurs are viewed in a positive light. A majority of students believe that entrepreneurs create new and innovative products that help create jobs (Figure 2.4).

However, only 54% of respondents reported that they were learning about entrepreneurship at their HEI, either through dedicated courses on entrepreneurship, or through lessons and activities included in other courses. Of this percentage, lectures on entrepreneurship by a university professor, reading about

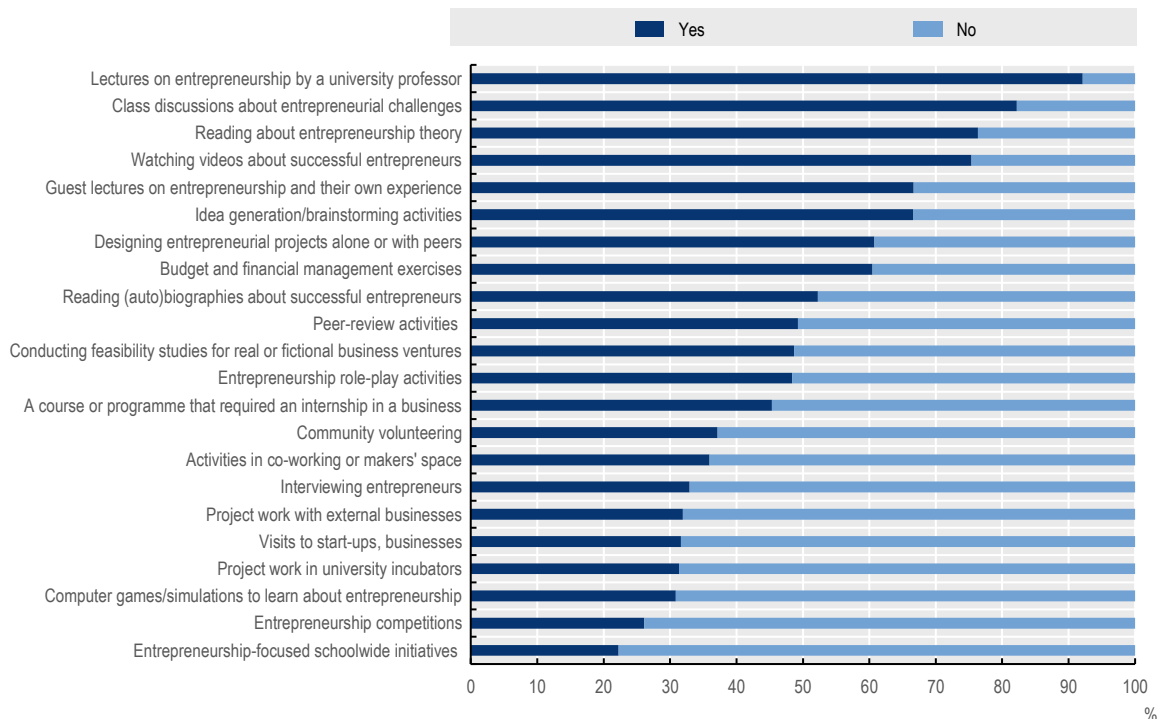
entrepreneurship theory and class discussions about entrepreneurial challenges were chosen as the most common ways to learn about entrepreneurship (Figure 2.5).

Figure 2.4. Students' view of entrepreneurs is positive



Source: Authors' elaboration based on the Entrepreneurship Education Survey (OECD, 2021_[18]).

Figure 2.5. Students learn more about entrepreneurship through lectures and class discussions

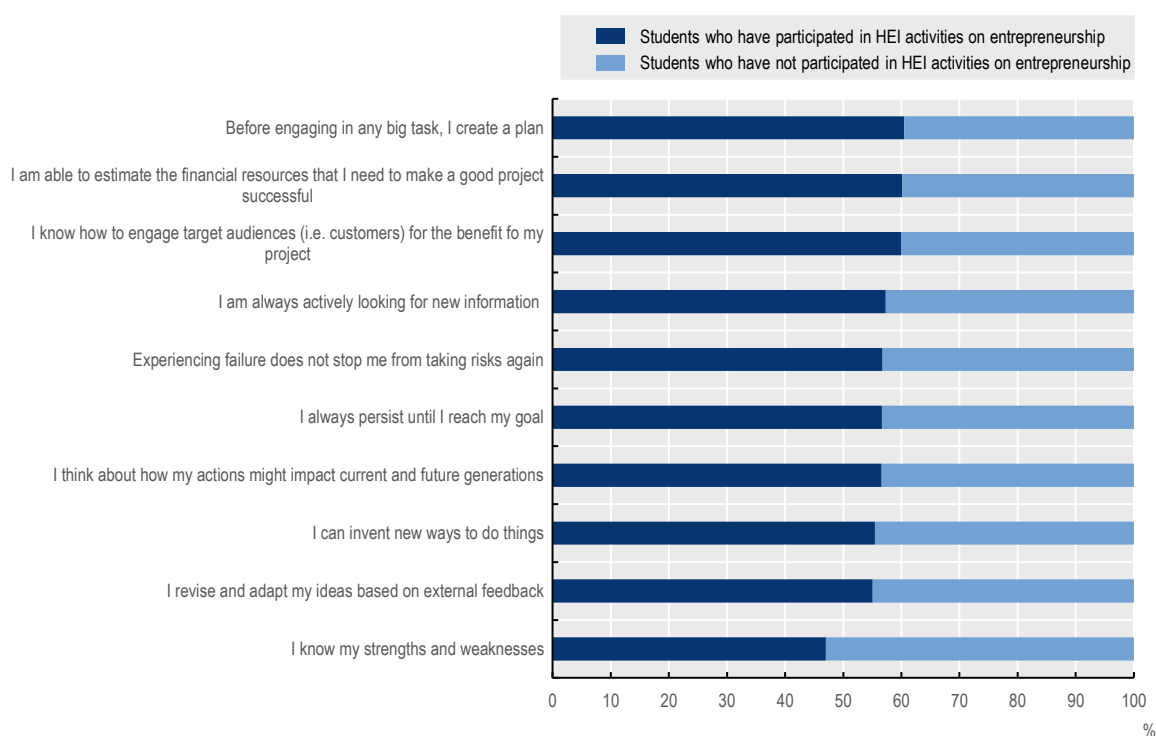


Note: The survey asked "Have you participated in the following activities facilitated by your Higher Education Institution?". The lighter bars also represent participants who did not provide an answer.

Source: Authors' elaboration based on the Entrepreneurship Education Survey (OECD, 2021_[18]).

The EE Survey also asked respondents to self-assess their competencies and skills in entrepreneurship. The goal was to assess how HEI activities had enhanced the students' capacity to create new businesses, implement projects and identify and recognise their personal skills and competencies. Results indicate that, after participating in HEIs' entrepreneurial activities, the students' assessment of their skills in communication and planning appeared to be more positive (Figure 2.6).

Figure 2.6. Students' self-assessment after participating in HEI entrepreneurial activities



Note: The survey asked "To what extent do you feel confident about the following descriptions of yourself?" on a scale from 1 to 5. The lighter bars also represent participants who did not provide an answer.

Source: Authors' elaboration based on the Entrepreneurship Education Survey (OECD, 2021^[18]).

Assessment and challenges of entrepreneurial education in Greece

The interpretation and scope of entrepreneurship teaching could be expanded

Overall, entrepreneurship is viewed positively and is often equated with creating new companies. Entry into entrepreneurship in the form of business creation is an integral part of what entrepreneurship is and what it entails. A focus on business creation is not uncommon and to a large degree expected, especially because entrepreneurial teaching and learning is still in its early stages in Greek HEIs.

The implications of focusing on starting a company as the definition of entrepreneurship is twofold:

- Courses on accounting, business planning and other subjects related to running a business are considered entrepreneurship courses. This could limit the way entrepreneurship is seen in academic communities, with potential ramifications for the way students, faculty and other stakeholders think of (their) career options and the practical relevance of enrolling in such courses.
- The curricula of different programmes become, by design, less comprehensive than they might be. That is, they do not touch upon facets of entrepreneurship that are not always or even directly related to starting a company.

The interviews revealed that HEI courses have a strong emphasis on entrepreneurship. HEIs could broaden their courses to include leadership and intrapreneurship, defined as acting entrepreneurially within existing businesses. This wider focus could allow teachers and students to identify and engage with techniques of intrapreneurship, and act in novel, unexpected ways within established corporations. More importantly, a wider focus would teach how and why intrapreneurship could lead to entrepreneurship (Kacperczyk, 2012^[19]).

Some HEIs already offer courses with a wider definition of entrepreneurship. The Archimedes Centre for Research, Innovation and Entrepreneurship at the National and Kapodistrian University of Athens (NKUA) is a Business Accelerator that aims to connect the research community with industry and incubate the best entrepreneurial ideas of the academic community and NKUA's alumni to start-ups. After its 15 months of operation, Archimedes is funded by sponsorships and donations from the National Bank of Greece, Eurobank, Piraeus Bank and Alpha Bank. The TTO facilitates collaboration of researchers and faculty with industry, at various stages of development and use of the university's intellectual property. The Business Accelerator offers NKUA's students and alumni consulting services, entrepreneurial training, co-working space, mentoring by experienced practitioners and networking with Greek and foreign agencies, aiming to accelerate the idea to market business process and the creation of sustainable businesses.

The Athens University of Economics and Business has organised a Youth Entrepreneurship Summer Programme (YES). This is an intensive two-week programme to promote entrepreneurship and innovation, introducing the Greek entrepreneurial ecosystem to high school students in lectures, workshops and competitions, while embracing teamwork among students of different backgrounds. Its curriculum includes lectures and workshops on finance, business, innovation, leadership, analysis of case studies in domestic and international settings, business games, group activities and business plan development. Only a small fraction of the classes and activities are dedicated to new venture creation, and most aim to broaden participants' knowledge base, give them the chance to understand the business world, and instil an entrepreneurial attitude, so they can explore their potential as future entrepreneurs and as business executives. The first YES programme was held in the summer of 2010. Since then, more than 600 students from 260 schools (65% from Attica's prefecture and 35% from other regions) have participated. In recent years, the programme has had 80 to 100 participants per year (AUEB, 2018^[20]).

Support for academic entrepreneurship could be increased

Recent evidence shows conclusively that engaging in academic entrepreneurship benefits research and teaching (Fini, Perkmann and Michael Ross, 2021^[21]). Offering incentives to faculty to engage in entrepreneurial activities not only increases their chances of generating research income but can boost research and teaching performance. Academic entrepreneurship in Greek HEIs has benefited from the introduction of new institutional structures, including patenting, licensing of academic inventions, start-ups, contract research and consulting (Grimaldi et al., 2011^[22]). Such activities are typically facilitated by TTOs or similar institutional structures, which provide legal support, consulting services and market research. In promoting academic entrepreneurship, Greek HEIs follow international practice (Clarysse et al., 2005^[23]; Hulten, 2010^[24]; Siegel et al., 2003^[25]). This is a positive step, because academic entrepreneurship not only boosts academic performance but can generate sustainable income for HEIs (D'Este and Perkmann, 2011^[26]).

These new institutional structures are a promising development, but there is scope for improvement. Some countries, Austria, for example, offer incentives for academics to engage in entrepreneurship. These may relate to intrinsic motivation or, in some cases, the availability of research funds to sponsor doctoral students and lab managers. In line with government regulations, Greek HEIs, however, offer no such incentives. Academic entrepreneurship may receive soft recognition but is not explicitly considered in cases of tenure or promotion. In the United States, by contrast, patenting, for example, is an explicit criterion for promotion.

Box 2.3. Language used to incorporate entrepreneurial activities in tenure and promotion documents at selected universities

College of Engineering at Carnegie Mellon University

“Research: Measures of excellence in this area include the quality, volume, and impact of publications, including papers, monographs, books and research reports; evaluation of research by others; patents; prizes and awards for research; solicited and invited lectures; the amount of financial support; and the contribution of the candidate’s work towards the needs of society”.

Pennsylvania State University

“Other evidence of research or creative accomplishments as appropriate (patents, new product development, new art forms, citation index analysis, etc.)”.

University of Wisconsin Madison

“[E]vidence of research performance and of a candidate’s standing in a discipline includes ... patents or evidence of intellectual property. The case must be made as to the quality and level of contribution of the candidate’s present work”.

Source: Sanberg, P. et al. (2014_[27]), “Changing the academic culture: Valuing patents and commercialization toward tenure and career advancement”, <https://doi.org/10.1073/pnas.1404094111>.

Other incentives may include flexible work arrangements with industry. This could take the form of part-time posts of academics in private companies, for example, faculty from Carnegie Mellon University in the United States working for Uber. It could also materialise in secondments, in which employees of a given organisation work full-time in a different organisation for a finite period before returning (Kolympiris, Hoenen and Klein, 2019_[28]). Both part-time posts and secondments are common across industries. In the United Kingdom, Shell, British Gas and Rolls-Royce, for example, have seconded their employees to the Department of Energy and Climate Change. The Advisory Centre on World Trade Organization Law runs a secondment scheme with lawyers from developing countries. Scores of accountancy firms and hospitals run different secondment schemes (Beaverstock, 1996_[29]).

Entrepreneurship education could generate stronger ties with industry. While Greek HEIs engage with industry, there is room for improvement. Greece ranks 119th out of 131 in the Global Innovation Index metric on university-industry research collaboration. Going forward, progress made within these links can also spill over to broadening the curriculum and finding innovative ways for teaching entrepreneurship.

For instance, the Hellenic Federation of Enterprises (SEV), works closely with private institutions and less so with public HEIs (Alba Graduate Business School, 2020_[30]).¹ Similarly, the SNF fellowship programme is run mainly through the National Centre for Scientific Research “Demokritos”, perhaps the leading institution in Greece in forging industry ties. Aristotle University of Thessaloniki and the National Technical University of Athens are also in the process of setting up industrial PhDs. These are, in our assessment, steps in the right direction.

Similarly, across HEIs, internships are not always standardised, which could prove problematic. Employment and career centres do help towards standardisation and some successful cases, such as Athens University of Economics and Business, do exist (AUEB, 2021_[31]), but there is room for improvement.

Efforts to promote entrepreneurship within HEIs could be expanded

Across the board, efforts to promote entrepreneurship have increased, and further synergy between them could help promote entrepreneurship. Some cases are noteworthy. The TTO of Aristotle University of Thessaloniki, for instance, has provided active support and advice during the establishment of the “Archimedes” Centre of the National and Kapodistrian University of Athens. ACEin, the Entrepreneurship Centre of AUEB, co-ordinates Ennovation, an entrepreneurship acceleration programme/competition in collaboration with 20 other HEIs in Greece and Cyprus. Similarly, the joint “Digital Innovation and Start-up Entrepreneurship” MSc. programme of the University of the Aegean and the National Technical University of Athens have provided entrepreneurship support.

Exchange of best practices, mobility of personnel, joint events and the like between the different initiatives, however, is limited (Jensen, Thursby and Pham, 2013^[32]; Kang and Miller, 1999^[33]; Michael and Balraj, 2003^[34]; Obst and Kuder, 2015^[35]). International experience has shown that synergies of this sort can generate significant spill-over effects and are fertile ground for knowledge exchange.

To a lesser extent, the efforts are not always strongly integrated in the same university. In its basic form, this lack of integration manifests in some efforts not being promoted centrally; for example, at university websites or through widely distributed leaflets targeting the student population. As a result, noteworthy efforts can go unnoticed, which is likely a forgone opportunity for interested parties.

Further efforts could focus on internationalisation, since most efforts towards entrepreneurial teaching and learning do not include a strong internationalisation component. This is partly explained by the regional focus of recent efforts, but other explanations can be offered.

The vast majority of classes are offered in Greek, both at the undergraduate and the graduate level. This is mandated by Greek law, and presents a significant obstacle in allowing students to have a broader and comprehensive view of entrepreneurship. Along the same lines, documentation of study programmes, modules, instructor credentials are also primarily in Greek. Recently, Law 4 692/2020 (Art. 82) provided for the introduction of academic programmes for foreign students by Greek HEIs. It also provides (Art. 91) for joint academic programmes with foreign HEIs.

One example of an internationalised programme is “e-Leadership” in Algebra University College in Croatia (Box 2.4). The majority of modules in the e-Leadership Master of Business Administration (MBA) programmes are held by faculty from the Kelley School of Business at Indiana University in the United State (Technopolis, 2018^[36]).

Finally, the programmes tend to be run only by local faculty of Greek origin. Almost no visiting professors from outside Greece came in. It would be expected that the majority of modules and seminars might be run by local faculty, but in our assessment, the virtually complete lack of international externals is noteworthy. External faculty could introduce fresh perspectives, ideas and views. These could be beneficial not only for students but also for local faculty, since they could interact with them, learn from them and even start developing joint research projects. An abundance of evidence demonstrates how mixing and mingling with outsiders is a key ingredient of scientific progress.

Box 2.4. e-Leadership programmes in Algebra University College (AUC) in Croatia

Algebra University College (AUC) is a private, non-profit Croatian higher educational institution focusing on applied sciences education for digital competences. Within AUC, the e-Leadership MBA was accredited in 2016 as a two-year specialised professional master programmes (120 ECTS, 1 credit) in digital entrepreneurship education, in the field of economy and management. e-Leadership is a new paradigm proposed by the European Commission. AUC considers e-Leaders as people who are “both

business and digitally savvy and exhibit a capability to lead strategically". The programme is designed for individuals who are "business professionals and talents aspiring to become leaders of corporate digital transformation or to start-up effectively their own innovative and disruptive business venture in the digital world". Hence, the e-Leader represents a special type of entrepreneur, or intrapreneur, or both. The e-Leadership programmes in Algebra University College in Croatia is an example of an internationalised programme. The majority of modules in the e-Leadership MBA programmes are held by faculty from the Kelley School of Business at Indiana University.

Source: Technopolis (2018^[36]), "Entrepreneurial teaching and learning at Algebra University College".

Recommendations

For policy makers

- Explore specific measures to **facilitate and reward academic entrepreneurship formally**. This could be a tripartite process. First, include entrepreneurial activities of academics as criteria for academic promotions, as not to distort the faculty's main mission, to conduct research, these entrepreneurial activities should not be required of all academics. However, for those who are engaged in them, they should count towards career progress. Secondly, offer reduced teaching loads for entrepreneurial academics, to compensate for the time and effort they spend on, for example, starting a company that could eventually generate substantial income for the HEI. Thirdly, allow part-time contracts for faculty who opt to split their time between their entrepreneurial endeavours and their academic duties.
- Create new **institutionalised forms of university-industry** collaboration that will complement the services of incubators and technology parks. For example, like most UK universities, Greek HEIs could have "professors of practice". These are typically successful entrepreneurs and/or investors who assume part-time duties as faculty. Their prime role is to make the most of their insights, in giving hands-on advice to students and faculty with entrepreneurial aspirations. They also often teach foundation courses that allow students to appreciate the nuts of bolts of entrepreneurship. Additional solutions could include sabbaticals for faculty with industrial players, as well as secondments.
- Launch an **online platform on HEI-based entrepreneurship**. The platform would map all the relevant activities and would list a "who's who" of local experts, serving as the focal point of knowledge dissemination. Synergies could be formed as, for example, it will be straightforward to identify experts in a given topic and seek help. Similarly, the platform should work towards minimising duplicate efforts, organising joint events and the like.
- **Offer incentives that could attract leading academics on entrepreneurship from outside Greece**. Such provisions could include offering adequate monetary incentives and minimising paperwork to initiate temporary visits of such academics. In the long run, more (mostly graduate) programmes in Greek HEIs should be offered in English.

