

Supporting Entrepreneurship and Innovation in Higher Education in Slovenia

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Preface

Like other European countries, Slovenia 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 with 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.

The HEInnovate country review of Slovenia shows that HEIs are increasingly promoting entrepreneurship skills through a wide variety of courses and extra-curricular activities to ease graduates' transition to the labour market and support young entrepreneurs. Most Slovenian institutions include entrepreneurship development, knowledge transfer and innovation in their strategic documents, showing a will to push forward a new agenda to connect with society and support economic competitiveness. The Slovenian government, through the Ministry of Education, Science and Sport and the Ministry of Economic Development and Technology has accompanied HEIs in this transition, with a number of measures, notably the creation of a Strategic Committee for Entrepreneurship and the provision of additional funding for knowledge transfer activities, and teacher-training, to support entrepreneurship education.

Looking forward, Slovenia should continue to support HEIs in their efforts to enhance their contribution to society and connect their missions to the needs of their communities. A good example of governmental support is funding of technology transfer offices and career centres to promote innovation, entrepreneurship and knowledge transfer. The incentives for HEIs staff to develop research and entrepreneurial teaching are also a crucial component to help institutions drive forward their entrepreneurship and innovation agendas. Lastly, the creation of national consortia, networks, partnerships

and communities of good practice to help small HEIs scale-up their activities related to entrepreneurial education could greatly strengthen the innovation ecosystem.

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



Lamia Kamal-Chaoui

Director of the Centre for Entrepreneurship, SMEs, Regions
and Cities



Antoaneta Angelova-Krasteva

Director for Innovation, Digital Education and International
Cooperation, European Commission

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A team of experts also actively contributed to this report, Sheila Martin, PhD (Association of Public and Land-grant Universities, United States), Mag. Michael Ploder (Joanneum Research, Austria), Brigida Blasi, PhD (Italian National Agency for the Evaluation of Universities and Research Institutes or ANVUR), Pedro Saraiva, PhD, (Nova Information Management School Nova University of Lisbon, Portugal).

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Abbreviations and acronyms

ANVUR: National Agency for the Evaluation of University and Research

ARRS: Slovenian Research Agency

BSc: Bachelor of Science

CEO: Chief Executive Officer

EC: European Commission

EEA: European Education Area

EPC: Environmental Protection College

ERDF: European Regional Development Fund

ESF: European social fund

EU: European Union

FABLAB: Fabrication Laboratory

FELU: Faculty of Economics of the University of Ljubljana

FTPO: Faculty of Polymer Technology

GDP: Gross Domestic Product

GODC: government office for development and European Cohesion Policy

GUT: Gdansk University of Technology

HE: Higher Education

HEIF: UK Higher Education Innovation Fund

HEI: Higher Education Institution

HESA: UK Higher Education Statistics Agency

HESS: Higher Education for Smart Specialisation initiative

HICUP: Humans Interacting with Computers Lab, University of Primorska

I&E: Innovation And Entrepreneurship

INOUP: Innovative Learning and Teaching for Quality Careers of Graduates and Excellent Higher Education

IP: Intellectual Property

IPR: Intellectual Property regime

KEC: Knowledge Exchange and Collaboration

KEF: UK Knowledge Exchange Framework

KPI: Key Performance Indicators

KTT: Knowledge and Technology Transfer programme

MEDTI: Ministry for Economic Development and Technology

MESS: Ministry of Education, Science and Sport

MIT: Massachusetts Institute of Technology

MSc: Master of Science

MSU: Montana State University

MTC: Martin Trust Center for MIT Entrepreneurship

NPHE: National Programme of Higher Education

NRDP: National Development Programme

PhD: Doctor of Philosophy

PIVOT: Partners for Innovation, Ventures, Outreach and Technology Center, University of Utah

PKP: Creative Path to Knowledge

PO1: EU Future Cohesion Policy, objective 1

POPRI: Pan Ogbia Peoples Renaissance Initiative

PP: Professor's Privilege

PRO: Public Research Organisations

PWSZ: State University of Applied Sciences of Poland

R&D: Research and Development

RIS3: Regional Strategy for Research and Innovation for Smart Specialisation

RISS: Research and Innovation Strategy of Slovenia

S3: Smart Specialisation Strategy

S4: Slovenian Smart Specialisation Strategy

SEF: Slovenian Enterprise Fund

ŠIPK: Students' Innovative Projects for the Benefit of Society

SME: small and medium-sized enterprises

SPIRIT: the Public Agency for Entrepreneurship, Internationalisation, Foreign Investments and Technology

SQAA-NAKVIS: Slovenian Quality Assurance Agency for Higher Education

STEM: Science Technology Engineering and Mathematics

SZT: National Council for Science and Technology

TTO: technology transfer offices

TVC: Center for Technology and Venture Commercialisation (TVC), University of Utah

UNL: NOVA University of Lisbon

Table of contents

Preface	3
Acknowledgements	5
Abbreviations and acronyms	6
Executive summary	10
1 Overview of the Slovenian higher education system	15
Curriculum and types of higher education institutions	17
Governance of the higher education system	19
The research and innovation system	22
Structures and policies to support entrepreneurship and innovation	23
Results of the Higher Education Leaders Survey	27
References	32
Notes	32
2 Enhancing the organisational capacity of higher education institutions in Slovenia	33
Introduction	34
The national policy framework for HEIs' innovation activities	35
Organisational structures of HEIs supporting knowledge transfer	38
Conclusions and recommendations	44
References	46
Notes	47
3 Leadership and governance	49
Introduction	50
Innovation and entrepreneurship in HEIs' strategic documents	50
Implementing the I&E strategy throughout the HEI	53
Supporting the development of regional and national innovation ecosystems	55
Conclusions and recommendations	56
References	57
4 Entrepreneurial teaching and learning	59
Introduction	60
Setting the scene: Gaps and national/international examples	61
Initiatives at the system level support a culture of entrepreneurship	62

Entrepreneurial teaching and learning in Slovenian HEIs are well established	65
Conclusions and recommendations	71
References	73
Notes	74