For higher education institutions

- **Opening up the curricula to more modules**. Modules such as Leadership, Design Thinking and Intrapreneurship could become integral parts of the curricula in all programmes on entrepreneurship in Greece. This would follow international practice, where, for example, many leading graduate programmes in entrepreneurship and innovation offer such courses.

- Systematically **assess the effectiveness of entrepreneurship teaching and learning activities before and after students have been exposed to them**. Involve in the evaluation students who were not exposed to entrepreneurship education so that this second group can be used as a benchmark. Evaluation of pedagogies should be used to improve practices or design new initiatives. Outcome variables taken into account in the evaluation should include:
 1. Entrepreneurial tendencies, including need for achievement, need for autonomy, creative tendency, risk taking, and drive and determination.
 2. Intention (and realisation) to start a firm or act in innovative ways within paid employment.
 3. Knowledge and skills acquisitions, such as degree of certainty in performing tasks in the categories of marketing, innovation, management, risk taking and financial control.
- **Embed internship programmes in the curriculum**. Internship programmes have proved to be successful components of tertiary education. One or two months is not long enough for a student to absorb and understand the culture of an industry and how it operates.

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Notes

¹ For more information, please visit <http://inventict.gr/en/about-us-en/>.

² For more information, please visit (<https://www.thehellenicinitiative.org/>).

3

Digital Transformation and Capabilities

Digital technologies are rapidly transforming societies and economies. Particularly in the context of the COVID-19 pandemic, higher education institutions (HEIs) continue to be affected by the massive shift to digital tools and platforms. This chapter gives insights into Greece's digital transformation and capability, based on three main axes: infrastructure; teaching and learning; and internationalisation, and then provides recommendations for policy makers and HEIs.

Introduction

The rapid progress of technology and digital tools is changing the ways in which societies and economies function. In recent years, this pace of change has accelerated, pushing digital transformation¹ in new directions (OECD, 2019^[1]), including in higher education. The COVID-19 pandemic has dramatically accelerated digital transformation, with transitions from in-person to online classes, straining students' skills and institutions' resources. To reap the benefits of digital transformation and address its challenges, policy makers need to narrow the gap between technological developments and public policies (OECD, 2019^[1]).

HEIs are becoming increasingly aware of the digital transition and its consequences (OECD/European Union, 2019^[2]). As HEIs move beyond the COVID-19 pandemic, they will need to consider how digital transformation changes their education, research, engagement and management activities. (OECD/European Union, 2019^[2]). HEIs must therefore set targets and introduce strategies to recover and benefit from the digital transition (Box 3.1).

Box 3.1. “Digital Transformation and Capability” dimension in the HEInnovate Framework

The OECD and the European Commission incorporated the “Digital Transformation and Capability” dimension in the HEInnovate Framework in 2018. This dimension reflects the growing role of digital technologies in underpinning the objectives of the framework. Updated in March 2021, this dimension illustrates the intertwined nature of the HEInnovate framework, where an entrepreneurial mindset is necessary for achieving digital transformation. In the same vein, digital transformation is critical for delivering entrepreneurial outcomes.

The dimension consists of the following characteristics:

1. The HEI encourages a digital culture and implements and monitors a digital strategy supporting innovation and entrepreneurship.
2. The HEI invests in, manages and continuously improves a fit-for-purpose digital infrastructure.
3. The HEI actively supports the use of digital technologies to enhance quality and equity in teaching, learning and assessment.
4. The HEI actively uses open educational resources, open science and open data practices to improve the performance of the institution and increase its impact on its ecosystem.
5. The HEI makes full use of its digital capacity to promote sustainable and inclusive innovation and entrepreneurship.

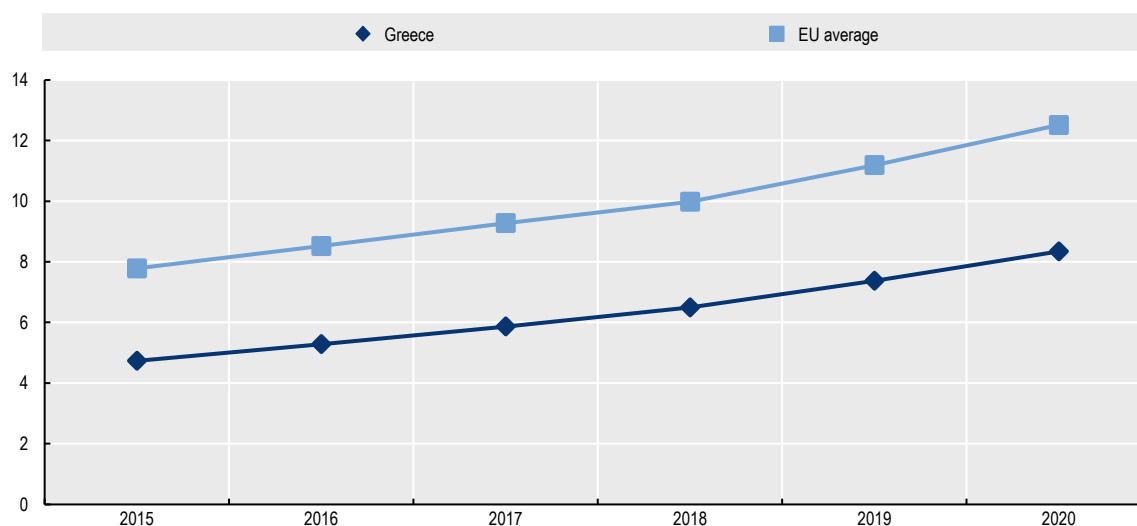
Source: HEInnovate (2021^[3]), *Homepage*, <https://heinnovate.eu/en> (accessed on 28 May 2021).

Although its ranking in Europe is low, Greece’s digital transition is making progress

Before the onset of the pandemic, Greece was making strides in its digital transition. Overall, the country’s average for the indicators on the Digital Economy and Society Index (DESI) increased by 5 percentage points from 2018 to 2020 (EC, 2020^[4]). Moreover, in the connectivity and human capital chapters of DESI, Greece progressed at a higher than average pace, marking an increase in almost all indicators (EC, 2020^[4]). Going forward and bouncing back from the crisis, these scores are expected to improve further, approaching the EU average.

However, among its European peers, Greece lags behind in the “digital transformation and capabilities” chapter of DESI, which is critical to supporting entrepreneurship and innovation in higher education. Overall, in the DESI 2020, Greece ranks second-last in EU28, falling short of the EU average by over 15 percentage points in the overall score (EC, 2020^[41]).

Figure 3.1. Greece continues to work to reach its European peers in digital transformation



Note: Values on y-axes represent averages, based on the calculated weighted average of the five main DESI dimensions: 1) Connectivity (25%), 2) Human Capital (25%), 3) Use of Internet (15%), 4) Integration of Digital Technology (20%) and 5) Digital Public Services (15%).

Source: Authors calculations from Digital Economy and Society Index (EC, 2020^[41])

Addressing pre-existing barriers and fallout from the pandemic can maximise potential

Sectoral challenges will influence Greece’s digital transformation. In 2020, the sector was expected to absorb 15% more students, but the domestic operating budget was cut by 60%.² The case-study institutions considered the impact of this limit on funding as a legacy challenge. HEIs rely on outdated and poor-quality IT infrastructure. In addition, domestic funding is linked to student numbers, meaning that only institutions of sufficient scale have the resources to invest in digital infrastructure.

To compensate for underfunding, EU programmes (such as Erasmus+ and Horizon 2020) have been a major source of funding for digital initiatives and therefore influence the direction of investment (e.g. towards greater pan-European systems integration, international mobility and EU-wide tech transfer collaboration). Greek institutions have shown a high degree of participation in these programmes. This can translate into further progress in the digital transformation for research-intensive institutions, as they are able to bid for Horizon 2020 grants. However, it also runs the risk that the funding is not focused on the specific national context and on the specific gaps that Greek HEIs are facing.

Case-study HEIs report that the pandemic exposed the vulnerabilities of digital capacity in Greece. The sudden shift to digital platforms put strains on the country’s infrastructure, with insufficient connections for video and two-way teleconferencing (EC, 2020^[41]). Additionally, as classes moved online, case study HEIs reported that staff did not have the necessary digital skills to teach on online platforms.

Greece took action to advance its digital transformation and capabilities

Despite the COVID-19 pandemic, Greece stepped forward with ambition to meet the challenge. Various governmental entities have taken part in this endeavour, renewing their efforts for a digital transition. Businesses and entrepreneurs were supported by the National Documentation Centre, which provided information on the digital transformation for businesses and funding opportunities for digital solutions. It also created a gateway to the latest scientific knowledge related to COVID-19 (EC, 2020^[4]). The Ministry of Education provided a digital platform for live teaching and homework for students (EC, 2020^[4]).

The new Ministry of Digital Governance (established after the 2019 elections) has designed, co-ordinated and introduced the “Digital Transformation Bible” (DTB), outlining the national strategy for 2020-2025. This describes Greece’s vision and national goals for digital transformation, and outlines the guiding principles, the model of governance and implementation and the strategic axes of digital transformation (Government of the Hellenic Republic, 2020^[5]). For the HE sector, the DTB includes axes of intervention to help HEIs to go digital. It seeks to upgrade all digital services (i.e. information systems) offered to students, such as e-secretariat, student registry, student care and the system for internships.

The DTB’s aim is to make Greece “digital by default” by 2023 (EC, 2020^[4]). This target will not be met without some challenges. Particularly for HEIs, there is considerable room to improve. In interviews, HEIs raised concerns about resource allocation, governance and regulatory limitations, among other issues, which could slow the current momentum. Policy makers and HEIs must work in tandem to overcome these challenges. The result would allow a complete digital transition, meet the expectations of citizens and students, and use the transition as a source of resilience in the case of other major disruptions.

Digital infrastructure

The sudden shift to digital platforms has resulted in a fast-paced reorganisation of the infrastructure available and an urgency to create new platforms. With an overall connectivity score of 33.4% in digital infrastructure (as compared to the EU average of 50.1%), Greece ranks last among EU countries (EC, 2020^[4]).

Despite the pandemic, digital infrastructure is improving

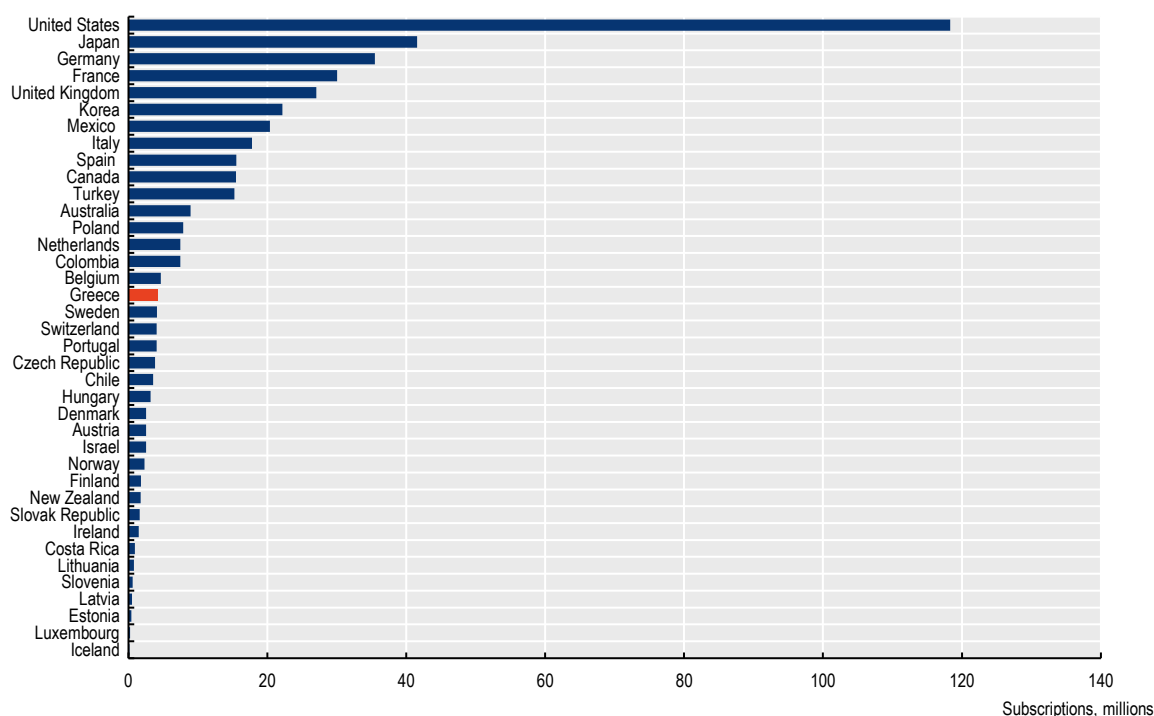
Recent efforts by the Greek government to enhance digital infrastructure have been focused on connectivity, public sector and cybersecurity, setting the stage for notable improvements. During the onset of the pandemic, the total fixed broadband subscriptions per 100 habitants increased by 0.9 p.p., reaching a total share of 39.2% per 100 habitants.³ As of June 2020, 4.2 million Greek residents in total were registered as broadband users.⁴ As for connectivity, fast broadband coverage in Greece has shown substantial progress, of 15 p.p. from 2019 to 2020 (EC, 2020^[4]). The “Digital Transformation Bible” is projected to expand “ultra-fast broadband” to an additional 11 million people by May 2021, adding to a stable broadband infrastructure (Figure 3.2).

The case-study institutions reported that the national effort to improve digital infrastructure has also helped support digital infrastructure in the HE system. Pre-existing digital systems provided by the government have facilitated inter-university collaboration. The Greek Universities Network (GUnet), an alliance of universities, provides a range of services and maintains HE-focused software projects. GUnet has the ability to rely on and use the expertise of the network operations centres (NOC) of all HEIs. These centres have successfully implemented a significant number of projects, supplies and studies, and actively participate in determining and carrying out GUnet’s tasks. The Greek Research and Technology Network (GRNET S.A.), a technology-based company whose governing board consists largely of academic staff, provides networking, high-performance computing (HPC) and cloud computing services to academic and research institutes, to educational bodies at all levels, and to public agencies, the broader public and the

private sector. It is also responsible for designing and developing information systems/services for HEIs. These systems are in general seen in a positive light, as they are a strong fit for the specifics of the Greek HE system and make interoperability easier to achieve. However, various HEIs underlined their motivation to work with other information systems, and are starting to see the dependence on GUnet as an obstacle. Living Values Education (LVE) systems and student records systems are among other systems that HEIs found valuable during the pandemic.

Figure 3.2. Greece fares well in infrastructure technology compared with other OECD countries

Total number of fixed broadband subscriptions, by country, millions, June 2020



Note: Data reported for December 2018 and onwards is being collected by a new entity, using a different methodology. Figures from December 2018 represent a new series and are not comparable with previous data for any broadband measures Australia reports to the OECD. For Mexico and Switzerland, the data are preliminary, and for Poland the Data are OECD temporary estimates.

Source: OECD (2020^[6]), *Broadband Portal*, <http://www.oecd.org/sti/broadband/broadband-statistics/>.

A centralised ICT administration in HEIs could improve infrastructure

A centralised IT administration could help bridge the gap in the shift to digital technology. Determining the strategic direction for the digital transformation in the Greek HE system is complicated, since decision making and the administration of information and communication technologies (ICT) can be fragmented. Interviews indicated that in the institutions studied for this review, the responsibility seems to be driven by information technology (IT) experts, with input from academic managers. The National Technical University of Athens (NTUA) noted that it has three different departments devoted to ICT, as well as other units managing digital projects of their own (such as mobility or internships). Case-study HEIs did not report that senior leadership is actively involved in the digital capacity building of their institutions. A centralised entity could work in tandem with the government to identify gaps and also where there is room for improvement (Box 3.2).

Box 3.2. Joint Information Systems Committee (Jisc)

The Joint Information Systems Committee (Jisc) is a non-profit organisation based in the United Kingdom, which provides support and assistance for the UK's higher and further education institutions on a membership basis. Established in 1993, it was instrumental in creating a shared digital infrastructure and services for universities and colleges, and in particular the high-speed Janet Network and eduroam wifi service. Over time, its remit expanded to negotiating sector-wide deals with IT vendors and commercial publishers, leveraging scale to secure greater value for money. It has also taken an increasingly active role in providing advice and guidance on digital technologies for education and research, including in the realm of digital strategy, and developing shared new services such as learning analytics.

Jisc represents a central administration for digital infrastructure in the UK. Funded through contributions from a mix of government agencies and member institutions, it concentrates efforts regarding digitalisation of the HE sector within one entity.

Source: Slaughter, R., M. Clark and M. Dobson (2020^[71]), *IT Infrastructure Reviews: Key Findings*, <https://www.jisc.ac.uk/reports/it-infrastructure-reviews-key-findings>.

Strengthening Open Science and Open Data through digitalisation

“Open science” is the process of making the output of publicly funded research widely accessible to the public (including the scientific community, the business sector and society at large) using digital technology. Science has a tradition of openness and has used the new digital technology to create a new paradigm for the scientific enterprise. The main elements of open science are: open access to scientific publications and open data (OECD, 2015^[8]). Open science and data improve the effectiveness, quality and productivity of education and research systems. Open science and data can help HEIs promote collaboration, knowledge exchange and new ways of sharing results (HEInnovate, 2021^[3]).

In Greece, the institutional framework gap in the field of Open Science and Open Access persists, which creates barriers for publishing and accessing datasets. As of 2017, the percentage of open access publications in Greece stood at 34.7% (Lisbon Council, 2017^[9]). However, open access to scientific content is supported by strengthening the digital infrastructure of research and academic institutions in Greece. The means for this support comes mainly through the formation of repositories of scientific content and the successful participation of relevant institutions in EU competitive programmes.

The DTB includes a section on Open Access and is predicated on the adoption of a National Open Science Plan, a project currently under implementation. Athena Research and Innovation Centre has set up an Open Science Task Force that takes a sector-led approach to developing a national strategy for open science, which includes details on three key pillars: policy, legislation and infrastructure/services. The Task Force includes representatives of 11 national academic and research institutions, 26 national research infrastructures, and Open Science initiatives. It published a proposed National Plan for Open Science in June 2020. Greece is taking progressive steps towards open access of scientific content. Along with the recent key role of academic institutions, strengthening digital infrastructure can help narrow the gap in open science and open data.

Digital Teaching and Learning

Before the pandemic, distance learning was used only as an alternative to face-to-face teaching. In some cases, Greek HEIs faced some barriers to the use of digital technology for education. While most universities allowed for blended formats, distance classes and online learning were often limited to a certain level of degree (e.g. postgraduate) (Owusu-Boampong and Holmberg, 2015^[10]). In this context, limited efforts were spent to develop and offer the type of digital courses frequently seen elsewhere, like MOOCs (massive online open courses) to the public. Only a few universities, such as the Hellenic Open University and the Athens University of Economics and Business, developed their own MOOC course delivery platforms. In addition to national regulations, case-study HEIs reported that internal processes for approval of digitally delivered courses can sometimes be complex and pose some limitations.

While already digitalised, teaching and learning continues to strive for a full digital transformation

After its past challenges, distance learning in Greece is at a turning point. In the pandemic, it showed both strong signs of adaptability and a commitment to create the best possible digital environment for students and staff. Various programmes and initiatives were introduced to accommodate distance teaching and learning. Many academics redesigned their teaching material, extended their teaching hours per week, or modified the existing teaching material to make it suitable for use in teaching online. By the end of the spring semester 2020, 96.5% of courses had been offered online. This allowed for greater participation by current students, compared to traditional face-to-face course delivery.

The pandemic also offered digital opportunities for intra-university collaboration. A number of HEIs (such as the University of the Aegean and the Centre for Research and Technology-Hellas) have started across a network of campuses, creating a foundation for digital collaboration. These collaborative processes have strong digital underpinning, for example, enhanced start-up support. Greece can also learn from other international practices on how to capitalise on online teaching and learning (Box 3.3).

Box 3.3. eCampus Ontario

eCampus Ontario is a non-profit organisation that promotes accessibility, collaboration, and innovation in online and technology-enabled learning. Founded by the provincial government of Ontario in Canada, the organisation assembles various colleges, universities and Indigenous institutes in the province, regardless of their size or specialisation. eCampus has four objectives:

- Support the development and delivery of quality online learning across Ontario.
- Lead in research, development and sharing of exemplary practices in online and other forms of technology-enabled learning.
- Support member institutions in encouraging innovation, collaboration and excellence on behalf of Ontario students and faculty.
- Contribute to the evolution of teaching and learning by responding to emerging tech and the development of state-of-the art online courses and programmes.

eCampus' mission is to focus on the contribution to teaching and learning by responding to emerging tech, developing online courses and programmes and supporting online learning throughout the region.

Source: eCampusOntario (2021^[11]), *Homepage*, www.ecampusontario.ca. Accessed on March 6, 2021.

These findings show that the HE system in Greece has managed to digitalise teaching and distance-learning. As a notable example, the University of Crete and Charokopeio University offers 93% of their courses via distance learning while Patras University offers 91% of its courses online (DECEFOF, 2020^[12]). However, while adapting to the restrictive measures, new limitations, such as class structures and modules, have emerged. At the University of Western Macedonia, the average lecture session in April 2020 was almost three hours long, with an average of 100 students per class, and with double the number of classes including 200-plus students than small lectures. More can be done to achieve fully fledged digital transformation of such activities.

One way to fully benefit from digital tools is a “pedagogy-first” approach, defined by the UK’s Quality Assurance Agency as “the development of digital learning in which the pedagogical approaches to be taken in the delivery of the programme are placed at the forefront and regarded as a key driver in the programme development and design process” (QAA, 2020^[13]). This requires experimentation with different digital tools, using digital tools not as a replacement for in-person learning but because they are the best tools to support the learning required.

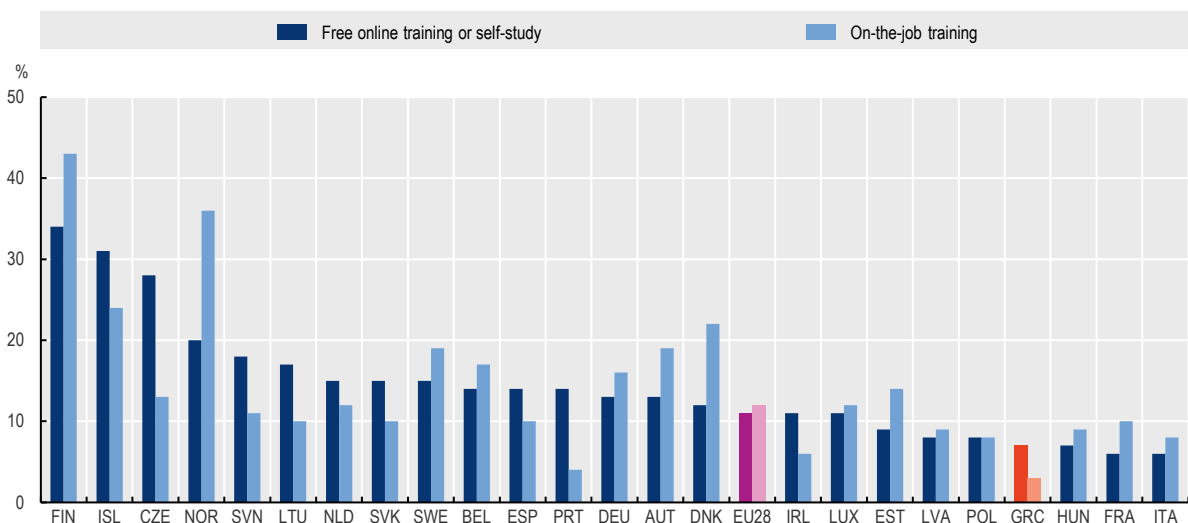
The digital transformation could have important benefits in the Greek educational system. Greece has one of the highest student-to-staff ratios amongst OECD countries. The share of staff younger than 35 years old in the higher education system was lower than 10% in 2019 (OECD, 2019^[14]). Digital technology could allow for efficiencies that permit staff to focus on activities where they will have the most impact, for instance more small-group interactions.

Greece can expand its digital skillset

Developing digital skills, and access to skills training are key elements in achieving a complete digital transformation (OECD, 2021^[15]). The skillset of the Greek workforce continues to lag behind, especially in digital platforms (Figure 3.3). The latest DESI report recognises Greece’s low ranking among its European peers. Although the share of adults in 2020 with basic digital skills surpassed 50% for the first time, the country’s score falls short of the EU average of 58% (EC, 2020^[4]). Nevertheless, recent momentum in human capital skills is notable. From 2018 to 2019, the average for individuals with at least basic digital skills increased by 4 percentage points, a more rapid rise than the EU average (EC, 2020^[4]).

Figure 3.3. Greece ranks among the lowest of EU countries in skills training

Individuals who carried out training to improve their digital skills, by type, 2018 (as a percentage of internet users)



Note: Digital skills refer to the use of computers, software or applications.

Source: OECD (2019^[17]), *Measuring the Digital Transformation: A Roadmap for the Future*, <https://doi.org/10.1787/9789264311992-en>

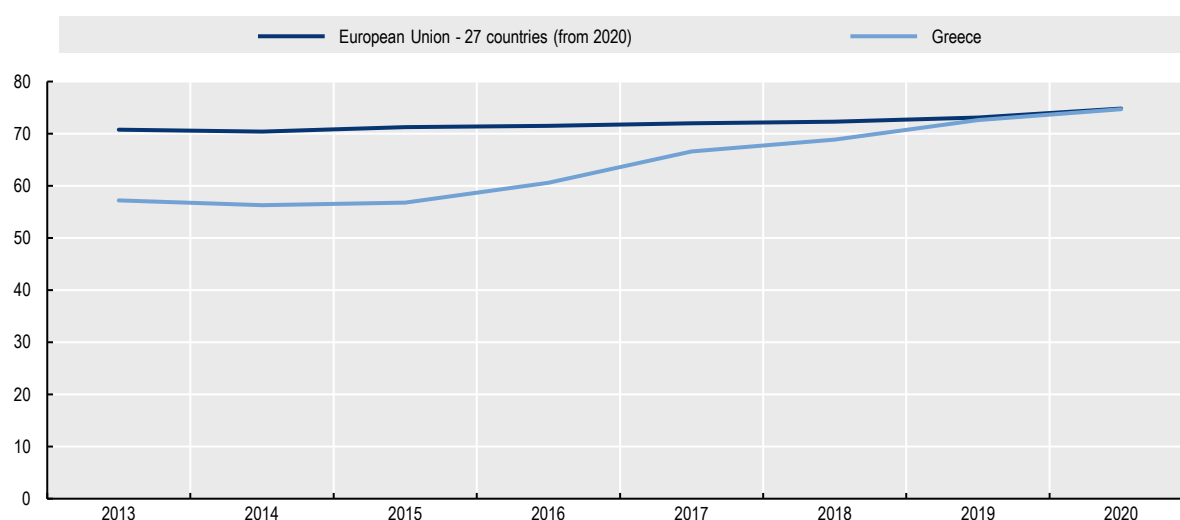
Greece has placed skills development of students at the heart of the foundations of the HE system. The provisions of Law 4 485/2017 specify and implement the primary constitutional requirements for higher education, with skills for students a primary focus:

“Develop students’ critical competence and skills, create the conditions necessary for the emergence of new researchers and provide graduates with the knowledge and skills necessary for their scientific and professional careers” (EC, 2021^[16]).

The Digital Transformation Bible 2020-2025 prioritises skills development for all citizens. The goal is to facilitate use of public services, and to equip the population with the skills they need for their future employment (EC, 2020^[4]).

Figure 3.4. Digital skills in Greece are improving among the employed

Thousands, employed persons with ICT education, tertiary education (levels 5-8)



Note: The ICT education statistics are part of the ICT training domain, one of the domains in the wider concept of digital skills. Source: Author’s calculations based on (Eurostat, 2021^[18]) data, employed persons with ICT education by educational attainment level.

Despite this recent momentum (Figure 3.4), the shortage of skills among staff and students is an obstacle for Greece. Although the level of participation in higher education has risen, a better match between the skills students acquire and what they need in the labour market will play an important role in employment outcomes for graduates.

Digital and internationalisation

Understanding internationalisation in the HE sector

It can be argued that higher education has always been internationalised (De Wit and Altbach, 2021^[19]; Clark, 1994^[20]). While universities can be tied to the national system, the expansion of their networks beyond national borders has always been part of institutions’ activities.

In recent years, internationalisation in tertiary education has shifted from a peripheral preoccupation to a top priority in the reform agenda (De Wit and Altbach, 2021^[19]). Higher education has experienced a major

expansion after becoming a key partner in economic activities (De Wit and Altbach, 2021^[19]). In Europe, EU programmes, the Bologna process and European university networks (e.g. the European University Association, or EUA) have underlined the priority of cultivating outside connections for their local campuses.

The massive shift to digital platforms caused by the pandemic has presented new opportunities for internationalisation of HEIs. Access to global experience has been greatly expanded, and the barriers to participation in international collaborations have been significantly reduced. Greece's response to COVID-19 has coincided with its co-ordinated efforts to connect its universities with the academic universe abroad.

A strong domestic focus in Greece could be limiting

As discussed above, European programmes such as Erasmus+ and Horizon2020, with their requirements and opportunities for international collaboration, play an important role in shaping the higher education landscape in Greece. These programmes connect universities and HEIs from different countries, and create common grounds to enhance the mobility of students and staff. However, they can also skew the focus of internationalisation efforts to be exclusively Europe-focused. Greek HEIs mainly offer courses in the native language. Greece offered only 10 English-Taught-Degree Programmes (ETDPs), ranking among the lowest in Europe (Maiworm and Wächter, 2002^[21]). Recently, this number has more than doubled, to 24 ETPs, but this is nevertheless amongst the lowest in Europe (Wächter and Maiworm, 2014^[22]). This barrier can partly be explained through the Greek legislative framework, which explicitly prevents public universities from offering international programmes in English (Saiti and Chletsos, 2020^[23]). Nevertheless, instated by Law 4 692/2020,⁵ HEIs can offer courses, mainly at the undergraduate and graduate level, in other languages. This law is chiefly designed to facilitate the integration of foreign students. As the country opens to courses and degrees taught in languages other than Greek, the number of incoming international students and the potential for HEIs to expand their networks may rise.

Yet, a strong domestic focus can open doors internationally

The strong domestic focus can also open doors for Greece across borders, as recent initiatives have shown. "Study in Greece",⁶ an initiative supported by the Ministries of Education and Religious Affairs, Foreign Affairs and Tourism, aims to improve the internationalisation of Greek HEIs, and build linkages with foreign academic institutions. The initiative provides a "one-stop-shop" online platform with information on Greek HE, including training opportunities and possibilities for studying at Greek institutions. This system capitalises on Greece's unique strengths. Its extensive research on agrifood and archaeology, for example, places Greece as a European leader.

Internationalisation can also increase competition between HEIs. Enhancing the skills and competencies of older students, through more competitive tertiary education, is essential for increasing their employability (OECD, 2020^[24]).

Recommendations

For policy makers

The following present actionable policy recommendations for policy makers to capitalise on existing practices and strengthen the country's digital transformation:

- **Build on the current role of GRNET and GUnet, to create a central digital transformation body for the HE sector.** This extended role could look at supporting the cost-effective joint procurement of infrastructure, and developing training and best practices across HEIs. Greek HEIs

should be allowed to use/select from a set of tools the one they consider fit for their customised purposes. Its HEIs do not have the autonomy to select the right tool for the job.

- **Create dedicated funding for investment in digital transformation**, including domestically oriented needs, and allowing for experimentation with new systems or approaches.
- **Increase quality and KPIs in delivering online courses and exams**. This could enhance the pedagogical value of online courses and their delivery (in content, use of online platforms and synchronous teaching).
- **Allow flexible conditions to make small IT procurements possible**, in line with specific university digital strategy.

For higher education systems

The following present actionable policy recommendations for representatives from higher education institutions to capitalise on existing practices and strengthen the universities' digital transformation:

- **Align individual institutional strategies with the Digital Transformation Bible**.
- **Provide actionable trainings and development for digital skills for staff**, with a particular emphasis on best practice in digital teaching. Trainings could add on interactivity, breaking content into smaller chunks.

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Notes

¹ “Digitisation” is the conversion of analogue data and processes into a machine-readable format, a first stage of digital technology. “Digitalisation” represents a second structural step and results from the interconnection of digital technologies, resulting in new activities or in profound modifications of existing ones.

² Information gathered from online interviews.

³ See OECD (2020_[6]).

⁴ Author’s calculations based on OECD (2020_[6]).

⁵ According to Law 4 692/2020 (Art. 82).

⁶ For more information, please visit <https://studyingreece.edu.gr/study-in-greece/>.

4 Knowledge Exchange and Collaboration

By exchanging knowledge and collaborating with their stakeholders, higher education institutions (HEIs) generate societal and economic value and build human capital and skills. While its progress has been substantial in recent years, Greece – a moderate innovator – could further improve by strengthening the connection of HEIs to its productive sector and to its diverse regional ecosystems. In particular, HEIs could collaborate and co-create in the framework of Smart Specialisation (RS3 strategy) in regions. The chapter presents the current state of play and the challenges it faces, then offers recommendations for policy makers and HEIs.

Introduction

In Greece, most HEIs and research centres (RCs) are engaged in knowledge co-creation with local partners, but activities and performance vary significantly, reflecting regional disparities. Some HEIs and RCs are thriving in very dynamic environments involving a virtuous cycle of knowledge exchange and collaboration. European, national and sub-national governments have instituted policies to spur innovation and co-creation, in all regions. HEIs and RCs thus have a key role, as they can help identify challenges and engage with stakeholders to stimulate innovation and links to the productive sector. The Smart Specialisation Strategy offers a platform for HEIs to engage with regional partners to promote growth and innovation, and several interesting practices have emerged. Opportunities for KEC have also arisen at the international level, by engaging with researchers and businesses connected to the Greek diaspora. Greece is recognised as a moderate innovator and strives to enhance the exchange of knowledge between regional actors.

Knowledge exchange and collaboration (KEC) activities connect higher education HEIs with their local ecosystem and stakeholders, including firms, entrepreneurs, government, intermediaries, (nongovernmental organisations (NGOs), and citizens. KEC encourages technological and social innovation. KEC can help firms access and leverage the research output of universities and RCs, introduce innovation in their industrial processes, and HEIs can leverage collaboration to improve their capacity to promote innovation (Rossi, Rosli and Yip, 2017^[1]). KEC activities can also support cultural amenities (e.g. collaboration with museums) and promote sustainability (e.g. decarbonisation of a given community).

Knowledge exchange and collaboration is a diverse, multifaceted, dimension that encompasses different activities and roles that HEIs and RCs can play. What was once called the “third mission” of HEIs has become a broader concept that requires HEIs and RCs to connect proactively with their ecosystems and networks (Table 4.1.). Knowledge exchange takes different forms – academic engagement such as collaborative research, contract research, consultancy and academic entrepreneurship including the income generation derived from intellectual properties (IPs), the formation of spin-off firms and start-ups. Other types of knowledge exchange include public engagement, community engagement, cultural and social forms of exchanges. These different channels involve individual academics and groups of academics, as well as the departments, faculties and the university, as a whole.

Table 4.1. Key definitions for Knowledge Exchange and Collaboration

Term	Process, participants and implications
Knowledge generation or knowledge production	Implies “new” knowledge produced as an outcome of some form of process, but does not indicate the nature of the process. It does not explain whether the “new” knowledge is discrete from or a product of past knowledge and experience. Research knowledge is likely to be a key factor, but the desirable balance between disciplinary inputs, fusion of disciplines and lay knowledge and expertise is open-ended.
Coproduction of knowledge	Implies a process where knowledge is or can be produced through interaction with others, possibly with people of different perspectives and backgrounds, through co-operative endeavours and mutual learning.
Knowledge utilisation	Implies a key focus on the intent and purpose behind that use of knowledge. It does not limit itself to the uses to which the knowledge is put, but seeks to reveal intent, purpose and agency in the process.
Knowledge transfer	Implies that knowledge is portable, has a linear direction, and that delivery and reception is a one-way process from A (usually a researcher) to B (usually a “user”).
Brokerage of knowledge	Implies negotiated knowledge, deliberation between different parties – A and B (and C, etc.), and possibly mediation through a third party towards a mutually acceptable set of goals, working methods and more effective interactions and knowledge processes.
Storage of knowledge	Implies that knowledge is portable and can be held in a form that can be accessed when needed.
Knowledge exchange	Implies a two or multiple-path process with reciprocity and mutual benefits, maybe with multiple learning, but not necessarily recognition of the equitable value of the different forms of knowledge being exchanged.

Term	Process, participants and implications
Knowledge sharing	Implies a similar process to exchange, but possibly with greater recognition by those involved of the value of the knowledge of those with whom they are sharing.
Knowledge dissemination	Implies strategies being employed to get knowledge from A to B, usually instigated by A.
Transformation of knowledge	Implies changing the knowing or knowers towards a different state or condition in the process.
Knowledge mobilisation	Implies eliciting or spreading knowledge to a wider range of recipients, possibly with the intent of increased application of knowledge. In the process, knowledge from A can be made useful to B's interests or otherwise have impact on society.
Knowledge translation	Implies communication using a mediated language modified for recipients.