FIGURES

Figure 1.1. Number of enrolled students for the academic year 2020/21, by level and type of study programme	17
Figure 1.2. Composition of the higher education sector in Slovenia in 2021	18
Figure 1.3. The Slovenian higher education and research system	22
Figure 1.4. Type of “third mission” activities included in the HEI strategy	27
Figure 1.5. Structures and staff dedicated to support “third mission” activities	28
Figure 1.6. Types of entrepreneurial support measures offered in Slovenian HEIs	29
Figure 1.7. Types of indicators used by HEIs for measuring the impact of their third mission activities	29
Figure 1.8. Main areas in which HEIs have invested in digital technology systems in the past two years	31
Figure 1.9. International practices in HEIs	31
Figure 2.1. Average Knowledge transfer activities of the University of Ljubljana compared to EU average	42

TABLES

Table 3.1. I&E agenda in strategic documents of Slovenian HEIs	52
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BOXES

Box 1. List of recommendations	12
Box 1.1. HEInnovate Review of Slovenia	16
Box 1.2. The National Programme of Higher Education 2021-2030 focuses on research and knowledge transfer	20
Box 1.3. The developmental funding pillar and requirement for HEIs	21
Box 1.4. Creative Path to Knowledge 2016-2020 (PKP) and Students’ Innovative Projects for the Benefit of Society, 2016-2020 (ŠIPK) connect HEIs with their ecosystems	24
Box 1.5. Smart Specialisation Strategy is an EU pillar to promote knowledge-driven growth	25
Box 1.6. Other EU initiatives that support HEIs’ research and collaboration activities	26
Box 2.1. Organisational Capacity and Measuring Impact according to the HEInnovate Framework	34
Box 2.2. The ‘Professor’s privilege’	36
Box 2.3. EU report on measuring impact practices in Slovenia	40
Box 2.4. The ongoing debate on metrics for collaboration	41
Box 2.5. The United Kingdom’s new knowledge exchange framework	42
Box 3.1. The Leadership and Governance dimension of HEInnovate	50
Box 3.2. Including I&E in the strategic plan: International examples	51
Box 3.3. Implementing the I&E strategy: good international examples	54
Box 3.4. Montana State University’s Optical Technology Centre	55
Box 4.1. Entrepreneurship Teaching and Learning dimension of HEInnovate	60
Box 4.2. PWSZ contributes to the local entrepreneurial ecosystem in Poland	62
Box 4.3. Internationally networked spaces for prototyping fabrication in HEIs	64
Box 4.4. Babson College pioneers ways to train HE entrepreneurship educators	65
Box 4.5. MIT segmented approach to Entrepreneurial Teaching and Learning	67
Box 4.6. NOVA efforts to create entrepreneurial PhD students	68

Executive summary

Higher Education (HE) in Slovenia is an integral part of the national innovation and entrepreneurship¹ agenda. Slovenia's innovation system is composed of national research units within higher education institutions (HEIs) and national research institutes (RIs). The HE system has expanded to include new universities and independent HEIs (faculties and professional colleges). Slovenia has a diverse HE system, despite its relatively small size. The government supports education, research and entrepreneurship development through a number of bodies, including the Ministry of Education, Science and Sports, and the Ministry of Economic Development and Technology.

Entrepreneurship and innovation are well developed in the Slovenian HE system. Entrepreneurship education is relatively accessible and reflects the characteristics of the productive sector, which is based on many small and family-owned businesses. It is common for HEIs to engage in research and collaboration with external stakeholders and conduct entrepreneurial teaching activities, encouraging more students to establish their own companies. Notably, entrepreneurship education supports students who want to take over their family business, or plan to work in one. Smart specialisation strategies have generated additional opportunities for co-operation between HEIs and their communities.

In this context, the government is introducing reforms to leverage entrepreneurship and innovation in HE. In 2020, the Ministry of Education, Science and Sport created the first national Strategic Council for Entrepreneurship in Education, bringing together experts from business and education sectors to promote entrepreneurship at all educational levels. The Slovenian Development Strategy 2030 focuses on "knowledge and skills for a high quality of life and work" as a specific goal that will require integrating science, education and business.

This report draws on the HEInnovate framework to analyse the innovative and entrepreneurial practices in Slovenia's HE system and HEIs. The analysis draws on interviews with national stakeholders, which, because of the COVID-19 pandemic, were conducted remotely. The report focuses on three dimensions: 1) Organisational Capacity: Funding, People and Incentives; 2) leadership and governance; 3) Entrepreneurial Teaching and Learning. In addition, and with reference to the first two dimensions, the report discusses "Measuring Impact" as a transversal dimension. The report sheds light on a number of advanced practices, identifies some challenges and provides some recommendations.

Despite the increasing policy support, Slovenian HEIs continue to operate in a system with low incentives and career opportunities for collaboration and knowledge exchange. In the last decade, the government has laid the ground for intellectual property rights protection and helped create technology transfer units. Public funding for these activities is in the initial stages, but the government supports research and collaboration through project funding, challenging the sustainability of the actions. As in other OECD countries, career progression for HEIs faculty depends on research (i.e. the publication of academic papers). Measuring and evaluating "third mission" activities and knowledge transfer activities is, gaining ground in Slovenia, creating opportunities for change in the near future. This move to assess the value generated by HEIs is supported by bottom-up activities; HEIs interviewed are increasingly measuring the impact of their "third mission" activities, even without national or regional frameworks for categorising and measuring collaboration.

The leadership of Slovenian HEIs promotes a focus on entrepreneurship and innovation. Most mission statements and strategic plans increasingly mention co-operation and the establishment of partnerships and entrepreneurship development as core priorities. Some HEIs develop their strategic plans in co-operation with the productive sector, to align institutional priorities with the innovation needs of their own communities and networks. Co-ordination structures have emerged in some HEIs to link research and engagement strategies throughout different faculties (within the same university) or research groups. However, some HEIs are not consistently linking faculty-level strategies to overarching institutional priorities. Furthermore, the absence of continuous public funding is an obstacle to a long-term entrepreneurial and innovation agenda.