Note: Some of the many terms used to describe processes of knowledge exchange and implied meanings of these terms.

Source: Adapted from (FAZEY et al., 2013^[2]) Knowledge Exchange: a review and research agenda for environmental management: <https://www.cambridge.org/core/journals/environmental-conservation/article/abs/knowledge-exchange-a-review-and-research-agenda-for-environmental-management/6D9F2E92C9F10BA51C6265C8BFAAED5D> and De Silva, M. et al. (2021^[3]), "Addressing societal challenges through the simultaneous generation of social and business values: A conceptual framework for science-based co-creation", <http://dx.doi.org/10.1016/j.technovation.2021.102268>.

Within HEInnovate, KEC is one of the eight dimensions around which HEIs can evolve to promote entrepreneurship and innovation (Box 4.1). The capacity to connect and co-operate with other actors is a distinctive trait of innovative and entrepreneurial HEIs that are strongly connected to other actors. These include firms of all size and maturity, other public and private research organisations, national and subnational government agencies, such as regional development agencies or metropolitan authorities, cluster associations, technology and science parks.

Box 4.1. The Knowledge Exchange and Collaboration dimension in the HEInnovate Framework

In recent decades, the missions of higher education institutions have expanded. The direct contribution of HEIs to research and development (R&D) investment has tripled in the past 40 years. HEIs have also acquired increasing autonomy in many OECD countries. This transformation has gone hand in hand with some megatrends, such as an ageing population, digitalisation and globalisation, which are challenging HEIs' traditional functions, teaching and learning. Fast-paced technological change and automation require HEIs to teach new skills, such as adaptability, "learning to learn", and digital skills (the "twenty-first century skills"). Technological progress has also made information more accessible to citizens, putting increasing pressure on HEIs to facilitate access to research and produce research that adds value to society. HEIs can tackle these challenges by teaching new skills to students and by engaging with business and civil society to produce research that adds social and economic value. This is commonly referred to as "third mission" activity typical of "entrepreneurial universities".

The OECD and the European Commission have developed the HEInnovate guiding framework in order to help HEIs develop third-mission activities to become drivers of socioeconomic development. Based on economic theory, field research and experts survey, the OECD and the European Commission have identified eight areas in which HEIs should take action. The HEInnovate guiding framework includes eight key dimensions, reflecting a multidimensional approach to the "engagement agenda". These dimensions are leadership and governance, organisational capacity (funding, people and incentives), entrepreneurial teaching and learning, preparing and supporting entrepreneurs, digital transformation and capability, knowledge exchange and collaboration, the internationalised institution and measuring impact.

Source: HEInnovate (2021^[4]), *Homepage*, <https://heinnovate.eu/en> (accessed on 28 May 2021).

Co-production and dissemination of knowledge

The co-production and dissemination of knowledge generates conditions that can increase local innovation. Connecting local agents, their objectives and their expertise is fundamental in shaping innovation policies. It allows them to identify the problems, constraints and strengths of local ecosystems, to chart a path towards a sustainable, inclusive and mission-oriented innovation strategy (OECD, 2020^[5]). Knowledge co-creation goes beyond generating business value in the form of economic gains for the stakeholders involved. It also adds social values, with positive spill-overs for employment, cultural and social capital (De Silva and Rossi, 2018^[6]).

Several aspects enable conditions for co-creating innovation and socioeconomic development through knowledge exchange (De Silva and Rossi, 2018^[6]). Firstly, knowledge co-creation tends to arise through the necessity of expertise, resources and the production of a socioeconomic impact. These factors require collaboration within organisations, pushing stakeholders to create interactions among themselves to address problems more effectively. Secondly, the urgency of addressing a problem requires a prompt and inter-disciplinary response. This could make collaboration between stakeholders desirable, while requiring research institutes to provide innovative solutions to the societal challenge. Another precondition is also the alignment between the scope of the co-creation project and the objectives of the stakeholders. Finally, the engagement of professional figures KEC activities can be fostered through systems of incentives, created by the government or by the institutions involved themselves.

Promoting co-production and dissemination by thinking locally and acting globally

The approach to knowledge co-creation is not a one-size-fits-all proposition. Just as with the framework for innovation and socioeconomic development, the approach needs to be shaped around the needs and strengths of local communities. This also requires thinking of knowledge exchange practices through the multidisciplinary and interdisciplinary lens. HEIs focus almost exclusively on technological innovation and technology transfer to produce and disseminate research, in collaboration with external stakeholders. However, if we understand knowledge exchange as the “third mission” of HEIs, then social sciences must also be involved with technical and scientific domains to address society’s challenges (e.g. those targeted in the SDGs, the inclusion of migrants, or encouraging the development of cultural amenities). Building on the specific characteristics of each local ecosystem, policies aimed at encouraging knowledge co-creation should design *ad hoc* tools to support local stakeholders in focusing on the potential of the community in which tertiary education institutions operate, and in encouraging the integration of additional external knowledge.

Collaboration and co-creation, however, do not come easily to HEIs for different reasons, and leveraging proximity may be necessary to overcome some barriers. A given HEI – due to its leadership or other factors – may prefer to insulate itself from the local ecosystem, acting like an “ivory tower”. Lack of collaboration can also depend on strong cosmopolitan views of both HEIs and the local business community, or on low trust among local players, and an always possible “not invented here” or NIH, effect.¹ Leveraging geographical proximity and local networks can be a way to reduce these barriers to co-operation. In the age of globalisation and digitalisation, co-location is the dominant form of university-business co-operation.

KEC in Greece’s innovation and regional framework

Overall, Greece has taken important steps towards promoting KEC, innovation and knowledge co-creation at the national and regional levels. Various HEIs and RIs are engaged with their local stakeholders and actors to generate innovation or to address societal problems. In discussing these experiences of co-operation, it is important to understand the policy and economic context in which they have emerged.

Greece is a moderate innovator, with some exemplary regions

Greece is considered a “moderate innovator”, according to (Russo and Pavone, 2021^[7]), (Figure 4.1). The analysis that ranks a country’s portfolio of innovation policy mix (derived from the STIP-Compass database)² from above average to below average, finds Greece to have an average composition of policy mix in the following domains:

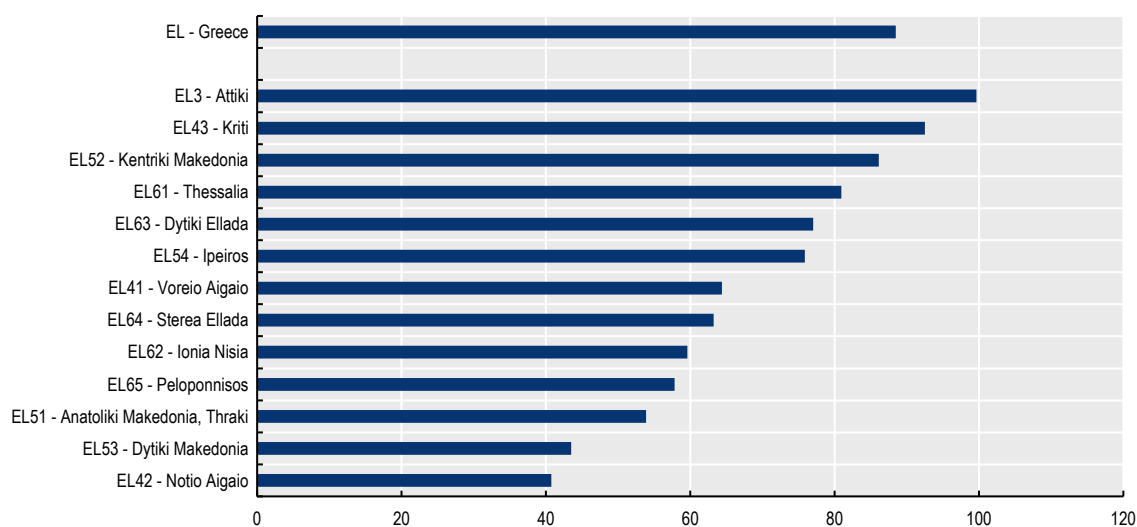
- innovation policy governance: strategies agendas and plans, policy evaluation; multilevel co-ordination; ethics
- funding innovation: finance, funds and research grants
- training for innovation supporting PhD programmes.

However, Greece's innovation policy mix is below the average in the following four categories:

- intellectual property rights (IPR)
- general training for innovation and specific initiatives to reduce the gender gap
- intermediaries (e.g. service organisations seeking innovative service offerings for their markets)
- a low rate of cultivation of human capital, high unemployment amongst graduates, and a low rate of literacy and numeracy proficiency.

Figure 4.1. Greek regions’ performance on the regional innovation index score

The innovation index score of the 13 Greek regions, 2021 (EU average = 100)



Source: Eurostat (2021^[8]), *Regional Innovation Scoreboard 2021*, European Commission.

Similarly, the Regional Innovation Scoreboard of 2021 confirms the “moderate” ranking of the Greek innovation system. The scoreboard notes Greece’s strengths as Innovators, Linkages and Employment impacts, with a relative score to the EU average of 160, 109, 107.7, respectively. On the other hand, Greece’s score is low in the following indicators: Intellectual assets (48.7%); Use of Information Technologies (40.8%) and Finance and Support (50.3%) (Eurostat, 2021^[8]).

The scores are not homogenous across Greece. The regions of Athens (Attiki) and Crete (Kriti) rank as the two most innovative regions (Eurostat, 2021^[8]). Figure 4.1 shows the innovation index score of all 13 regions, and many regions in Greece face structural challenges that are holding back their innovation capacity. Socioeconomic challenges – typical of almost every region of Greece, outside Athens and Crete

– also come into play. These can include low income, high unemployment and economies that are agricultural or tourism-based.

Greece’s innovation framework aims to support regional development

To enhance the potential of Greece’s regions in the fields of innovation, knowledge transfer and science-industry co-operation, the country has implemented support measures funded by the Operational Programme of Competitiveness, Entrepreneurship and Innovation 2014-2020. This gave birth to the RTDI (Research, Technological Development and Innovation) flagship strategy of Greece, i.e. the Single RTDI State Aid Action “RESEARCH – CREATE – INNOVATE”. The programme was launched in 2017, and the total public funding for the 1 038 projects financed calls was EUR 535.65 million, with research organisations being granted almost half of that amount (EUR 267.58 million). The intervention categories of the strategy the following three, notably, i.e. research and development by SMEs; partnerships of enterprises with research institutes; and exploitation of research results.

The programme’s funds were allocated based on the size of each region (Table 4.1), to reduce the gap in state-of-the-art innovation in the local context. Less developed regions will receive more funding. The experience of the RESEARCH – CREATE – INNOVATE Programme is thus an exemplary initiative to encourage regional innovation and to bring Greece, as a whole, to a further elevated innovation capacity.

Table 4.2. Regional funding to reduce the innovation gap between regions

Regional allocation of public funding through Single RTDI State Aid Action “Research – Create – Innovate”, 2017-20

Regions	Public funding (EUR)
Less developed regions (Anatoliki Makedonia, Thraki, Kentriki Makedonia, Ipeiros, Thessalia, Dytiki Ellada)	151 200 000
Regions in transition (Dytiki Makedonia, Ionia Nisia, Peloponnisos, Voreio Aigaio, Kriti, Sterea Ellada)	49 000 000
More developed regions (Attiki, Notio Aigaio)	79 800 000
Total	280 000 000

Source: EC (2020^[9]), “Single RTDI State Aid Action “Research – Create – Innovate” (Draft)”, <https://ec.europa.eu/growth/tools-databases/regional-innovation-monitor/support-measure/single-rtdi-state-aid-action-research-create-innovate-draft>.

Knowledge exchange in the Higher Education sector

Most HEIs are engaged in knowledge co-creation with local partners

Most HEIs and research centres are engaged in knowledge co-creation with local partners. Some HEIs (in particular the research centres in Crete and Thessaloniki) are thriving, in dynamic environments within a virtuous cycle of knowledge exchange and collaboration activities. Regional differences are supported with policies to spur innovation and co-creation. HEIs and RIs have a key role, as they can help identify challenges and engage with stakeholders to stimulate development and links to the productive sector. For instance, the Foundation for Technology and Research-Hellas (FORTH) has been pivotal in its region. Since 2018, FORTH has collaborated with the Pancretan Co-operative Bank on a project aimed at strengthening innovative entrepreneurship in Crete, through the PRAXI Network (a network part of FORTH) (FORTH, 2018^[10]). The project aims to connect with the region of Crete, the Chambers, the universities and the research centres, in order to: “better utilise innovative products and financial instruments from European and National programmes, but also the attraction of partners – investors”

(FORTH, 2018_[10]). The services produced link to the productive sector in the region of Crete. In particular, regardless of the thematic area of activity, the services will cover “a wide range of business: from traditional, family businesses and co-operatives to knowledge-intensive businesses and technology-mature or sensitised, as well as those with an export orientation” (FORTH, 2018_[10]).

Similarly, the Centre for Research and Technology-Hellas (CERTH), located in the Thessaloniki area, has established a network of relationships with stakeholders. In recent years, the RI has worked with regional authorities, on the One-Stop Liaison Office, a structure of mediation and networking between the academic and research institutes and the business community. CERTH has also worked with the Ministry of Interior, establishing the Alexander Innovation Zone in 2006, responsible for the strategic development of the innovation ecosystem of the area.³

The National Technical University of Athens (NTUA) collaborates with local companies in the shipbuilding industry and the food sector. The university provides research, human capital (through internships), and specified expertise. The creation of Archimedes Centre in NTUA has established links with the productive sector, focusing on regional and sectoral challenges.

In the aftermath of the COVID-19 pandemic, Greek HEIs have supported research and knowledge transfer throughout the country. This has included academic, research and extensive social action, offering a breadth of services and solutions and making a significant contribution in tackling the pandemic. Medical schools and departments and university hospitals were at the forefront of these efforts. University infrastructure (e.g. laboratories, equipment) and liquid antiseptic for everyday hand sanitising were offered to public services (universities, ministries, hospitals, schools); respiratory valves, patient examination and intubation canopies were produced by 3D printers already installed at universities.

Research groups from Greek HEIs actively participate in international and national studies for the treatment and epidemiological study of COVID-19 cases, with important research results. Four HEIs and 6 RCs collaborated in the Flagship Research Action “Epidemiological study in Greece through extensive testing for virus and antibody detection, viral genome sequencing and genetic analysis of patients, in response to the SARS-CoV-2 crisis”. Supervised by the GSRI and funded with EUR 2 475 million under the Ministry of Development and Investments’ public investments programme (PIP), this has resulted in the development of the first locally produced rapid antigen test for COVID-19, which was in the filing process for patents as of December 2020.

Universities have also conducted nationwide research on the psychological effects of the pandemic, on citizens’ beliefs about the pandemic and its management, on issues of distance learning, travel restrictions and the quality of life during the pandemic. Smart applications have been developed within clinics, laboratories and institutes applying artificial intelligence and big data knowledge, to prevent and manage the spread of the pandemic and to support decision making, in combination with the detection of new COVID cases and monitoring of COVID patients.

Greece leverages higher education to promote KEC throughout the country

In the past 20 years, Greece has promoted strategic plans and operative programmes in HEIs contributing to KEC activities.⁴ The first strategy, the PRAXE programme,⁵ was launched in 2001, with the support of the European Commission. Its aim was to give grants to spin-offs created by Greek HEIs to commercialise and disseminate their research (Halme and Lamminkoski, 2019_[11]). Further calls were published in 2011 with the same objectives, including the creation of spin-offs, spin-outs and innovative start-ups, primarily for commercialisation of research results.⁶

The most recent intervention that touches upon knowledge co-creation is Law 4 485/2017,⁷ which specifies the mission and the primary constitutional requirements for higher education. Its provisions particularly focus on KEC and the third mission of tertiary education in Greece:

“Meet the development needs of the country, promote the dissemination of knowledge and the cultivation of the arts, the use of research results and innovation, with a view to the principles of scientific ethics, sustainable development and social cohesion; contribute to the national plan for productive reconstruction of the country towards sustainability.”

Technology transfer policy making and funding is a priority of the recent political agenda for promoting entrepreneurship and innovation in Greek universities and research institutes. However, only one out of four tertiary education institutions in Greece has a technology transfer office (TTO), and almost all are less than ten years old. Only two research bodies, the Foundation for Research and Technology-Hellas (FORTH) and the RC Athena, have maintained their respective TTOs since the 1990s. In general, TTOs are autonomous entities within institutional governance arrangements. They employ a small staff of one or two people, who have fixed-term contracts in 40% of TTOs.

The Greek system is also developing competence centres to support co-operation between HEIs and the productive sectors. The current Programming Period of the National Structural Funds, and in particular the national Smart Specialisation Strategy, provide funding for the creation and operation of Competence Centres. This policy has a dedicated action launched in 2020 by the General Secretariat for Research and Technology (GSRT) with a EUR 30 million budget, aimed to support the Greek economy in the provision of specialised, innovative services, know-how and technology transfer to companies, especially small and medium-sized enterprises (SMEs).

Greece’s RIS3 supports knowledge exchanges in HEIs

HEIs and research centres in Greece capitalise on the potential of Research and Innovation Strategies for Smart Specialisation (RIS3). RIS3 includes programmes aimed at pooling, focusing and concentrating resources on research and innovation, to maximise the impacts of the structural funds (EC, 2014^[12]; 2015^[13]; Radosevic et al., 2017^[14]). RIS3 have become a pillar in the *ex-ante* conditionality for accessing the European Structural Investment Funds (in particular the research and innovation support provided under the European Regional Development Fund) (Foray et al., 2012^[15]; Foray, 2018^[16]; Morgan, 2015^[17]). The current state of diversification of RIS3 priorities across Greek regions (Box 4.2) highlights the potential innovation development paths of Greece in the macro-region’s strategic planning. As the Greek Ministry of Education reported:

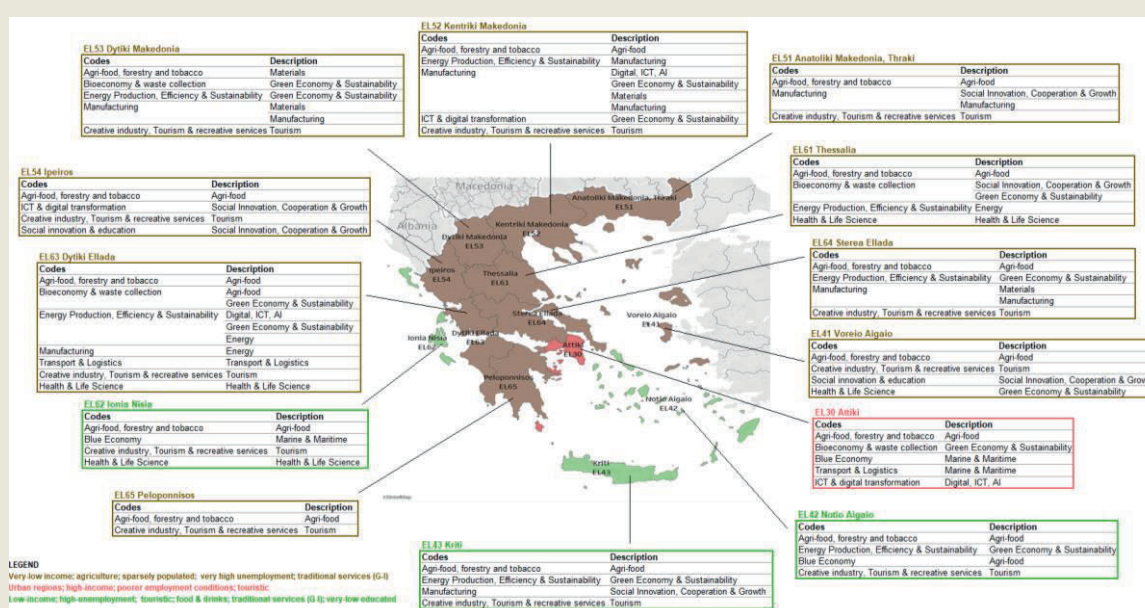
“The vision driving the National Research & Innovation Strategy for Smart Specialisation (RIS3) prioritises people and society, resulting in a high level of quality of life, low environmental footprint and respect for cultural heritage and creativity. The main objective of the National RIS3 is a transformation of the productive sector through research, technological development and innovation, while mitigating regional disparities and creating sustainable employment”.