All HEIs interviewed are stimulating the entrepreneurial mind-set of students through courses and extracurricular activities. The approach to entrepreneurship reflects HEIs specificities (size, curriculum, type of institution), generating a variety of practices. In small and specialised independent HEIs – which often play a vibrant role in their communities – Entrepreneurial Teaching and Learning activities are intended to support local business and facilitate the integration of graduates in a specific sector (including family-owned businesses). Public universities that are covering the national level and next to business also the public sector stimulate entrepreneurship through practical exercises, with exposure to professional challenges.

The report offers recommendations for policy makers and HEIs in each dimension. These recommendations are displayed in Box 1. The main points are the following:

- For policy makers
 - Enhancing legal frameworks, resources and institutions for effective collaboration. Slovenian authorities could consider ensuring sustainable programme funding for collaborative applied research. Technology transfer offices could be further developed with appropriate funds and staff training opportunities. In general, it would be useful to generate incentives for HEIs staff to engage in collaboration, and to create a monitoring framework that would allow HEIs to measure their impact on communities and networks.
 - Leveraging HEIs within regional innovation ecosystems. Encouraging collaboration between HEIs and regional stakeholders can promote research that reflects actual innovation needs. In addition, proximity between regional actors and HEIs will facilitate monitoring and help in assessing impact.
 - Aligning the entrepreneurial agenda with the research agenda, to support the development of spin-offs and science-based entrepreneurship. Studying the possibility of establishing national consortia, networks, partnerships or communities of good practice can help small HEIs to scale up entrepreneurial education.
- For higher education institutions
 - Supporting structures and incentives for collaboration activities. HEIs could consider including entrepreneurship and collaboration among the criteria for staff promotions, and developing key performance indicators at the institutional level to monitor and assess the impact of the “third mission”.
 - Incorporating into HEIs’ strategic documents explicit definitions and objectives for innovation, knowledge transfer and entrepreneurship. Articulating a mission that includes such objectives as part of the institutional strategy can provide focus for faculty, staff and students.
 - Ensuring that entrepreneurship teaching and learning activities become common practice in all an HEI’s schools and faculties, rather than being limited to the Faculties of Management and Economics. Mainstreaming entrepreneurship education could have a positive impact, including for adults involved in lifelong training. HEIs could consider establishing stronger partnerships with regional and external stakeholders, in order to develop entrepreneurial courses that reflect the innovation appropriate for their own ecosystem.

Box 1. List of recommendations

This box lists the recommendations provided in the HEInnovate Review of Slovenia. The recommendations are organised by each HEInnovate dimension. In addition, for each dimension, recommendations are divided into two groups: those for national authorities, in particular the Ministry of Education, Science and Sports, and recommendations for HEIs in general.

Organisational Capacity

For policy makers

- Ensure sustainable funding for collaborative applied research or knowledge transfer, and/or increase performance-based public funding allocated to HEIs to develop third mission activities.
- Ministries responsible for HE, research and economic development should jointly support the development of innovation and entrepreneurship at HEIs and harmonised their initiatives to ensure their sustainability such as the development of intermediary structures (technology transfer offices) with appropriate funds.
- Promote faculty staff engagement in research, collaboration and entrepreneurial activities. This would require considering knowledge transfer as criteria of evaluation. The preparation of new Research and Innovation Strategy, and National Programme for Higher Education for 2021-2030 offer the opportunity to introduce new incentives for HEIs and ecosystem.
- Create a monitoring framework with clear national objectives to enable HEIs to measure their own impact in knowledge transfer activities. The government could provide some guidance to HEIs to help them improve their capacity to monitor and evaluate their impact and contribution to the realisation of national strategies. HEIs should measure all their activities systematically, with agreed metrics and narratives that take into account the diversity of HEIs.

For higher education institutions

- Support the development of structures (such as technology transfer offices) and incentives to strengthen collaboration activities. Invest resources to establish monitoring and evaluation capacity in HEIs. The initial investment in time and resources may generate a virtuous cycle, enhancing research and innovation capabilities at the institutional level.

Leadership and Governance

For policy makers

- Promote innovation and entrepreneurship through the criteria for habilitation for HEIs staff. Support HEIs in the creation of, incentives, reward structures for staff engaging in entrepreneurial teaching and innovation development.
- Build stronger connections to regional and national innovation ecosystems and among HEIs (including among university member institutions). This could help develop research and knowledge transfer activities that reflect the needs for innovation at the national and regional level. Leverage the Smart Specialisation Strategy (S4) to stimulate co-operation amongst HEIs in research and entrepreneurial development.

For higher education institutions

- Explicitly define the objectives of innovation, knowledge transfer and entrepreneurship in HEIs' strategic documents. Involve external stakeholders in setting these objectives.
- Ensure that the innovation and entrepreneurship agenda is mainstreamed throughout the HEI staff. Harmonise faculty-level strategies with institutional priorities.

- Generate employment and career opportunities to give staff incentives to undertake innovation and entrepreneurship activities.

Entrepreneurial Teaching and Learning

For policy makers

- The Slovenian Quality Assurance Agency for Higher Education (SQAA-NAKVIS) could consider introducing entrepreneurial teaching and learning in the criteria for the accreditation and external evaluation of HEIs and study programmes.
- Encourage the establishment of national consortia and entrepreneurship networks to promote exchange of experiences, creating networking spaces for teachers, mentors, and students.
- Encourage partnerships between HEIs businesses of all sizes, municipalities and local communities, to identify local challenges and innovation opportunities. These local examples can feed into entrepreneurship teaching and learning opportunities in HEIs.