Based on three pillars,⁸ its RIS3 strategy underlines the importance of the role of research organisations in Greece (universities and research centres), “as they form the dynamic and internationally recognised part of the national innovation system, which can ensure the connection with scientific and technological developments and the broad technological base that is necessary. In fact, RIS3, recognising research institutions as its main drivers, aspires to reinforce Research, Technological Development and Innovation (RTDI) activities, through integrated research strategies for universities and providing support through the modernisation of internal network infrastructure of all the universities and research centres of the country” (GSRT, 2015^[18]).

Box 4.2. Research and Innovation Strategies for Smart Specialisation (RIS3) in Greece

The efficiency of RIS3 in driving innovation in Greece can be compared across regions, using a systematic and comparative analysis of RIS3 across EU regions (McCann and Ortega-Argilés, 2016^[19]). This is made available on the online tool ExplORIS3⁹ and complemented by the classification of socioeconomic characteristics of EU28 regions (Pagliacci et al., 2020^[20]). The results on RIS3 classification show the potential of Greece's regions in terms of sectorial specialisation (Figure 4.2). The approach helps identify the emerging potential of complementarities and synergies among productive specialisations and could be a powerful lever for geographically integrated development paths.

Figure 4.2. Greece's regions display a wide variety of RIS3 priorities



Source: Author's elaboration on ExplORIS3: Research and Innovation Smart Specialisation Strategy (RIS3) 2014-2020 in EU Regions (Pasquale Pavone, 2021^[21]).

Using ExplORIS3 and the Code Classes category, the main field of intervention in Greece is “Agri-food, forestry and tobacco”, a priority listed by each of Greece's 13 regions. This is a reflection of the fact that most territories have socioeconomic characteristics described as “Very-low income; agriculture; sparsely populated; very high unemployment; traditional services” (Pagliacci et al., 2020^[9]). “Manufacturing” is the second main priority for Greek regions, although such activity is concentrated in Eastern, Central and Western Macedonia, complemented by interventions in Crete, Central and Western Greece. Finally, as expected for a country where tourism is an important sector for economic development, “Creative industry, Tourism and recreational services” is the third most common strategy, 11 regions listing it as a priority. Only Thessaly and Attiki, where the capital is located, are exceptions.

Tourism is not a priority for Attiki, leaving scope to align RIS3 priorities with the socioeconomic conditions of local ecosystems in Greece. The same observation is true of the maritime industry, a sector in which Greece is a European and global leader, although few territories have set it as a priority for their RIS3 strategy. Only two regions, Attiki and the Ionian Islands, have policies described as

“Marine and Maritime”, for a total of three actions, two of which specifically involve shipbuilding and ship repair as a policy objective.

The EU Strategy for the Adriatic-Ionian Region (EUSAIR) can catalyse Greece’s contribution to encourage complementarities within the macro-region. Greek HEIs and public research bodies can contribute to: Digital, ICT, AI and Energy Production, Efficiency & Sustainability; Agri-food and Blue Economy; Marine & Maritime; Energy and Manufacturing; Materials and Agri-food, forestry and tobacco; Manufacturing and Energy Production, Efficiency & Sustainability.

Source: McCann, P. and R. Ortega-Argilés (2016^[19]), “Smart specialisation, entrepreneurship and SMEs: Issues and challenges for a results-oriented EU regional policy”, <http://dx.doi.org/10.1007/s11187-016-9707-z>; Pagliacci, F. et al. (2020^[20]), “Regional structural heterogeneity: evidence and policy implications for RIS3 in macro-regional strategies”, <http://dx.doi.org/10.1080/00343404.2019.1635689>.

Notable examples from Greek HEIs and RIs illustrate their activities in regional HEI strategies. The Democritus University of Thrace is involved in the design and implementation of the regional Smart Specialisation Strategy, with an active role in the governance bodies, along with other higher education in the region. The region has benefited from the support provided by the Higher Education for Smart Specialisation project to strengthen the role of higher education in Eastern Macedonia and Thrace Smart Specialisation Strategy (Tolias and Arregui-Pabollet, 2021^[22]). The case study noted that HEIs in the region are successfully participating in nationwide collaborative research projects and in regional contract research projects, as well as in national research infrastructure. However, the majority of policy instruments available to the region for smart growth and for skills/training are designed and managed at the national level, not particularly tailored to the regional context. The partnership between regional administration and HEIs can be strengthened for the co-design of funding instruments that respond to a shared vision of regional challenges, and HEI’s third mission could benefit from a performance-based type system.

The University of Western Macedonia (UoWM) collaborates with local partners and employs a Smart Specialisation strategy. The strategy focuses on the development of entrepreneurship, with a special focus on Research and Innovation, in the next difficult years of the transition to the post-lignite energy era, but also the return to normalcy due to the pandemic (Interreg, 2020^[23]). Similarly, the University of Crete (UofC) also works through the region’s Smart Specialisation strategy in collaboration with government entities. One focus area of this strategy is knowledge exchange. Among these objectives, the strategy serves to “encourage the development of start-ups, which will be based on scientific work and the scientific potential of Crete’s institutions and attract investments which seek co-operation with important research groups of Crete and make use of research infrastructures” (Region of Crete, 2015^[24]). Greek HEIs/RIs and their stakeholders could look at international examples, in neighbouring countries, to examine how regional innovation ecosystems are “mobilised”. Box 4.3 presents the example of Italy’s Emilia Romagna region.

Box 4.3. The RIS3 approach of Emilia-Romagna for 2021-2027

The EU has other examples of how HEIs can contribute to Smart Specialisation (RIS3 Strategy) approaches. Formalising a long-term specialisation strategy of a given productive ecosystem supports and facilitates the engagement of HEIs with their stakeholders. The Smart Specialisation Strategy is the key tool for developing research and innovation in Emilia-Romagna. It is not simply a plan, but the centre of a strategy, a vision looking forward to the next seven years and aiming to concentrate regional resources on the specific characteristics of each territory. Smart Specialisation Strategy puts together different tools, like European structural funds, allowing for the integration of resources to maximise impacts and to attract funds from other national and European programmes, to make it easier for the regional system to attract research and innovation (R&I) projects.

Emilia-Romagna has 20 years of experience in R&I. It was only in 2014, however, that the strategy became transversal across regional programmes and departments, with the goal of integrating all the components of the regional system. The regional strategy is co-designed with other stakeholders, such as research centres and universities. The regional ecosystem is mapped, and the objective of the policies designed is to connect the dots between stakeholders, including firms, and to create synergies. This system is made up of stakeholders and also the networks and clusters established in the region, some of which are formal and some informal. The final purpose is to group together stakeholders with similar interests, to create a common vision with a bottom-up approach.

In Emilia-Romagna, the RIS3 strategy for 2021-2027 is the following: challenge-based (respecting the aims of Cohesion Policy, i.e. to create a greener, smarter, more connected Europe; closer to the needs of its citizens); social-driven (understanding R&I not only as a key to unlock competitiveness, but also as a tool to respond to new societal challenges); and cross-sectoral (with priorities decided through an interdisciplinary approach). The strategy for 2021-2027 is divided between four macro-categories, with 15 thematic objectives.

The enabling factors for such a bottom-up approach to be successful are different: open innovation; creativity (meant as the usability of innovation products, their functionality); responsible R&I (ethically responsible, starting from an open and accessible science); public engagement (meant as involving society, citizens, and the third sector to define policies and priorities). The path to creating the RIS3 in Emilia-Romagna takes a full year, involving work groups and consultations that are open to everyone. This approach makes it the best tool to perfect the regional strategy for Smart Specialisation.

The experience of Emilia-Romagna offers three takeaways:

1. R&I is not only something that happens in the fields of technology and competitiveness, but it is better understood through the lens of its social impact across multiple disciplines. R&I is needed to create and distribute wealth, to improve the quality of life, to provide pathways to sustainability and inclusiveness.
2. Sustaining research is not just an objective of industrial policy, but must be integrated with every other regional policy to become more effective.
3. It is possible, and preferable, to build a strategy with a bottom-up approach, creating participation and including different stakeholders to co-design policies, so that the RIS3 framework represents the strengths and needs of each actor involved.

Emilia-Romagna shifted from a process-based knowledge transfer, mainly from higher education institutions to local firms, to a more horizontal approach. The horizontal approach features more nodes in the network that can transfer knowledge and competences. These nodes must be put into a position to work together, while the ecosystem has to be put in a spot to attract innovation from outside. Since Greece is still in a phase where most activities regard knowledge transfer processes. Emilia-Romagna's example could represent an ideal blueprint for developing innovation policies in Greek regions.

Source: (Interreg, 2020^[25]) A Policy Brief from the Policy Learning Platform on Research and innovation SMART SPECIALISATION STRATEGY (S3) Policy Learning Platform on Research and innovation 2 Policy Brief: Smart Specialisation Strategy (S3). https://www.interregeurope.eu/fileadmin/user_upload/plp_uploads/policy_briefs/Smart_Specialisation_Strategy_S3_-_Policy_Brief.pdf.

Knowledge exchange can be enhanced by addressing HE structural challenges

HEIs in Greece have shown potential for developing KEC activities and turning towards knowledge creation. Many institutions, however, face challenges that may hamper their progress. These include geographical hurdles, lack of incentives and instructions on creating and implementing partnerships. They

can also be tied back to Greece's unique geographical situation (see Chapter 1).¹⁰ The challenges of building partnerships between HEIs and firms can also be explained by the mindset of Greek HEIs. Given their history and political context (see Chapter 1), HEIs can be hesitant to collaborate with the business community. On the other hand, businesses can also be reluctant to engage with HEIs.

The HE system could also benefit students by introducing further KEC activities. If students from Greek HEIs cannot find their footing in the labour market, it makes it more difficult to establish ties with local ecosystems, since alumni are a powerful intermediary for connecting universities and research centres on one side, and enterprises on the other.

Collaborate to promote human capital

Regenerating a country's human capital is a way of ensuring that the development of the Greek ecosystem will be sustainable. Tertiary education must play a central role in building a population with the skills to address societal challenges with an innovative mindset. This should not be limited to the younger generations. To fully exploit its potential, the country should try to include older cohorts, who may need new skills to adapt to its changing conditions. International practices offer some good examples (Box 4.4).

Box 4.4. Leveraging university collaboration to promote lifelong learning

In 2003, the Politecnico di Milano (Polimi) created a foundation, the Fondazione Politecnico di Milano, in collaboration with businesses such as ENI, Pirelli and Siemens and the public sector (the municipalities and the region). It supports research at Polimi and the economic and social development of the region. Polihub, Polimi's incubator, is managed by the foundation.

The foundation also provides lifelong learning. Beneficiaries of the foundation are not only its founders but also its 200 partners. The main advantages of this status is that it is less constrained by university bureaucracy and thus able to act faster, with greater flexibility. The foundation manages approximately 200 projects per year, matching regional needs and university research, and providing support for instance in terms of funding application or network creation.

Source: OECD/European Union (2019^[26]), *Supporting Entrepreneurship and Innovation in Higher Education in Italy*, <https://doi.org/10.1787/743e88f48-en>.

As of 2018, Greece had one of the highest rates of people who are not in employment, education or training (NEET) for 15 to 29 year-olds (among OECD countries) (OECD, 2019^[27]). As of 2019, it had the highest unemployment rate among EU countries, both among 25 to 39 year-olds with a tertiary education, at 16.8%, and among the total for the active population, at 17.3%.¹¹ This is also due to a lack of soft skills – e.g. communication, teamwork, flexibility and adaptability – among graduates. At the same time, the literacy and numeracy proficiency, computer-related skills and problem-solving capabilities in Greece are below the OECD average, both for the general population and for students with a tertiary education.

These data indicate how much potential KEC activities present. The first step should be to collect information on the population to understand their educational background. Adopting a tool for a nationwide digital tracing of academic careers of students could be useful. However, the underpinning of knowledge co-creation is that, notwithstanding the high unemployment rates, a majority of this population with unexpressed potential is still embedded in Greek society, including those working in public institutions, private firms and its third sector. On one hand, upskilling Greece's population could be an enormous boost for KEC activities. A strong push for lifelong learning could create continuous and beneficial linkages between HEIs and local citizens, amplifying the potential to create connections between universities and

research centres and local institutions and firms, using alumni as a channel. On the other hand, lifelong learning can be regarded as a knowledge transfer activity, since it is aimed at conveying knowledge to citizens, with benefits that can spill over not only to firms, but to society as a whole.

Linking HEIs and the local ecosystem can promote collaboration, entrepreneurship and innovation

In Greece, most HEIs generate partnerships and collaboration with their own ecosystem. Further action can promote stronger links between HEIs and their surrounding actors. These can help to overcome the challenges faced by both HEIs and the HE system at large. Those interviewed for the report often reported that in their ecosystem, entrepreneurial culture was not robust, which undermined the development of knowledge co-creation in the local context. Underfunded and understaffed themselves, universities and research centres feel the pressure of bearing the responsibility for innovation in their local ecosystems, which are often underdeveloped.

Greek higher education has shown new interest in engaging in knowledge exchange and peer learning. The collaboration of the European Commission with the Regional Research and Innovation Council of Eastern Macedonia and Thrace, the Hellenic Ministry of Education and Ministry of Development and Investment of Greece in organising the final event of the Higher Education for Smart Specialisation case study in Eastern Macedonia and Thrace is one good example. The event offered an excellent framework to discuss new opportunities in the context of the 2021-2027 European Regional Development Funds (ERDF) and Cohesion Funds (CF), particularly in view of the introduction of the “Skills for Smart Specialisation, industrial transition and entrepreneurship” under the Smarter Europe policy objective.

The conclusions of the case study in Eastern Macedonia and Thrace inspired other Greek regions to become more engaged in regional innovation strategies under Smart Specialisation Strategies. Participants benefited from the experience built by the OECD and the European Commission in the HEInnovate initiative and became aware of the HEInnovate Greece country review, learning how to become more innovative and entrepreneurial, and also learning from the experience of other EU regions.

Among the main conclusions of discussions at the event, wide agreement was reached on the important role of Greece higher education in opening international networks. These could help regions increase interregional learning experiences and their appeal for talent and investments. Funding instruments tailored to regions’ challenges were also discussed, on the basis that co-creation between higher education and regional innovation stakeholders would be important. Participants also highlighted that the context of Smart Specialisation offers an excellent opportunity to increase experimentation and piloting of new funding instruments at a time of significant budget constraints.

For HEIs, further collaboration, connections with local stakeholders, and structured, coherent institutional strategies could help unlock KEC potential. Observations made about the national level can also apply to the local ecosystem. Cultivating a culture of trust and exchange requires a clear strategy aimed at an objective, on the basis of the strengths and needs of the HEI and the local community, to make an effective use of the resources available, and to give a purpose to the engagement with outside partners. At the same time, institutionalisation of knowledge co-creation in the governance of the institution is essential, in particular through professional figures who can set the strategic priorities and integrate them into the departments’ activities, and are familiar with the strengths and needs of the institution, engage consistently with local actors, and monitor and evaluate knowledge exchange. These things happen in synergy: culture is bred through commitment, and commitment is built through investments, professionalisation and building strategies that become part of an institution’s core mission, integrating an entrepreneurial mindset in its structures.

Box 4.5. Smart Specialisation Strategy, Värmland, Sweden

The Academy for Smart Specialisation in Värmland, Sweden, represents a unique effort to generate a sustainable relationship between a higher education institution and its regional ecosystem. The Academy for Smart Specialisation is part of Värmland's Research and Innovation Strategy for Smart Specialisation 2015-2020 (VRIS3), a strategy document implemented by Region Värmland, Sweden.

The academy is a powerhouse of applied research that aims to diversify, internationalise and increase the resilience of the regional economy. Its interdisciplinary platform provides research activities tailored for regional stakeholders, including specific training programmes. However, changes in the regional governance and limits on attracting funding and engagement from the business community may make it difficult to scale up the academy and give it a more central role within the regional development policy. Further resources are needed to mainstream it in Karlstad University and increase its national and international visibility and impact.

The regional government has actively leveraged national and European policies to build on the existing industrial infrastructure and to prepare for the economic and societal challenges of international competition, changing demographic profiles and outmigration (ruralisation). The regional government, which originally functioned mostly as a regional development agency, has an ambitious Smart Specialisation strategy to strengthen R&D capacity and help diversify the economy in new sectors, to create new skills, valuable jobs and, more generally, an appealing new narrative for Värmland.

Smart specialisation has been transformational in Värmland by promoting new specialisations and skills in the forest-based bioeconomy, ICT, smart industry and tourism, for example. The Smart Specialisation concept is firmly rooted in Värmland's approach to sustainable and inclusive growth and well-being, as reflected by its regional development strategy. The region managed to capitalise on existing strengths and generate new knowledge networks. Bringing clear priorities into the regional agenda has facilitated the allocation of available resources. The success of Smart Specialisation in Värmland can be attributed to the institutional "mobilisation" of regional actors, political agencies and place-based leadership, combined with high levels of trust and social capital in the region.

Source: OECD (2020^[28]), *Evaluation of the Academy for Smart Specialisation*, https://www.oecd.org/cfe/smes/Evaluation_Academy_Smart_Specialisation.pdf.

The systematisation of knowledge exchange in Greece also depends on adapting co-creation strategies to the academic and economic strengths of local ecosystems. The interviews revealed a two-tier system in the way Greek HEIs manage their pursuit of knowledge exchange: the challenges of what appear to be a core-periphery divide and a STEM-societal challenges divide. Some sectorial needs are also highlighted.

Universities and research centres perform better, not surprisingly, when they are located in central and more prosperous regions, such as Athens, Crete and Thessaloniki. However, some of the most successful experiences in knowledge co-creation were achieved by research centres, namely NCSR, CERTH and FORTH, whose campuses are not only in these regions. Of the six universities, the NTUA has a ratio on par with the EU28 average; but at the same time, it demonstrates good practices in knowledge exchange, suggesting that the student-to-teacher ratio is an important predictor of success in an overcrowded and underfunded system.