For higher education institutions

- Promote entrepreneurial teaching and learning that involves exploring innovation teaching methods and finding ways to stimulate mind-sets on all levels of HE including doctoral study programmes for entrepreneurship. Offer courses that stimulate entrepreneurship with pedagogical methods that encourage self-initiative, creativity, the ability to solve challenges, experiential learning and apprenticeships.
- Create resources to support teachers and mentors involved in entrepreneurship teaching and learning activities, including experts and industry professionals. Such national initiatives as **INOVUP Innovative Learning and Teaching for Quality Careers of Graduates and Excellent Higher Education** can be replicated at the HEI-level.
- Develop entrepreneurial teaching and learning opportunities at all levels of higher education. Offer courses that stimulate entrepreneurship with pedagogical methods that encourage self-initiative, creativity, the ability to solve challenges, experiential learning and apprenticeships.
- Provide access to entrepreneurship education in lifelong learning activities, to enable working professionals to develop entrepreneurial skills.
- Leverage existing initiatives, ensuring that entrepreneurship teaching and learning activities are embedded in all Schools and Faculties of the HEI, rather than being limited to efforts conducted by the Faculties of Management and Economics.
- Promote events with high-level speakers from Slovenia and abroad, encouraging the participation of all interested HEIs and open to participants from outside HEIs, including entrepreneurs, angel investors, venture capital, etc.

Note

¹ In this review, a broad definition of “entrepreneurship” is adopted. Entrepreneurship is not only business creation, it is about change through creativity and experimentation rather than preserving the status quo (Stevenson and Jarillo, 2007; Norrman et al., 2014). Entrepreneurship can be defined as the capacity to transform innovative ideas into sustainable process and products.

1 Overview of the Slovenian higher education system

This chapter provides an overview of the higher education system in Slovenia. It highlights the main actors, legislative framework, funding mechanisms as well as ongoing policies to support entrepreneurship and innovation. The chapter also presents the results of the Leader Survey administered to all HEIs in the country, which explores eight dimensions of the HEIs' entrepreneurial and innovative agenda.

Slovenia is active in promoting policies, institutions and practices to support entrepreneurship and innovation in higher education. The government, in particular, has been implementing reforms and regulations to better connect HEIs with stakeholders, with the specific aim of strengthening the link between research and the innovation needs of its productive sector, which is based on SMEs and family-owned businesses.

Box 1.1. HEInnovate Review of Slovenia

HEInnovate is a guiding framework developed by the European Commission (EC) in collaboration with the OECD, designed to help HEIs increase their innovative and entrepreneurial capacities. To support policy makers and HEI leaders, the OECD and the EC have jointly developed HEInnovate and 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 Transformation and Capability
- The Internationalised Institution
- Measuring Impact.

HEInnovate includes a self-reflection tool for HEIs as well as a Policy Learning Network. The third strand of work 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 Slovenia is rooted in the priorities of Slovenia's national authorities, focusing on four key dimensions: Organisational Capacity: Funding, People, Incentives; Measuring Impact; Leadership and Governance; and Entrepreneurial Teaching and Learning.

Seven HEIs were interviewed as case studies for this review:

- *Univerza v Ljubljani* (University of Ljubljana)
- *Univerza na Primorskem* (University of Primorska)
- *Nova univerza* (New University)
- *Univerza v Novem mestu* (University of Novo mesto)
- *GEA College – Fakulteta za podjetništvo* (GEA College – Faculty of Entrepreneurship)
- *Fakulteta za tehnologijo polimerov* (Faculty of Polymer Technology)
- *Visoka šola za varstvo okolja* (Environmental Protection College).

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

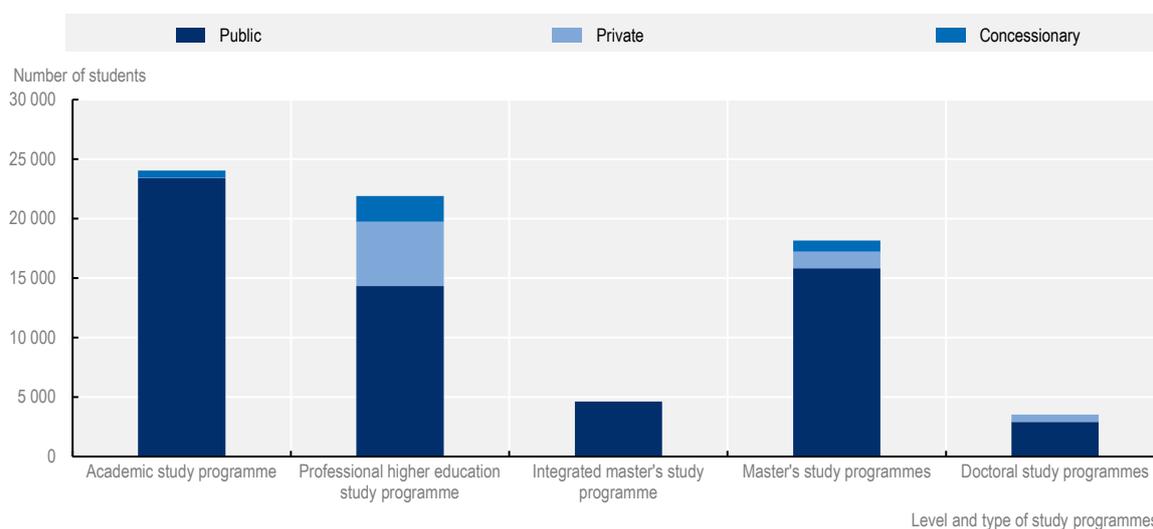
Curriculum and types of higher education institutions

Slovenia, as an EU country and part of the European higher education arena, has a three-tier higher education system, including a professional and an academic bachelor's degree (first cycle), a master's degree programme (second cycle) and doctoral programmes (third cycle), under the Higher Education Act.¹ The higher education institutions may develop and offer supplementary study programmes (i.e. within the scope of lifelong learning). Various other forms of teaching may also be organised, for example, short courses, summer schools, training programmes and other similar programmes. In such cases, collaboration is arranged with other partners from higher education or the economy.

As stipulated in the constitution and the Higher Education Act (Article 2), study programmes are managed by the HEIs, which include universities, faculties, academies of art and higher professional colleges. These institutions are responsible for scientific research, artistic work and education. Faculties, art academies and HEIs may be established as independent HEIs. Public HEIs are founded by the state, and private institutions may be founded by domestic or non-domestic legal entities or natural persons. Under the Higher Education Act, all HEIs are autonomous and are free to adopt academic and research programmes, as well as independent arrangements for their internal organisation, in accordance with the provisions of the act (Ministry of Education Science and Sport, 2020_[1]).

During the 2020/2021 academic year, 72 221 students were enrolled in higher education programmes in Slovenia (see Figure 1.1). The sector includes three public universities: the University of Ljubljana, the University of Maribor and the University of Primorska. The great majority of these students are enrolled in the University of Ljubljana. Three other private universities include the University of Nova Gorica, the New University and the University of Novo Mesto, in addition to one additional public independent HEI and 41 private independent HEIs (see Figure 1.2).

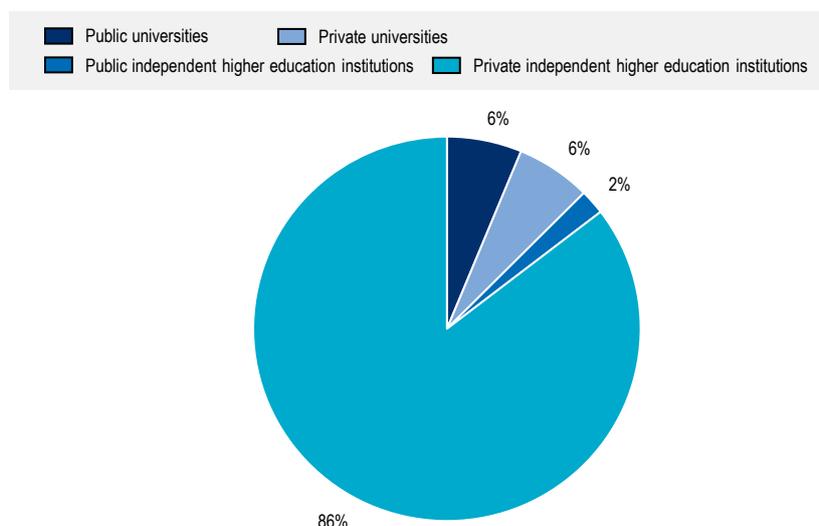
Figure 1.1. Number of enrolled students for the academic year 2020/21, by level and type of study programme



Note: Total number of enrolled students 2020/2021: 72 221 (approximately 80% are full-time students).

An academic study programme refers to a bachelor's degree, and a professional higher education study programme to a professional bachelor's programme. An integrated master's study programme includes a continuous bachelor's and master's study programme.

Source: SiStat (n.d._[2]), *SiStat Database*, <https://pxweb.stat.si/SiStat/en/Podrocja/Index/192/education>.

Figure 1.2. Composition of the higher education sector in Slovenia in 2021

Note: Total number of HEIs: 49.

Source: Statistical Office of the Republic of Slovenia

Universities, faculties and academies of art may offer study programmes in all three cycles. Higher vocational colleges, as a rule, offer the first-cycle programmes (undergraduate); if they meet special stipulations, they may offer the second-cycle programmes (graduate). The entry requirements are provided by law and specified in study programmes. If certain requirements are met, students have the option to transfer from one study programme to another one at the same level. Graduates receive a diploma and a professional or academic title in accordance with the Professional and Academic Titles Act. Since the 2001-2002 academic year, graduates have received diplomas. In addition, as of 2007, they started to receive these documents free of charge in the Slovene language, as well as in one of the official languages of the EU.

In Slovenia, universities are autonomous, scientific, research-oriented, artistic and educational higher education institutions. Their mission is to pursue research and offer professional training and the arts. Universities are multidisciplinary institutions composed of faculties and art academies. They educate their students and provide them competences for further education or employment. Universities must comply with the criteria for offering programmes of study in all three cycles.

Faculties perform research and educational activities in one or more related scientific disciplines and actively support these activities. Faculties may be established when the requirements for at least two cycles of study (the first and second, or the second and third cycles) are met.

Academies of art

Academies of art offer artistic and educational activities in one or more related artistic disciplines and actively support these activities. Academies of art may be established when the requirements for at least two cycles of study (the first and second, or the second and third cycles) are met.

Professional colleges

Professional colleges offer educational activities within one or more related trades or occupational fields and actively support these activities. Professional colleges may be established when they meet the requirements at least for the first cycle of study. They may also perform research or artistic activities if this is specified in a charter and if they meet all the requirements. If the charter stipulates and the accreditation procedure concludes that the college has at its disposal adequate higher education teaching staff and meets the requirements for scientific research or the arts, the college may also offer master's study programmes; otherwise, it may offer such programmes in co-operation with universities, faculties or art academies.

International university associations

The Higher Education Act provides for the possibility of establishing an international association of universities, as well as the requirements for transnational education. An international association of universities headquartered in the Republic of Slovenia may be founded based on a written agreement by at least one Slovenian university and one accredited university outside Slovenia. Co-founders may include other universities or university networks and research organisations. Slovenian public universities may establish an international university network upon the approval of Slovenia's government. An international association of universities headquartered in the Republic of Slovenia is eligible to be funded under a specific item of the state budget. If the university association offers study programmes accredited in EU member states, these programmes are considered accredited in Slovenia. However, the programmes must be registered with the Slovenian Quality Assurance Agency for Higher Education (SQAA). Transnational higher education in Slovenia may be executed under contracts between higher education institutions accredited in the Republic of Slovenia and accredited foreign higher education institutions. The higher education institutions accredited in the Republic of Slovenia may also carry out transnational higher education abroad. The SQAA provides obligatory components of the contract for implement transnational higher education.

Governance of the higher education system

The Ministry of Education, Science and Sport and the Council of the Republic of Slovenia for Higher Education play a central role in Slovenia's HE governance. The ministry is responsible for preparing regulations and policies, national programmes or development plans in the higher education sector. The Council of the Republic of Slovenia for Higher Education advises the government in the preparation of professional guidelines and the National Programme of Higher Education; in drafting amendments to higher education legislation; in planning the development of higher education; offers its opinion on the national framework for qualifications; and performs other tasks. The Parliament (the National Assembly of the Republic of Slovenia) oversees all regulations and programmes and approves the nomination of the public higher education institutions.