It emerged in the interviews that most KEC activities in Greece are in the STEM field, with a strategic focus on digital and technological innovation. Some HEIs have departments, programmes or memoranda of understanding in other domains, such as the social sciences, humanities and tourism, and other institutions mentioned having incorporated the SDGs into their agendas. UoWM, DUTH and Aegean, all in peripheral

regions, are experiencing important inflows of migrants and express a will to invest in knowledge co-creation in the social sciences to address the social problems they face.

Sectors such as the naval and cultural industries, in which Greece is a European leader, can help to carry the country's development, also through knowledge exchange. As for tourism, only FORTH and Aegean capitalise on their ecosystem's expertise. Only the NTUA, which has an *ad hoc* faculty in naval architecture and marine engineering, appears to be involved in structured co-creation projects connected with the maritime industry, one of the most important sectors for the Greek economy, and no institution mentioned having active projects in cultural heritage. These areas have unfulfilled potential. Tourism GDP, according to the OECD, accounted for 6.8% of total gross value added (GVA) in 2017, and 10.0% of total employment in Greece, making it one of the biggest sectors of the economy and a pillar for economic growth.

Recommendations

Greece could leverage its network of HEIs to promote human capital, entrepreneurship, innovation and inclusion in all regions. National and regional innovation policies are strongly inspired by EU frameworks and initiatives. HEIs and RIs can play an important role in tailoring these policies to the national and regional needs in innovation and co-operation. This section offers some recommendations to policy makers and to HEIs/RIs, which could improve their capacity to connect and collaborate with stakeholders.

For policy makers

- **Create a legal framework for effective collaboration between HEIs and the business community**, offering legal safety, stability and clarity. To fully realise the quadruple helix collaboration, legal certainty is imperative. This framework should tackle the question of academic entrepreneurship, intellectual property rights (IPR) and the boundaries of business involvement in joint actions with HEIs in local innovation initiatives.
- **Develop innovative incentive mechanisms**. Create incentives for universities, professors and students on the HEI side, and for local firms, entrepreneurs and local institutions in the ecosystem, to engage in long-term knowledge co-creation activities with local communities. Incentives might be financial, but designed to shift the focus of teachers' performance assessments from exclusively scientific output, to rewarding those involved in knowledge co-creation. Measuring involvement in third-sector activities could be an integral part of the academic activity of professors, through *ad hoc* indicators. This strand of interventions would need innovation in policy design and assessment with which several EU countries are experimenting.
- **Reduce the core-periphery divide within the HEI system**. HEIs on the periphery shoulder a heavier burden of cultivating innovation in weaker ecosystems, while, in some cases, also facing the pressure of migration flows. Policy makers could consider investing in knowledge co-creation activities designed to mitigate inequalities and promote social inclusion, to build stronger communities with higher levels of social capital. Social capital is required to create connections built on trust, and thus to foster innovation, while innovation and economic development tend to be stronger and more sustainable in places that are more integrated and less unequal.
- **Support border regions to promote HE as innovation intermediaries**. Border regions face different and challenging geopolitical conditions. To reduce challenges, *ad hoc* investment could create a "free zone for learning opportunities", following the model of the International Konstanz School, which includes a network of universities in Austria, Switzerland and Germany. The small, scattered population of the archipelagos would benefit from innovation intermediaries, enhancing networking in Greek regions among the various stakeholders involved in KEC.

- **Scale up the potential of co-creation, and generate synergies and complementarities, through an ambitious HE agenda.** In a regionally based paradigm to develop innovation policies, innovation intermediaries can help create cluster initiatives to organise knowledge co-creation around HEIs. This can institutionalise third-mission activities more systematically, expanding beyond the single initiatives of professors and/or firms, reducing the fragmentation of knowledge exchange and creating institutionalised forums for engagement with local stakeholders. This could build incentives and link HE policy with regions in Greece.
- **Monitor further alignment towards more effective KEC.** Finally, to engage faculty members, as well as firms, NGOs, local administrations and citizens, HEIs should increase their efforts to monitor and evaluate knowledge co-creation activities. This can give them a concrete view of their strengths and weaknesses, not only for more focused interventions to improve their strategies, but also to develop clear-cut narratives encouraging participation of internal and external actors in knowledge exchange and collaboration.

For higher education institutions

- **Encouraging alumni networking.** Establish networks of alumni to create local, national and international connections with firms, HEIs and external stakeholders. This could mitigate the negative effects of the brain drain, giving universities the chance to retain strong ties with their alumni and enhance the possibility of developing international knowledge exchange activities. On the other, it can help bring universities and firms together locally, using alumni as a bridge between the different scopes of HEIs and their partners to align their interests.
- **Develop cultural heritage as a pivotal asset for co-creation.** To extend the horizon of disciplines involved in knowledge exchange, Greek HEIs should look into the humanities, and in particular archaeology, as a field in which to enhance knowledge co-creation. Greece's historic and cultural heritage is an important asset. Its position at the heart of worldwide research in this field and at the forefront of the use of digital technologies can help create richer tourist experiences. It can thus become a catalyst for knowledge exchange. This has potential for economic development, not only by attracting tourists, but in developing innovations in conservation and restoration. Innovations of this kind could lead to new areas of knowledge, human capital, and collaborations and knowledge exchange with local and international private firms.
- **Training for co-creation to establish strategies targeted to the local communities and their problems.** Knowledge co-creation requires institutionalisation, especially in hiring and training professional figures whose expertise is needed to develop strategies for knowledge exchange and incorporating it into the institution's mission. Training people who can act as catalysts of innovation, on behalf of universities and research centres, in harmony with the whole local ecosystem and its stakeholders, can help mitigate problems, produce solutions and build the adequate structures to address societal issues in their communities. HEIs should not only feel "of the region" but "with the region". They should participate in local strategic mapping exercises and become fully involved in the local RIS3 through the appropriate Entrepreneurial Discovery Processes (EDP). The essentials of the Foundational Economy could be developed for their regions.
- **Create further opportunities for industrial PhDs.** Industrial PhDs allow students to pursue their degree in a vocational setting. They provide candidates with business experience and allow them to graduate with transferable and pragmatic skills. They also add value to the exchange of knowledge and capital between HEIs and business, notably through human capital.

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Notes

¹ A NIH effect depends on the tendency for people and organisations to avoid things that they did not create themselves. NIH is often the result of pride (or jealousy) that makes members of an organisation believe that they can solve a problem in a better way than pre-existing solutions.

² The STIP-Compass is a joint initiative undertaken by the European Commission and the OECD, launched in 2018, to provide access to quantitative and qualitative data about countries’ science, technology and innovation (STI) policies. Its taxonomy of policy initiatives has three dimensions: policy themes, target beneficiaries, policy instruments.

³ Information gathered from online interviews.

⁴ The most recent intervention that touches upon knowledge co-creation is Law 4 485/2017, which specifies the mission and the primary constitutional requirements for higher education. Among its provisions, particular attention is given to knowledge exchange and collaboration, and the third mission of tertiary education in Greece: “Meet the development needs of the country, promote the dissemination of knowledge and the cultivation of the arts, the use of research results and innovation, with a view to the principles of scientific ethics, sustainable development and social cohesion; contribute to the national plan for productive reconstruction of the country towards sustainability”. The “Mediation Offices” Programme, which ran between 2003 and 2008, aimed to develop technology transfer activities and structures. It allowed a short-term intervention and yielded some results. However, with further funding and resources in HEIs, it could have helped create a system of incentives to engage agencies and researchers in these activities.

⁵ PRAXE was launched by the General Secretariat for Research and Technology (now GSRI). Further calls were published in 2011 with the same objective, i.e. establishing spin-offs, spin-outs and innovative start-ups, primarily for the commercialisation of research.

⁶ Spin-offs from research are the best-known form of academic entrepreneurship. As distinct from a model whereby universities “transfer” knowledge to private companies, this model directly involves individuals studying or working in universities and other RIs in the creation of the start-up.

⁷ Law 4 485/2017, http://www.et.gr/idocs-nph/search/pdfViewerForm.html?args=5C7QrtC22wEsrjP0JAIXBXdvtvSoClrL8jiNRVGgNfKB5MXD0LzQT_LWPU9yLzB8V68knBzLCmTXKaO6fpVZ6Lx3UnKI3nP8NxdnJ5r9cmWyJWeldvWS_18kAEhATUkJb0x1LldQ163nV9K--td6SluVYeTXOsORovdn0I_ZfRyMY0u5MuYIt1aaQCxpGiJYq8.

⁸ Strategic Pillar 1: Investing in the creation and dissemination of new knowledge to promote excellence in research. Strengthening mechanisms, networking, human resources in research, research infrastructure and innovation support of Research, Technological Development and Innovation (RTDI) structures (capacity building), promotion of access to information and research results. Strategic Pillar 2: Strengthening investment in research and innovation, supporting innovative enterprises in international markets through research and innovation, and development of new innovative “players”. Strategic Pillar 3: Developing innovative attitudes, institutions and RTDI links with the society to address social challenges.

⁹ The exploRIS3 tool: https://public.tableau.com/app/profile/pasquale.pavone/viz/ExploRIS3_2021/ExploRIS3.

¹⁰ As mentioned in Chapter 1: “While it is a relatively small country, Greece has a complex topology and demographics. Its HEIs are scattered across a mix of mainland and islands. Greece’s unique geographical characteristics define its distribution of people and resources.” Page 4, Chapter 1.

¹¹ Eurostat unemployment rates by sex, age and educational attainment level (%), https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Unemployment_statistics_and_beyond.

5 The Internationalised Institution

Internationalisation has become an important objective for the Greek higher education system and institutions. It can contribute to higher education institutions' (HEIs) entrepreneurship and innovation by generating new networks, new objectives and access to international practices. This chapter provides an in-depth discussion of current trends, opportunities and challenges faced by national actors, while embedding internationalisation into institutional strategies. It illustrates selected national practices and initiatives. Finally, the chapter issues policy recommendations for both policy makers and higher education institutions.

Introduction

Internationalisation has become a major issue in higher education, shaping national policies and institutional strategies, including for entrepreneurship and collaboration. In recent years, several reports have underlined the growing importance of internationalisation for higher education institutions and the different approaches across countries, regions and institutions (de Wit et al., 2015^[1]).

Greece has been developing efforts to internationalise its higher education system, which have been significantly encouraged by both external (European) and internal (systemic and institutional) initiatives. External drivers, such as the European Higher Education and Research programmes, and, in particular, the adoption of the Bologna process, have not only resulted in initiatives for internationalisation and successfully paved the way for new and more diverse forms of internationalisation, but have also been the driving force behind some important reforms in Greek higher education sector. Internationalisation has also inspired new practices in entrepreneurship and collaboration. The combined effect of European, national and institutional initiatives has helped cultivate internationalisation, which has increasingly become an important issue in Greek higher education and science.

Internationalisation has traditionally developed in the areas of education and research, but a growing debate has considered how it can be embedded transversally in universities. This would include taking advantage of internationalisation in what can be broadly considered the university's engagement with society. As shown by the HEInnovate framework (and self-assessment tool), an internationalised HEI can magnify its societal relevance by becoming a platform connecting the local and the global, enhanced by its capacity to create and disseminate knowledge to the various areas of economic and social life (Box 5.1). The increasing efforts of HEIs on Agenda 2030 are a good example of the connection between internationalisation and engagement.

Box 5.1. The Internationalised Institution

Internationalisation in the HEInnovate framework and self-assessment tool

The HEInnovate framework/self-assessment tool explicitly refers to internationalisation as a driver of entrepreneurship and innovation at the institutional level. According to the framework, internationalisation is the process of integrating 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. It introduces alternative ways of thinking, questions traditional teaching methods, and opens up governance and management to external stakeholders. It is thus linked very strongly with being entrepreneurial. It is possible for an HEI to be entrepreneurial without being international, but the HEI cannot be international without being entrepreneurial or innovative.

The HEInnovate framework/self-assessment tool provides five “statements”, listed below, which connect internationalisation with the entrepreneurial and innovation agenda, at the institutional level.

1. Internationalisation is an integral part of the HEI's entrepreneurial agenda.
2. The HEI explicitly supports the international mobility of its staff and students.
3. The HEI seeks and attracts international and entrepreneurial staff.
4. International perspectives are reflected in the HEI's approach to teaching.
5. The international dimension is reflected in the HEI's approach to research.

Source: HEInnovate (2021^[2]), *Homepage*, <https://heinnovate.eu/en> (accessed on 28 May 2021).

Internationalisation is gaining importance in the higher education agenda

Higher education must balance its embeddedness in its national context and a strong international vocation. On the one hand, higher education has been closely linked to nation building and to the fulfilment of multiple economic and social demands. On the other hand, the production and dissemination of knowledge is not hindered by borders, and in recent decades, has been accelerated through multiple forms of internationalisation. Moreover, the international “nature” or dimension of higher education has profoundly changed over the centuries and has taken on substantially different and more complex forms and approaches. Internationalisation of higher education, as it is understood today, has emerged over the last 30 years, driven by academic, economic, political and socio-cultural rationales (de Wit, 2018^[3]).

The concept of internationalisation is dynamic. It is a complex concept that has reflected the changes in approach to the international dimension of higher education. Internationalisation now means not only “the process of integrating an international, intercultural, or global dimension into the purpose, functions or delivery of post-secondary education” (Knight, 2008^[4]). Internationalisation can also become an instrument (rather than an end in itself) to enhance the quality of teaching, research and the service role of higher education in society (de Wit et al., 2015^[1]).

Broadly considered, the notion of internationalisation incorporates two components:

1. internationalisation abroad, i.e. including all forms of education across borders, such as mobility of people, projects, programmes and providers;
2. internationalisation at home, i.e. focusing on the dimensions of internationalisation that are more curriculum-orientated and on activities that develop international or global understanding and intercultural skills (Hudzik, 2011^[5]).

Recognising these two components of internationalisation does not necessarily mean that understanding of the concept must be fragmented. On the contrary, the need for a holistic and comprehensive approach to internationalisation by higher education institutions has been increasingly emphasised in the debates on this process. The concept of comprehensive internationalisation defines “a commitment, confirmed through action, to infuse international and comparative perspectives throughout the teaching, research and service missions of higher education. It shapes institutional ethos and values and touches the entire higher education enterprise. It is essential that it be embraced by institutional leadership, governance, faculty, students, and all academic service and support units. It is an institutional imperative, not just a desirable possibility” (Hudzik, 2011^[5]).

The rationales for internationalisation in higher education are diverse, though they are interconnected and may overlap in terms of characterising particular goals (de Wit, 2018^[3]; Crăciun, 2018^[6]; Seeber et al., 2016^[7]). At least four different rationales can be singled out: academic, economic, political (international diplomacy), as well as social and cultural (Box 5.2).

Box 5.2. Four rationales for internationalisation in higher education

At least four related rationales for internationalisation in higher education can be identified.

The first is the academic rationale. This involves such issues as the expansion of higher education’s capacity, the improvement of the quality of higher education, the expansion of knowledge creation’s capacity in HEIs, enhancing prestige (especially as reflected in rankings and league tables), and the opportunity to benchmark institutional performance in the context of international good practice. This has been an important motivation for many countries’ approach to internationalisation, especially in

Europe, with the significant developments towards more integrated higher education and scientific disciplines.

The second rationale to consider is economic. This integrates aspects ranging from short-term economic gains to long-term effects in national economic development, and the development and qualification of the workforce. In the short term, international students bring additional revenue through general living expenses. In the long term, international students can add to the domestic pool of highly skilled workers and help to strengthen the domestic knowledge economy. This is especially important for many European countries, like Greece, that are experiencing demographic change, negative population developments, a brain drain and growing skills shortages.

The third rationale to consider is political, and involves issues of public diplomacy, national security and international development. For many countries, the possibility of cultivating intellectual and educational links with other countries or regions is often promoted as a political imperative. For Greece, which occupies a critical geographical position, internationalisation of its higher education and scientific systems has political implications that should be developed through a strong political commitment and integrated into its regional and global diplomatic strategy.

Finally, the social and cultural rationales include such topics as international awareness of, and deeper engagement with, global problems (e.g. those outlined in the United Nations' Sustainable Development Goals), global citizenship and mutual understanding. One may also argue that rationales at the national and organisational-institutional level influence how academic, political, economic and social-cultural rationales shape internationalisation strategies and the way they are developed and implemented (Seeber et al., 2016^[7]). This is particularly relevant for a country such as Greece, with its rich and influential heritage. This can help it craft a strategy of international appeal and educational and scientific international partnerships.

Source: Seeber, M. et al. (2016^[7]), "Why do higher education institutions internationalize? An investigation of the multilevel determinants of internationalization rationales", <http://dx.doi.org/10.1007/s10734-015-9971-x>.

Internationalisation: effective approaches for a global expansion

National policies play a significant role in internationalisation

Despite the growing autonomy of universities and research organisations, the national policy and contexts play a central role in steering the higher education system and, particularly, in strengthening its degree of internationalisation (Crăciun, 2018^[6]; Enders, 2004^[8]; Luijten-Lub, Van der Wende and Huisman, 2005^[9]). Having well-defined and coherent national strategies for is an important factor for effective promotion of internationalisation (Crăciun, 2018^[6]).

The increasing visibility of internationalisation in higher education policy has helped develop national policies promoting this dimension (de Wit, 2018^[3]; Rumbley and Helms, 2018^[10]). Strategic thinking about the internationalisation of higher education at the national level is not widespread, however. Some national governments play an active role in the promoting the internationalisation of their higher education systems, and others play a more limited role. These strategies tend to be concentrated in Europe, in such countries as Belgium, Denmark, Finland, Germany, Ireland, Norway, Spain, Switzerland and the United Kingdom (Crăciun, 2018^[6]). There is also a significant number of examples in more developed countries such as Australia, Canada, Japan, Singapore or South Korea, with consolidated national strategies for the internationalisation of higher education.

However, while national governments can facilitate and strengthen internationalisation strategies, they can also stand in their way (Enders, 2004^[8]; Horta, 2009^[11]). This is particularly true if they cannot ensure adequate co-ordination and collaboration between the different actors of the higher education system (Bartell, 2003^[12]). The rationales, approaches, complexity and influence of these national policies are thus extremely diverse, since they reflect the particular needs of national higher education systems. National strategies for internationalisation of higher education need to be developed in co-ordination with HEIs, since they play a vital part in the strategies' success (Altbach and Knight, 2007^[13]; Hunter, 2018^[14]). Europe's higher education landscape offers some good examples of consistent and co-ordinated national strategies for internationalisation (Box 5.3).

Box 5.3. National commitment to international higher education

Finland

In Finland, the internationalisation of higher education has become a key policy goal for higher education. In its "Strategy for the Internationalisation of Higher Education Institutions in Finland 2009-2015", co-ordination and co-operation at the national and institutional level have been crucial.