The Higher Education Act establishes the three-cycle higher education system and defines the main functions of the higher education institutions (i.e. scientific research, artistic work and development, education). Strategic goals are defined within the National Programme of Higher Education (the NPHE), which is adopted by Slovenia's National Assembly. The development of such a plan is the result of a collaboration between the partners in higher education. A new document for the period 2021-2030 is being drafted, which places greater emphasis on research, innovation and knowledge transfer than the programme for 2011-2020 (see Box 1.2).

Box 1.2. The National Programme of Higher Education 2021-2030 focuses on research and knowledge transfer

The National Programme of Higher Education (NPHE) for the period 2021-2030 is currently being drafted. The Expert Group designated to prepare it adopted the starting points in mid-April 2021.

Starting points for the preparation of the NPHE include the increasing the intensity of research and innovation activities and the following key objectives to:

- Raise the level and quality of education in Slovenia.
- Increase the responsiveness, flexibility and attractiveness of the higher education system to the needs of the economy and society as a whole.
- Strengthen its international involvement.
- Improve access to education and opportunities for continuing education and lifelong learning in higher education.
- Increase research and innovation.
- Improve knowledge transfer to the environment.

This programme focuses more on lifelong learning, knowledge transfer and innovation than the previous iteration. The key goals of the NPHE 2011-2020, which the National Assembly adopted in May 2011, were quality and excellence, diversity and accessibility, internationalisation, diversification of study structures and substantial funding of higher education.

Source: Ministry of Education, Science and Sport (2021^[3]), *Background Report*, Unpublished.

Other important actors in the HE system

Slovenian Quality Assurance Agency for Higher Education (SQAA-NAKVIS)

Since 2010, the Slovenian Quality Assurance Agency for Higher Education (SQAA-NAKVIS) has been responsible for accrediting HEIs and study programmes. As part of the accreditation procedure, it conducts regular quality assessments or external evaluations. Internal evaluation of the quality of programmes remains the responsibility of individual HEIs.

Rectors' Conference of the Republic of Slovenia

The Rectors' Conference of the Republic of Slovenia is an association including the rectors of four universities whose main tasks are:

- Addressing issues related to undergraduate and postgraduate education and research.
- Addressing financial issues of common concern that also relate to university asset management.
- Dealing with matters of general law, particularly the Higher Education Act, the Research and Development Act and by-laws and other regulations concerning higher education.
- Communicating common positions to competent state institutions and the public.

Towards performance-based funding for co-operation and knowledge transfer

Funding mechanisms for the HEIs in Slovenia have recently been evolving. Until 2018, the HEIs received a sum of money calculated as a function of the number of their enrolled students. In 2016, the government

decided to amend the Higher Education Act to reform the funding system and encourage HEIs to pursue quality goals. The reform (adopted in July 2017) also included an increase in public funding, increasing from 1.3% of gross domestic product (GDP) from 2016-2018, to 1.6% of GDP in 2019 (Statistical Office of the Republic of Slovenia, n.d.^[2]). The reform introduced a performance-based funding allocation in addition to the basic fixed allocation and two-pillar funding system. The HEIs receive a fixed amount based on student enrolment, with additional funds of 25% of the basic allocation granted if the HEIs achieve performance requirements (corresponding to six key performance indicators in education and research). These two funding allocations constitute the first, and main, pillar. The reform also introduced a development pillar that represents 3% of the basic funding and is intended to stimulate knowledge transfer, co-operation with other stakeholders and internationalisation activities (see Box 1.3).

Box 1.3. The developmental funding pillar and requirement for HEIs

The Developmental Funding Pillar (DPF) funds are earmarked for developing academic activity in the following areas: quality of study, internationalisation, knowledge transfer, environmental co-operation, scientific research, artistic creativity and social dimensions.

In the 2018-2020 contract period, DPF funds were earmarked for the transverse development priority “Long-term development of academic fields and study programmes”. In accordance with the 2011-2020 National Programme of Higher Education, these comprise the following dimensions:

- quality of studies
- internationalisation
- co-operation with the environment.

Assessing the proposals of HEIs

A proposal submitted by an HEI must contain:

- an analysis of the situation
- a justification of the development objectives from the aspect of the strategic objectives of the HEI
- a description of measures for achieving the development objectives
- a justification of the indicators
- a justification of the financial evaluation.

Examples of development objectives and measures:

- *Internationalisation*
 - joint study programmes with foreign institutions
 - study programmes/subjects offered in foreign languages.
- *Co-operation with the environment*
 - co-operation with the (non)-economic sector in formulating the curriculum, enlisting experts from practical work in the study process, etc.
 - co-operation with research organisations (the exchange of staff, research training for students, the joint use of research equipment for education process purposes, etc.).

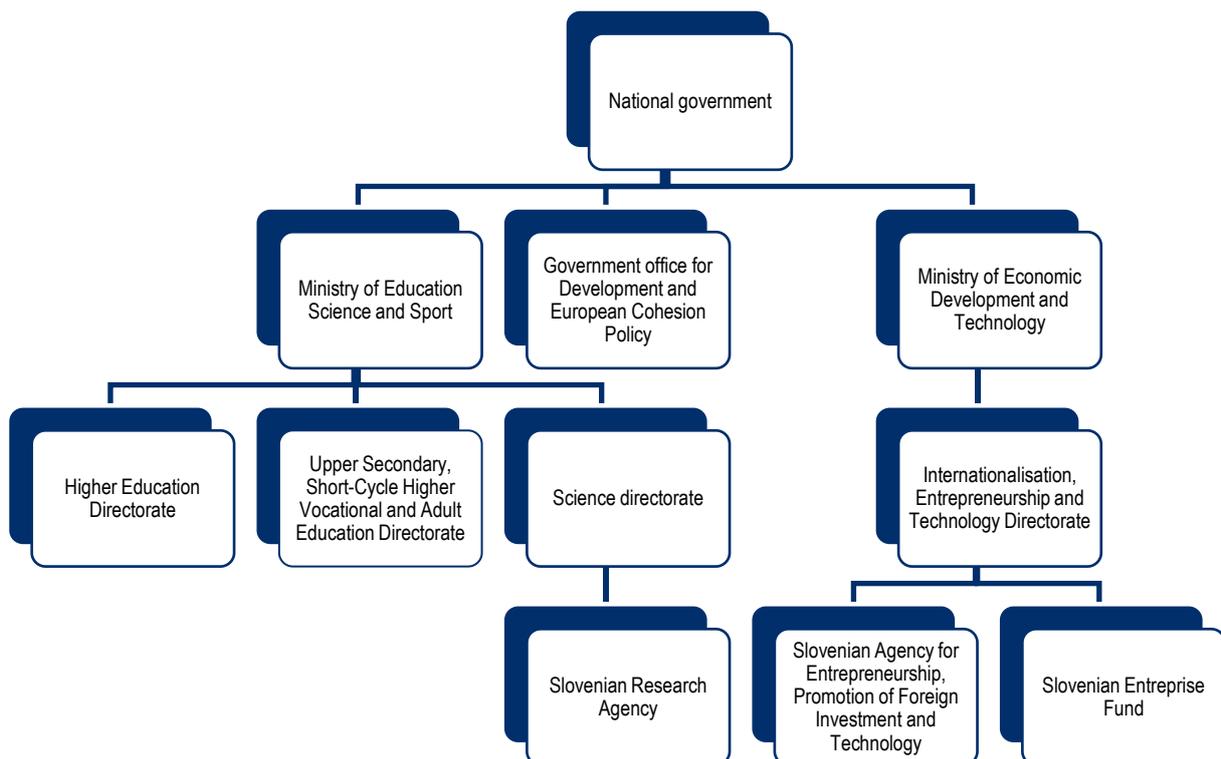
Source: Author's research based on background report provided by Ministry of Education, Science and Sports (unpublished).