This strategy has defined a set of policies promoting internationalisation in Finnish higher education and research for the period 2017-2025. The strategy aims at: cultivating international interest in Finnish science and research; and enhancing the quality and pioneering role of Finnish higher education in learning environments for research, development and innovation. It includes increasing the visibility of Finnish higher education and education services using joint marketing; facilitating and simplifying the processes connected with studying and working; promoting a broad national debate on promoting internationalisation in Finnish higher education and research; setting up a Team Finland Knowledge network to represent Finnish higher education and research in selected countries; and involving Finnish experts living abroad and alumni educated in Finland (Finnish Ministry of Education and Culture, 2017^[15]). In its aim to become one of the most internationalised higher education systems in Europe, Finland hopes to deepen its international links further, continuing to prioritise internationalisation of its higher education system and to pursue well-co-ordinated national strategies for internationalisation.

Spain

Spain's higher education system has moved conspicuously in recent decades to engage internationally (Rumbley, 2012^[16]). Its example shows how complex this process is and how important the commitment of the national government is in any effort to promote internationalisation in higher education.

In 2010, the Ministry of Education launched the University 2015 initiative (Spanish Ministry of Education Culture and Sports, 2010^[17]), a first step in the Strategy for the Internationalisation of Spanish Universities' (Spanish Ministry of Education Culture and Sports, 2015^[18]). It began with an assessment of the HE system's main strengths, weaknesses, opportunities and challenges/threats in internationalisation. The strategy exemplifies the commitment of the national government to internationalisation and the importance of aligning co-operation between the different actors of the system around the same strategy. Arguably, one of its major contributions was to promote a concerted approach to internationalisation throughout higher education system that involved the main stakeholders: the central government, regional authorities, universities and other stakeholders (Government of Spain, 2017^[19]).

Ireland

Ireland is another case of a higher education system in which the national government has taken an active role in driving internationalisation and in defining a national strategy. It designated four strategic priorities: ensuring policy cohesion across related areas of government and a strong regulatory environment that supports the objectives of internationalisation; cultivating internationally oriented, globally competitive higher education institutions; ensuring sustainable growth in the English-language training sector; and identifying and building presence and concrete outcomes in international education markets.

For each priority, the strategy defines the actions, resources and investment required, and the implementation and monitoring plans. This has been important in mobilising all higher education institutions to incorporate internationalisation in their strategic plans (Bloch et al., 2018^[20]). Like the other national strategies mentioned, the Irish national strategy is a key instrument for co-ordinating stakeholders towards common goals in internationalising the higher education system. As the Strategy makes explicit, “the actions to deliver on this Strategy involve all stakeholders, including Government Departments, State Agencies, education institutions and representative bodies. It is essential therefore that implementation takes place on a partnership basis”.

The most recent strategy for internationalisation of higher education emphasises the importance of high-quality education and a commitment to excellence. These are seen as vital in attracting talent to Ireland, to promote Irish students’ skills and experience for competing internationally, to allow higher education institutions to engage in world-class research and international collaborations, and to address global challenges.

Source: Department of Education (2016^[21]), *Strategy 2016-2020 - Department of Education and Skills*, <https://www.education.ie/en/The-Education-System/International/Strategy-2016-2020.html> (accessed on 25 May 2021); Finnish Ministry of Education and Culture (2017^[15]), “Better together for a better world: Policies to promote internationalization in Finnish higher education and research 2017–2025”, Finland: Ministry of Education and Culture; Rumbley, L. (2012^[16]), “Internationalization in the universities of Spain: Changes and challenges at four institutions”, in Maringe, F. and N. Foskett (eds.), *Globalization and Internationalization in Higher Education*, Continuum, London; Spanish Ministry of Education Culture and Sports (2010^[17]), *Estrategia Universidad 2015 (Strategy University 2015)*; Spanish Ministry of Education Culture and Sports (2015^[18]), *Estrategia para la Internacionalización de las Universidades Españolas 2015-2020 (Strategy for the Internationalization of Spanish Universities 2015-2020)*; Government of Spain (2017^[19]), *The Internationalization of Higher Education in Spain: Reflections and Perspectives*, http://sepie.es/doc/comunicacion/publicaciones/SEPIE-ENG_internacionalizacion.pdf (accessed on 19 May 2021); Bloch, R. et al. (2018^[20]), “Introduction: Universities and the production of elites”, http://dx.doi.org/10.1007/978-3-319-53970-6_1.

Different countries have adopted various approaches to the promotion of internationalisation. The first is the need for significant discussion about what internationalisation can contribute to the higher education system. The second is the need to be selective and to define the system’s priorities for internationalisation, the main areas of activities, and the tools to pursue them, understanding they will not be able to cover everything (and that not everything is equally important). A third aspect is the need for continuity and a recognition that successful strategies require persistence in the objectives and programmes to support internationalisation. Finally, international examples illustrate the need for involving the various stakeholders and building a common view about internationalisation across the higher education system. This requires special focus on the particular needs and specificities of the stakeholders and institutions in the higher education system.

HEIs' strategies complement national policies for internationalisation

A successful approach to internationalisation needs to account for the diversity and specificity of the higher education landscape and to integrate the contributions of the various stakeholders. Internationalisation is a multidimensional phenomenon, and HEIs are diverse internally. All this will be reflected in different attitudes to internationalisation (Seeber et al., 2016^[7]).

In the rapidly changing higher education environment worldwide, institutions tend to position themselves differently, relying on a variety of strategies and activities (Fumasoli and Huisman, 2013^[22]; Cattaneo, Meoli and Paleari, 2015^[23]). This means that they will have different understandings of internationalisation, on where they should focus and how they should develop their strategies (Altbach and Knight, 2007^[13]). In each institution, different rationales and understandings may coexist and different strategies emerge (Middlehurst, 2008^[24]; Stromquist, 2007^[25]).

This diversity of approaches may range from “spontaneous and marginal” to “systematic and centrally directed” approaches to internationalisation, reflecting various degrees of strategic vision and management. Some institutions develop limited activities detached from a global strategy, and others develop strategies deriving from the institution’s global vision, based on clear goals and operationalised in consolidated instruments (Klasek, 1992^[26]).

European HEIs are increasingly developing internationalisation strategies shifting from a short-term perspective toward a comprehensive, integrated approach to the internationalisation of the overall institution (Middlehurst and Woodfield, 2007^[27]). HEIs are increasingly conscious of the need for co-ordinated, holistic approaches to internationalisation, integrated into a broader institutional strategy. This corresponds with a proactive approach to internationalisation, involving long-term plans, policies, implementation and assessment (Rudzki, 1995^[28]).

Internationalisation in higher education is being approached not as a collection of loosely related activities but as an integrated set of initiatives. No one strategic format dominates (Maringe and Foskett, 2010^[29]), since each involves particular stakeholders and specific measures: contextual analysis, assessment of internal resources, setting achievable goals; formulation and evaluation of strategic options, and planning and implementation (Knight, 2004^[30]; Rudzki, 1995^[28]; Asderaki, 2013^[31]).

Globally, these different steps integrate three main stages:

- the design of internationalisation that mainly represents the strategic intent, mission statement, strategic vision, corporate strategy and strategic plan;
- the definition of the instruments to implement the design;
- the evaluation of the process by comparing the design with the implementation, by comparing real internationalisation achievements with the intended initial strategy (Ayoubi and Massoud, 2007^[32]).

It should be noted that the design and implementation of an internationalisation strategy is a long-term course and cannot be isolated from an institution’s other activities (Maringe and Foskett, 2010^[29]). National strategies should promote continuity, allow consolidation of institutional approaches to internationalisation and achieve significant impact in the various dimensions of activity.

Box 5.4. The complexity of internationalisation: An analytical framework

Internationalisation is a complex dimension of higher education, involving diverse rationales, areas, components and instruments, based on a diverse landscape of national and institutional approaches and strategies.

To analyse and understand such complexity, at the national or the institutional level, various dimensions of analysis should be considered, namely:

- *Motivations and goals*: The importance of internationalisation for the institution, the motivations and drivers for internationalisation and the goals of internationalisation strategies;
- *Institutional strategy for internationalisation*: The existence of a systematic or non-systematic approach to internationalisation, the prevalence of a bottom-up or a top-down approach to internationalisation, the type of involvement of institutional actors and of external stakeholders in internationalisation policies;
- *Areas and instruments*: The main areas of internationalisation, the policies or instruments developed for each mission, and the balance between activities related to internationalisation abroad and at home;
- *Effects*: The main effects of internationalisation policies for the different missions and the effects at the organisational level;
- *Challenges*: The main difficulties of the institution regarding internationalisation, and the main internal and external factors hindering and supporting internationalisation.

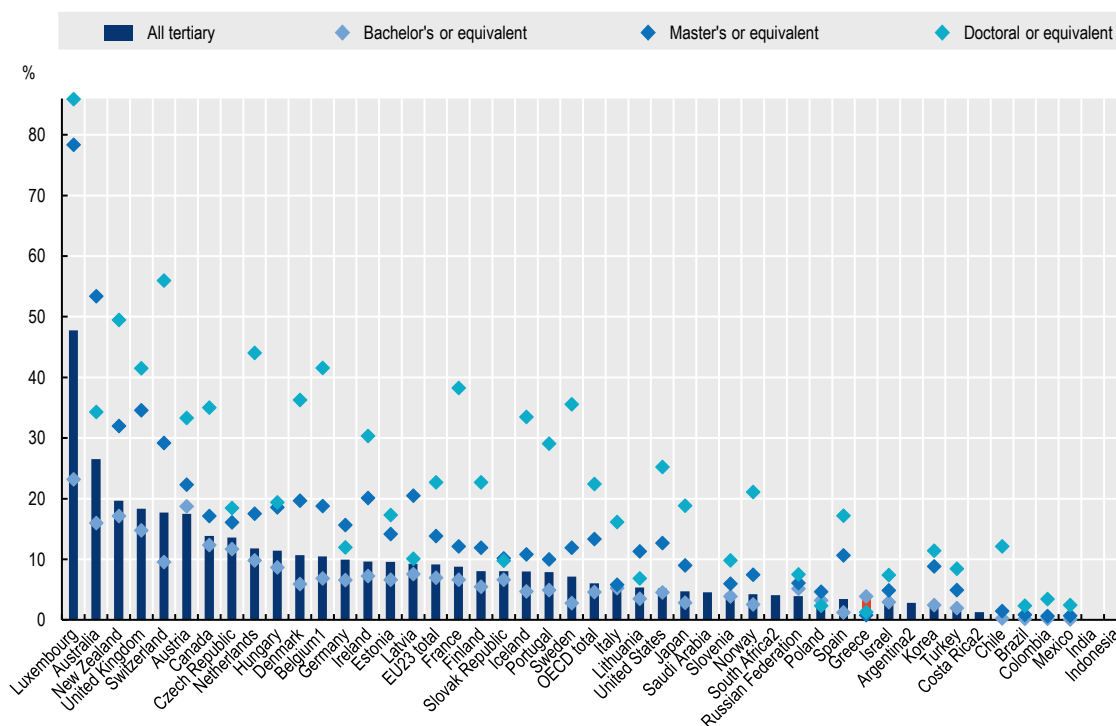
Internationalisation has become a priority in Greece's higher education system

Higher education in Greece has steadily embraced the agenda of internationalisation. Its higher education system has played an important role in nation building. Up to a decade ago, higher education was conducted almost exclusively in the Greek language, catering mainly to national students. Greece's participation in European integration has been a major factor in giving internationalisation greater visibility in the country's higher education landscape and has promoted significant changes (Asderaki, 2013^[31]; Papadimitriou, 2011^[33]). Greek HEIs have been very active in the European integration process, participating in several initiatives and programmes. This has become particularly visible with the Bologna process,¹ to which Greece is a signatory state, especially from the mid-2000s, with the adoption of tools that increased the comparability of education and degrees and allowed for more international mobility of students. The creation of the European Universities has also contributed to this trend, generating further momentum for the internationalisation of Greek HEIs, and shifting from its national orientation.

As a result, the Greek higher education system has advanced in internationalisation, increasing mobility at the levels of student and staff, resulting in some programmes in foreign languages, and attracting international students from a small group of countries.² Thanks to the late engagement with internationalisation of HE, the level of mobility is slightly below the OECD average, with lower mobility for graduate and postgraduate programmes Figure 5.1. . Recent trends in mobility flows suggest that the outward mobility of Greek students and academics is greater than inward mobility, indicative of the brain drain that has characterised the country for many decades (Asderaki, 2013^[31]; Livanos, 2010^[34]).

Figure 5.1. The number of incoming students in Greece remains low

Incoming student mobility in tertiary education, by level of study (2017), international or foreign student enrolment as a percentage of total enrolment in tertiary education



Note: All tertiary education includes short-cycle tertiary programmes, which are not presented separately in the figure.

1. Data on short-cycle tertiary programmes are based on nationality and refer to the Flemish community only;

2. Year of reference 2017.

Countries are ranked in descending order of the percentage of international or foreign students in tertiary education.

Source: OECD (2020^[35]), *Education at a Glance 2020: OECD Indicators*, <https://doi.org/10.1787/69096873-en>, Table B6.1.

The increasing collaboration with other European higher education and research institutions have also led to the possibility of offering joint programmes and the use of other languages in those programmes. For example, the University of Crete offers a joint master's degree in aquaculture and environment, in co-operation with University of the Highlands & Islands (UK), Université de Nantes (FR) and Radboud University (NL). As noted, European programmes have been important in promoting internationalisation amongst Greek academics and researchers, notably through the participation in European funding programmes for education and research. International collaboration with European partners has thus become a cornerstone of the internationalisation process of the Greek higher education system.³

Greece has taken important steps to promote the internationalisation process

Efforts supporting internationalisation in Greece's higher education system and institution started in the mid-2000s and have accelerated since 2019. The International Hellenic University in Thessaloniki, which was set up in 2005 and became operational in 2007, offered the possibility of adopting languages other than Greek in recognised programmes of instruction (Fotiadou and Mattheoudakis, 2019^[36]). International double and joint programmes of study, taught in a foreign language, can be offered at all levels of studies. These programmes are addressed to international students, and Greek students may also apply. The University of Athens' first undergraduate degree in English, a bachelor's degree in the Archaeology, History and Literature of Ancient Greece, accepted its first students in September 2020.

One major advance was the recent introduction of the Internationalisation of Higher Education through the National Strategic Reference Framework. This integrated programme supported the internationalisation and launching of the Hellenic Higher Education System in March 2021, with a budget of EUR 20 million. It was to fund projects starting in summer 2021 until October 2023. The programme is intended to support: existing or new international programmes taught in a foreign language; offices to support incoming international students; and international certification and accreditation of international, foreign-language courses.

Internationalisation now pervades several areas of higher education policy, one of which is the funding system. About 20% of total university funding through the state budget is expected to be determined on performance-based criteria. These will include internationalisation indices (under the relevant legal statutes). Internationalisation will be one of the criteria, although its relevance has yet to be established. Internationalisation has also become relevant in quality assurance, although its operation has yet to be clarified. These developments may help provide coherence and strengthen the systemic and institutional focus in internationalisation as a key dimension of the overall higher education strategy.

Mobility of students and researchers is also supported by scholarships from the Hellenic State Scholarships Foundation (IKY), serving as the National Agency for Erasmus+ in the field of education and training.

The Study in Greece portal⁴ indexes Greek HEIs' programmes of study and provides information on higher education in Greece to international students and academics. It has operated under the auspices of the Ministry of Education and Religious Affairs since 2020, and is financed by the National Strategic Reference Framework (NSRF) funds to serve as a focal point to support the internationalisation and extroversion of the Greek universities and offer information on studying and living in Greece, in co-operation with the Ministry of Education and Religious Affairs and Greek HEIs, as well as the Ministry of Tourism.

The Ministry of Education and Religious Affairs has been supporting initiatives to “build bridges” with HE systems and renowned universities. The International Academic Partnership Programme for Greece is a flagship initiative administered jointly by the Institute of International Education (IIE) and the Hellenic Ministry of Education and Religious Affairs. This programme will give HEIs in the United States an opportunity to engage with their Greek counterparts and craft durable and substantial partnerships, such as joint or dual degrees and exchanges of students, researchers and professors. All Greek HEIs participate in the programme, as well as 29 well-respected universities in the United States, including Ivy League institutions.

Building on the good experience and insights of the programme with the American universities, the Ministry of Education has engaged in other international co-operations. The United Kingdom-Greece Strategic Partnership in Education encourages collaborations between British and Greek universities. Greek and British universities are engaged in this collaboration, aiming to spur institutional collaborations at research or academic level and other schemes, such as short-term summer or winter schools. In the same vein, the ministry promoted the Co-operation with Chinese Universities, deployed around three pillars: a) the creation of a joint postgraduate programme of study between the Universities of Athens, Thessaloniki, Patras, Crete and South Western University, China, scheduled to accept its first students in September 2022; b) the creation of a Centre for Ancient Greek and Chinese Culture by a consortium including the Universities of Athens, Thessaloniki, Patras, Crete;⁵ and c) the exploration of wider synergies with Chinese universities, by organising joint events and providing opportunities for discussion. Another important initiative for international co-operation, with a focus on entrepreneurial education, was the “Entrepreneurial University” Masterclass Series, in spring 2021. This educational programme was organised in co-operation with the Embassy of the Netherlands in Greece, Orange Grove and Uni.fund, delivered by the Amsterdam Centre for Entrepreneurship (ACE) and Preneurz.Amsterdam.

A complex regulatory framework may restrict internationalisation

To become a major driver of the higher education system, internationalisation needs to pervade the higher education's regulatory framework in multiple dimensions, namely its legal framework and the incentives and rewards that regulate institutional and individual behaviour. In the recent past, the legal framework has held back the internationalisation of Greek higher education. The funding mechanisms for internationalisation have until recently also been largely lacking, although changes are being introduced to address this. Regulations for academic careers do not seem to consider internationalisation explicitly as a major factor, except in indirect contributions to some scholarly achievements made possible by greater participation in international research networks.

Throughout the review, many stakeholders at HEIs selected as case studies noted that the overall regulatory framework prevented Greek institutions from taking full advantage of the academic, organisational and financial opportunities created by internationalisation. The dominant perception among institutional representatives and academics was that internationalisation has only recently been regarded at the system level as a priority issue and that the advances still fell short of what was believed to be necessary. These stakeholders reported that they considered that the incentives are still relatively weak for encouraging strong institutional and individual commitment to various forms of internationalisation.

Internationalisation in Greece is driven by academic and economic rationales

The main rationales for internationalisation in Greek higher education institutions tend to be academic and economic (Box 5.1). Academic rationales are particularly associated with expanding student numbers, improving the quality of education and knowledge creation and advancement. On the one hand, internationalisation is perceived as representing new opportunities for collaboration and partnerships, for professors and researchers. On the other hand, it is seen as crucial for students, in cultivating an international perspective and enabling educational and social experiences in an international environment. Prestige and ranking are also important drivers for internationalisation, especially for institutions' top leadership.

Economic rationales have also become extremely important as drivers for internationalisation in Greek higher education. This has been particularly important given the opportunities created by the process of European integration for additional funding, which have been referred to as very important for research activities. This availability of funding has also been important, given the constraints faced by public funding that affected the system and that have hindered institutional strategies and development. The policy framework has clearly encouraged institutions to be proactive in obtaining additional funding through international activities and collaborations. Universities and research organisations, which have an important academic rationale for internationalisation, have been particularly motivated by such factors.

Political rationales, linked to public diplomacy, soft power and international development, are rarely mentioned by institutions, although the national discourse on internationalisation has accorded them some justification. The disjuncture between systemic and institutional attitudes may be due to a lack of instruments that reflect a discourse favouring internationalisation of education in a broader political and diplomatic framework.

Social and cultural arguments, integrating international awareness of and deeper engagement with global problems are scarcely mentioned by Greek higher education institutions. Nevertheless, many actors at the institutional and academic levels acknowledge the potential of this motivation in the future development of internationalisation in Greek higher education.

Many of the institutional stakeholders interviewed for the review present a combination of several of these rationales. Taking advantage of networks of the Greek diaspora helps combine academic justification (given their position and their networks in prestigious academic and research institutions abroad),

economic reasons (as a lever to a more successful participation in international funding programmes) and cultural reasons (due to the cultural and linguistic proximity). Internationalisation is complex, but it can harness the multidimensional potential of certain strategies of internationalisation and mobilise various forces and motivations, which may enhance their relevance and impact for higher education. Greece faces structural changes associated with its declining demographic trends and has been emerging from a severe economic crisis. Inevitably, these factors have influenced its approach to internationalisation of HEIs.

European integration has generated new opportunities for internationalisation

One of the major levers for the promotion of internationalisation in Greek higher education is the process of European integration and its implications for higher education and science. The participation of Greek higher education in the European networks has been significant.

Of the different missions, research has made the greatest progress in internationalisation. Greek universities have been more engaged internationally in research than in education. By June 2020, 30 228 research projects, with about EUR 70 billion in EU financial contributions, had been approved under Horizon 2020. With 4 291 Greek participants (851 unique participants) in 2 349 projects, placing Greece ninth in the related ranking. Total community funding attracted by scientists from Greek academic institutions, research centres and the private sector in June 2020 amounted to EUR 1.314.5 million. This funding was 2.6% of total Horizon 2020 funding to the Member States of the EU27 and the United Kingdom. Greece ranked 11th, above countries such as Finland, Ireland and Portugal.

This participation in international networks has brought access to research funding that has stimulated innovation, which has been crucial in supplementing national funding at a time of severe national financial constraints. It has also created major opportunities for collaboration, participating in projects, joint publications, scholarships or periods of research and study abroad. This has been particularly important for strengthening the Greek presence in international academic networks, as illustrated by the Greek research centres, such as the Foundation for Science and Technology-Hellas (FORTH), the Centre for Research and Technology (CERTH) and the National Centre for Scientific Research Demokritos (NCSR).

Greek universities' participation in mobility programmes has led to several interesting initiatives, although student mobility (incoming and outgoing) still lags. Some universities are undertaking efforts to attract international students, by broadening the offer of undergraduate (thanks to the recent reforms) and postgraduate programmes in English. Mobility is also low for academic staff, with some exceptions.

Internationalisation in the third mission is in the initial stages. Relatively few universities reported collaborations with local partners or any efforts to link up with society and address local challenges (see Chapter 4). Nevertheless, greater participation of universities and research centres in European networks may bear fruit. Several stakeholders noted that this might increase Greek institutions' capacity to work with external stakeholders. The internationalisation of research may help Greek universities and research centres forge more intense and productive partnerships with an array of local partners.

Participation in European networks has also been important for the most dynamic and research-intensive universities. The strong presence of Greek universities in the European Universities Initiative, such as the European Partnership for an Innovative Campus Unifying Regions (EPICUR), the European Reform University Alliance (ERUA) and European Civic University Alliance (CIVIS), shows not only strong Greek involvement in a major initiative that may reshape the European higher education landscape, but their commitment to internationalisation.

Larger and research-intensive universities are more engaged in international activities

Internationalisation in Greek higher education is unevenly distributed. Larger, research-intensive universities and research institutes have had great success in participating in European and international programmes and funding opportunities, but the smaller and younger universities and those located outside

the main metropolitan areas, tend to have limited involvement in and awareness of the challenges and opportunities of internationalisation.

This is also true for research, probably because it offers a clearer incentive to engage in internationalisation networks, a more explicit statement of the priorities and a greater awareness of the potential benefits. This greater maturity was also expressed in a more critical and proactive attitude to those international opportunities.

Institutional strategies can unlock potential for internationalisation

As for the institutional incentives to pursue internationalisation in Greek HEIs, research seems to favour a bottom-up approach. Many international research collaborations and partnerships are currently based on individual initiatives and informal contacts and networks. The individual initiative of academics and researchers has been crucial in establishing many of the existing international collaborations, particularly in European higher education and research. Some of the most dynamic were capable of obtaining funding in European projects, starting international research partnerships and integrating the European Universities Initiative. However, less dynamic institutions have shown limited capacity to develop successful collaborations. Box 5.5 offers a relevant international good practice.

Box 5.5. FH Upper Austria, University of Applied Sciences in Austria

In Austria, HEIs consider internationalisation an important dimension in their strategy and a way of improving their capacity to engage with stakeholders. International mobility introduces new education and research, developing intercultural connections and long-lasting partnerships. In other HEIs, committed individuals have built boundary-spanning networks, increasing commitment to the entrepreneurial and innovative agenda across faculties and making it more visible. The FH Upper Austria is one exemplary institution in this respect. The University of Applied Sciences (UAS) helps partner firms to connect with HEIs in countries to which they export products or conduct other business.

Some Austrian HEIs link their internationalisation strategies with entrepreneurship. Taking advantage of the common language, some HEIs have joined networks with German and Swiss institutions to promote the entrepreneurial and innovation agenda. The FH Campus Wien is part of an international network of universities of applied sciences, including the UAS of Munich and Zurich.

Source: OECD/European Union (2019^[37]), *Supporting Entrepreneurship and Innovation in Higher Education in Austria*, <https://doi.org/10.1787/1c45127b-en>.

In analysing the balance between the two main components of internationalisation in higher education – internationalisation at home and internationalisation abroad – it can be noted that universities and research centres have been able to develop some internationalisation practices and instruments of both components.

Institutions promote both internationalisation abroad and at home

As for internationalisation abroad in education, universities have been trying to promote student exchange programmes and joint programmes, to providing a richer, more relevant educational experience. This has been more significant in some institutions than in others, and the overall situation is still limited. In research, as noted earlier, the larger universities and some research centres have made the most effort to exploit the opportunities of internationalisation abroad, and had more success in developing research

collaborations and partnerships, participating in European research projects and developing publications with international partners.

The possibility of integrating internationalisation into the activities of universities and research centres can also be explored. Universities have increasingly attempted to develop programmes to attract international students, either by instructing them in foreign languages (i.e. in English), by developing distance and e-learning programmes, and by recruiting international students to create a more cosmopolitan atmosphere for local students and staff. Despite some positive examples, notably at the Athens University of Economics and Business, the evidence collected for the review suggests that such activities have been limited and that more efforts are needed in this area.

In research, regarding the dimension of so-called “internationalisation at home”, some interesting developments were reported. The leading universities and research centres have organised international research events/conferences and invited international researchers to collaborate in the institution’s research activities projects. Universities also support the engagement of international students in the community/society and in participating in the university’s social and cultural life.

There is scope to address remaining challenges within the Greece HE system

As noted above, internationalisation is becoming an increasingly important dimension in the Greek higher education system. Both at the system and at the institutional levels, it has become a more significant issue in HE policy. These developments go in the right direction and can help Greece’s higher education system handle the remaining challenges. They may help the system realise its full potential.

At the system level

Greece has scope to widen its approach to internationalisation. It is often implemented piecemeal, as is typical in the initial stages of internationalisation. Efforts can be made, however, to integrate objectives, instruments and areas of intervention in a more coherent and selective fashion.

Recent policy developments (some of which began after the interviews with the institutional representatives and case studies) occurred too late for evaluation in the present review. The way the new approach to internationalisation is introduced and the response of stakeholders (including HEIs) will influence how they affect the Greek higher education system, as well as “third mission” activities.⁶ The background presents several interesting initiatives, and a holistic approach, with objectives, priorities, tools and milestones would benefit the system as a whole. Such an approach is expected to be laid out in the strategic plan for higher education due to be presented in 2022, currently under research by the Hellenic Authority for Higher Education.

Several of the recent initiatives appear to be headed in the right direction and to be aligned with the priorities of the institutions. Allocating more funding to strengthen the system’s efforts towards internationalisation is certainly welcome. This will tap into the strong willingness of many actors in the system to promote greater and diverse forms of internationalisation. However, given the limitations faced by the system and the challenges ahead, a focused and consolidated approach to internationalisation will be important to attain optimal results.

If internationalisation is to become a major driver of the higher education system, the regulatory framework of the Greek higher education system will need adjustment. It should be made part of major regulatory tools such as legal instruments, funding, academic careers, quality assurance and academic recognition of foreign degrees and qualifications. Other dimensions of internationalisation, including quality assurance, academic advancement and academic recognition, should also be targeted. These elements reinforce each other and the effectiveness of each regulatory instrument depends upon their congruence with the overall system.

One of the challenges associated with the internationalisation of Greek higher education is that it needs to be part of a broader strategy to engage the system with its socioeconomic context at the local and regional levels. To exploit the full potential of internationalisation, the approach needs to be embedded in the community and nurture links with external stakeholders that view the higher education sector as a springboard for reaching external markets and opportunities of development, or as a vehicle to access and seize local and regional opportunities. This requires a degree of openness, and Greek higher education is still a work in progress.

The developments in recent years in promoting internationalisation are very encouraging, although they need to be pursued in a systematic manner. Improving the language skills of students and academics is a priority, both so that they can participate in co-operation and travel abroad, and take advantage of the availability of programmes in other languages made possible by recent legal changes. Multilingual proficiency for students and academic staff is vital and, according to a recent study in one of the most significant institutions (Fotiadou and Mattheoudakis, 2019^[36]) seems to require significant attention.

The internationalisation of Greek higher education is also relevant as a tool for reversing the significant brain drain of many decades (Asderaki, 2013^[31]; Livanos, 2010^[34]). This objective is important not only to enhance the appeal of Greek higher education to foreign nationals and to attract qualified professionals to the country, but also as a lever to encourage the significant numbers of Greek academics and researchers in the Greek diaspora to return. Their intellectual capital could propel Greek institutions to a more substantial level of internationalisation and participation in academic and research networks.

Another important challenge to the process of internationalisation of Greek higher education is its effectiveness in feeding into the labour market. Several studies have noted the difficulties graduates have in finding employment, and the level of graduate unemployment, which is higher than average in Europe (Asderaki, 2013^[31]; Livanos, 2010^[34]; Tzanakou, 2020^[38]). Greece's economic trajectory in the past decade has exacerbated this problem, reducing the opportunities of many young graduates. This not only contributes to the brain drain, but dampens the appeal of the system to foreign nationals, since the likelihood of finding a job after graduation factors into the choices of many international students. The success of Greek higher education's internationalisation strategy is strongly dependent on improving its capacity to absorb new cohorts of graduates into the labour market, regardless of their nationality.

At the institutional level

The challenges to internationalisation at the institutional level necessarily reflect the challenges at the system level, although they also present some specific issues. Some involve legal and financial frameworks, which can limit the development of internationalisation initiatives in higher education institutions. On the one hand, HEIs are under financial constraints that make it difficult to participate more actively in international activities. These constraints relate to the overall level of funding and the lack of specific support for internationalisation. On the other hand, Greek institutions have often expressed criticism of the legal and regulatory constraints on internationalisation in education and research.

As for the organisational framework, and human resources in particular, the academic and administrative workload is extremely high, which, among other things, hampers mobility. With regard to the organisational culture, the difficulties of recent years and the limited institutional autonomy have not been able to nurture the culture of change that is vital for internationalisation. Internationalisation thus faces broader challenges that have been holding back the institutions from a more proactive approach.

Most Greek higher education institutions have not sufficiently integrated internationalisation into their institutional strategy. The predominant approach is a "spontaneous-marginal strategy" (Klasek, 1992^[26]), in which HEIs develop internationalisation activities that are not based on clear goals and decisions.

The predominance of bottom-up approaches to internationalisation suggests that the process has not yet reached a high level of maturity. The initiatives toward international activities are seen as positive, but this

is not enough to develop a consolidated process. Greater commitment from the organisation will require more resources and support, but also more selectivity and proactivity.

The interviews with institutional representatives in online workshops, stakeholders either showed little awareness of what an internationalisation strategy could be (apart from generic statements praising international mobility and co-operation) or expressed critical views on their institutions' lack of an articulated strategy. Meanwhile, the virtual "study visits" imposed by the coronavirus pandemic did not allow for as free-ranging a discussion as might otherwise have been possible.

This perception of a somewhat superficial approach to internationalisation was confirmed by the websites of Greek universities. While they note various initiatives and activities, in particular attracting foreign students, adapting and redesigning courses and study programmes for an international context, and participation in mobility and co-operation programmes, little information is available on their priorities, goals and main areas of activity.

This limits HEIs awareness of the challenges of internationalisation, its organisational implications and of the fact that it requires new approaches to research, education and service to society. A holistic understanding of internationalisation is needed for engaging with society, connecting the local and the global, and disseminating scientific knowledge to economic and social life. Only a few references, from large research centres, were made to internationalisation initiatives linked to engagement with society.

Recommendations

Greek policy makers and HEI representatives could take into account certain recommendations (or rather considerations) to improve internationalisation and enhance its linkage with "engagement". These should be approached with some caution, given that "internationalisation of higher education" is in flux and is now the object of reform by the Greek government.

As noted above, the government has been active: a) removing some legal bottlenecks in teaching and learning activities in foreign languages; b) allocating financial resources to implement the reforms and move the system (and HEIs) towards a new equilibrium; and supporting HEIs to generate bilateral connections with HEI leaders at the international level.

Since, internationalisation tops the agenda of the Ministry of Education and Religious Affairs, it is possible that some of the issues noted here will already have been addressed by the time the HEInnovate report is published. The list below presents considerations for policy makers and for higher education institutions.

For policy makers

- **Raise awareness and mobilise resources for internationalisation.** Greece has historically neglected internationalisation in higher education policy, although recent policies have been introduced to reverse this. However, the landscape is still uneven, and some sectors of the higher education system may still consider internationalisation a minor or peripheral issue to their core missions. Internationalisation should now be given central importance, since it can contribute to better-quality, more relevant and more open higher education. This could also help to alleviate the excessive workload and the administrative burden shouldered by many professors and researchers. The system also requires greater funding to support institutional capabilities regarding internationalisation. The national support will benefit Greek higher education and scientific institutions as they compete for European and other international funding sources.
- **Develop a clear and structured strategy for internationalisation.** It would be useful to develop more focused views on the relevance of internationalisation for Greece's higher education. Such a strategy would need to show how internationalisation fits into the broader purposes and priorities

of the higher education system and how it can help to achieve them. This will require greater co-ordination between different actors at the government and policy level, involving education, research, economic affairs, regional development and international affairs. Finally, the strategy needs to be pursued in a determined and consistent way. These steps are particularly relevant given the limited awareness in the system of the current strategy on internationalisation.

- **Develop recognition and incentives for the various stakeholders to engage in international activities.** The system should strengthen the rewards and incentives for the various stakeholders, notably students, academics and researchers, to engage internationally, to participate in mobility programmes or in international projects, to attract international funding, or to develop part of their education and research abroad. The national system needs to generate incentives for institutions, academics, students, local authorities, and the business sector to internalise this priority and to make it part of their respective strategies. This is very relevant given the unevenness of the landscape and the limited current engagement of many sectors of the higher education system in internationalisation activities.
- **Promote flexibility and simplification of international activities.** Greater internationalisation of Greek higher education will require that the policy framework adopt a more flexible approach to certain procedures regulating education and research activities, and pursue ways to regulate institutions that exempt them from complying with national constraints that may delay and hamper their development of international activities.

For representatives of higher education institutions

- **Institutionalise commitment of HEIs:** Internationalisation should not only become an institutional priority, but also become institutionalised in universities and research centres. This requires a combination of personal and informal links and networks and a more institutionalised approach. Bottom-up and individual initiatives need to be institutionalised and institutionally supported. Individual initiatives need to be supported and steered so that the institution takes full advantage of those efforts. This means that institutions should allocate resources, especially qualified human resources, to support that purpose in an effective and fruitful way.
- **Develop a more structured approach towards internationalisation:** The approach to internationalisation needs to be embedded in the overall strategy of the institution and adapted to its potential and specificities. This implies reflecting on a strategy most suited to specific institutional realities and contexts and adapting it to their strengths and priorities.
- **Adopt a transversal approach:** Internationalisation should not be regarded by institutions as a set of activities outside their usual processes of education, research and service to society. It should infuse these areas of activity and be factored into the way they design and implement their activities in each of these missions. This may come more naturally in some areas, but the potential contribution is significant if institutions adopt an approach promoting internationalisation at home, especially regarding education and service to society, which can greatly benefit from international networks and contacts.
- **Build international networks beyond borders:** Institutions should invest in building their international networks, a task in which Greek academics and researchers currently working in higher education institutions abroad could play valuable role. The links between these academics and Greek higher education institutions should be supported and fostered, for example through joint educational and research collaborations, short visits or intensive modules or courses. The role of HEIs as gateways for internationalisation of their own regions is noteworthy and should be explored. Greek universities should also devote more attention to documentation, reflecting upon their activities in this area and how to build on those experiences.

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Notes

¹ The Bologna process “...seeks to bring more coherence to higher education systems across Europe”. For more information, please visit: https://ec.europa.eu/education/policies/higher-education/bologna-process-and-european-higher-education-area_en.

² Attracting international students from a small group of countries is a feature of countries that are relatively less established in terms of internationalisation of higher education.

³ For Greece, the outward mobility rate of graduates for 2016/2017 was 1.7% with regard to credit mobility and 12.1% with regard to degree mobility. These figures refer mostly to second-level graduates (ISCED 7). As for inward mobility, most incoming students seek an undergraduate degree (ISCED level 6), constituting 2.7% of the total student population of Greek HEIs, while few (0.9%) seek a doctorate degree (ISCED 8). Incoming tertiary students (from European Higher-Education Area, EHEA, countries) in Greece, mainly originate from Cyprus (almost 50% of all incoming students enrolled in the country), from Germany (6.2%) and Albania (about 4.8%), while 40% originate from other countries (Ministry of Education and Religious Affairs of Greece, n.d.^[40]).

⁴ For more information on “Study in Greece”: <http://www.studyingreece.edu.gr>.

⁵ The Centre’s Statute has been drafted and is pending approval by the leadership of the four universities.

⁶ Actions articulated in the Strategic Plan for Higher Education were being drafted by the Hellenic Authority for Higher Education at the time of writing this report.