The research and innovation system

Two ministries share the portfolio of research and development. The Ministry of Education, Science and Sport (MESS) is responsible for developing strategic framework and policy measures for public research activities and scientific research. The Ministry for Economic Development and Technology (MEDT) is responsible for technological development, entrepreneurship and innovation support, under the Directorate for Promotion of Entrepreneurship and Technology. The government has also established a special government office for development and European Cohesion Policy (GODC) to manage the European Union (EU) structural and cohesion funds and to co-ordinate the smart specialisation strategy for research and innovation (RI3) or the Slovenian Smart Specialisation Strategy (S4).

Similar to the Council for Higher Education, Slovenia also created the National Council for Science and Technology (SZT), which prepares the guidelines for research and innovation, the National Development Programme (NRDP) and the Research and Innovation Strategy of Slovenia (RISS). The MESS, based on guidelines of the National Council for Science and Technology and in consultation with experts, prepares the NRDP. The Ministries of Finance and Ministry of Economy are also involved in setting up the development programme. The Ministry of Finance is responsible for checking resource availability for research and development (R&D) and the Ministry of Economy checks the coherence of the development programme with innovation and entrepreneurship policy.

Figure 1.3. The Slovenian higher education and research system



Source: EU (2017^[4]), *Analytical Background Report Specific Support to Slovenia Horizon 2020 Policy Support Facility*, European Union; Republic of Slovenia (2021^[5]), *About the Ministry of Education, Science and Sport*, <https://www.gov.si/en/state-authorities/ministries/ministry-of-education-science-and-sport/about-us/>.

Implementing agencies

Implementing agencies in Slovenia connect HE policy and institutions to other policy areas and actors. Implementing agencies are in charge of policy support, release of funds, monitoring and evaluation. An important implementation agency is, for instance, the Slovenian Research Agency, which operates in connection with the National Research and Development Programme. Among other things, the agency selects and ensures financing for research and infrastructure programmes that offer a public service in the research field; evaluates the relevance, innovation level, efficiency, quality, competitiveness and professionalism of the work of companies and individuals that have received public funds; ensures the acquisition of additional funding for the National Research and Development Programme; and monitors and analyses research and development work.

Other implementation agencies are the Slovenian Enterprise Fund (SEF) and SPIRIT. The SEF is a public body that offers financial support to Slovenian small and medium enterprises (SMEs). It is particularly active with start-ups in promoting innovation in the national productive sector, which is dominated by SMEs. SEF operates as a venture capital fund. A third implementation agency, linking higher education and the productive sector, is SPIRIT Slovenia. SPIRIT (the Public Agency for Entrepreneurship, Internationalisation, Foreign Investments and Technology) promotes entrepreneurship and focuses on helping Slovenian SMEs increase their competitiveness and their technological development. SPIRIT is connected to university incubator services and provides support to innovation-oriented entrepreneurial ideas up to their realisation, as well as to existing innovative companies.

Structures and policies to support entrepreneurship and innovation

In recent years, the MESS has promoted entrepreneurial skills (including encouraging entrepreneurship in a broader sense) and the development of innovative culture among students and employees, in higher education institutions and more broadly within the higher education system. To this end, various initiatives, and support structures have been established, allowing for further development of entrepreneurial skills and innovation culture.

Targeted policies supporting entrepreneurship

Strategic Council for Entrepreneurship in Education

In 2020, the MESS launched the first national Strategic Council for Entrepreneurship in Education. The Council brings together a variety of professionals from education and business who are experienced in promoting entrepreneurship in different organisations and have successfully made changes in a variety of environments. Four members of the Council are delegates from the HEIs.

Working Group to promote a supportive environment for developing student start-ups, 2015-2016

The working group on promoting a supportive environment for the development of student start-ups operated from 2015 to 2016. The group made several proposals to promote innovation and entrepreneurship in Slovenian higher education institutions. Many of the proposals were later upgraded, transformed and further developed within the framework of various initiatives such as the Creative Path to Knowledge 2016-2020 (PKP) and Students' Innovative Projects for the Benefit of Society, 2016-2020 (ŠIPK) and ŠIPK projects. The working group's proposals to HEIs included:

- Encourage the development of extracurricular activities that develop students' skills in innovation and entrepreneurship.

- Establish a network of mentors from different (professional) backgrounds and ensure they are trained.
- Support the development, operation and networking of creative centres for students in the university (such as openlab, makerlab, “development garages”, clinics, etc.), where students have access to the equipment and knowledge to address various social and economic challenges.
- Meet with representatives of companies.
- Organise events and workshops for students, asking them to solve real business and social challenges of Slovenian companies and other organisations or develop innovative solutions in various fields.
- Encourage the development of student associations for innovation and entrepreneurship at higher education institutions.

Box 1.4. Creative Path to Knowledge 2016-2020 (PKP) and Students’ Innovative Projects for the Benefit of Society, 2016-2020 (ŠIPK) connect HEIs with their ecosystems

The Creative Path to Knowledge 2016-2020 (PKP) and Students’ Innovative Projects for the Benefit of Society, 2016-2020 (ŠIPK) aim to develop practical competencies of students in higher education during their studies. Students at every level and in different fields of study are involved in interdisciplinary project activities where they become acquainted with real challenges and issues of the work environment. Students are also mentored by professors and professionals from the private sector. This helps them develop new knowledge and gain additional competencies (whether generic or specific to their occupation) that the labour market will be needing in the future, such as entrepreneurship, creativity, the ability to think creatively and to address the challenges of a specific problem in real situations in the work environment. The PKP and ŠIPK projects ease students’ transition into the labour market after graduation.

The projects also aim to increase dialogue between the higher education sector and external partners. These exchanges assist reflection on possible adjustments and improvements to the study programmes.

Source: Republic of Slovenia (2021^[6]), “Creative Path to Knowledge 2016-2020 (PKP) and Students Innovative Projects for the Benefit of Society, 2016-2020 (ŠIPK)”, <https://www.gov.si/novice/2021-02-09-po-kreativni-poti-do-znanja-in-studentski-inovativni-projekti-za-druzbeno-korist-2016-2020/> (accessed on 17 June 2021).

Innovative Learning and Teaching for Quality Careers of Graduates and Excellent Higher Education, INOVUP (2018-2022)

The goal of the INOVUP project (co-funded by the EU through the European Social Fund and the Republic of Slovenia) is to improve the quality of higher education by introducing more flexible, modern forms of learning and teaching (INOVUP, 2019^[7]). A project council of the four partner HEIs participating in the project (the University of Ljubljana, University of Maribor, University of Primorska and the Faculty of Information Studies) is in charge of running the project. Through its activities, INOVUP helps to improve competencies of higher education teachers and other employees. The main activities of the project include:

- Training for higher education teachers and professional staff at higher education institutions, to help introduce more flexible and innovative forms of learning and teaching in HEIs in Slovenia. At workshops, higher education teachers and other employees learn how to use modern forms, methods and approaches of teaching, resulting in improved key competencies of students for lifelong learning.

- Preparation of a strategic document for training teachers and other employees in HEIs, based on an analysis of the current innovative pedagogical approaches for all project partners and interested higher education institutions.
- Preparation and dissemination of material on innovative and flexible forms of teaching across all fields of study, and raising awareness of the importance of new approaches to teaching.

Ongoing policies to support entrepreneurship and innovation

The Slovenian Development Strategy 2030 supports skills, entrepreneurship development

The Slovenian Development Strategy 2030, a new core development framework, takes into account global trends and challenges (Republic of Slovenia, 2017^[8]) The decision to draft a new long-term national development strategy was influenced by Slovenia's existing strategic development framework, which was launched in the Development Strategy 2005-2013. The latest iteration includes sustainable development goals set out in the United Nations' 2030 Sustainable Development Agenda (2030 Agenda).

The primary objective of Strategy 2030 is a high quality of life for all. In *Desirable achievements*, among 12 development goals, two (No. 2, Knowledge and skills for a high quality of life and work, and No. 6, Competitive and socially responsible entrepreneurial and research sector) directly address entrepreneurship in education and lifelong learning. In particular, the second goal aims at "treating lifelong learning and training as values that improve creativity, innovativeness, critical thinking, responsibility and entrepreneurship, and including such content in educational programmes at all levels" (Republic of Slovenia, 2017^[8]).

In addition, the sixth goal describes the socially responsible entrepreneurial and research sector as an essential driver of Slovenian development. It emphasises putting "research and innovation at the centre of its development policy, in order to create a more competitive, responsible entrepreneurial and research sector" (Republic of Slovenia, 2017^[8]).

Slovenia's Smart Specialisation Strategy favours entrepreneurial development

Slovenia's Smart Specialisation Strategy (S4) puts specific emphasis on innovation and entrepreneurship as drivers of sustainable and inclusive growth (Republic of Slovenia, 2017^[9]):

"S4 strategic objective is sustainable technologies and services for a healthy life, on the basis of which Slovenia will become a green, active, healthy and digital region with top-level conditions fostering creativity and innovation, focused on the development of medium-and high-level technological solutions in niche areas".

The S4 Strategy in Slovenia supports activities to promote entrepreneurship and stimulate young people's creativity throughout the educational process. For instance, activities focus on redesigning study programmes with topics that develop competence in the field of innovation, creativity and entrepreneurship, providing open learning environments, integration of experts in the teaching process, accelerators of ideas and promotion of opportunities for testing concrete business ideas (Republic of Slovenia, 2017^[9]).²

Box 1.5. Smart Specialisation Strategy is an EU pillar to promote knowledge-driven growth

Smart Specialisation Strategies, a pillar of the current European Commission's Cohesion Policy, aims to find strategic areas where regions or countries have a competitive advantage or have the "potential to generate knowledge-driven growth" (European Commission, 2019). Smart Specialisation strategies stimulate regional development by gathering key stakeholders (public sector, business and HEIs) to pursue opportunities to upgrade key sectors or to identify new areas. A Smart Specialisation Strategy

(S3) consists in identifying the sectors that have potential for growth, based on local resources and comparative advantages, and prioritises the development of these sectors through innovative activities or technologies.

In particular, the EC proposal for Cohesion funds for 2021-2027 will strengthen regions' capacities to implement S3, through stronger concentration of investments under the Smarter Europe and Greener Europe objectives. The new Policy Objective (PO)1, "A smarter Europe by promoting innovative and smart economic transformation" aims to bring together different policy areas. The European Regional Development Fund (ERDF) includes four "specific objectives" for investment under PO1, including "developing skills for smart specialisation, industrial transition and entrepreneurship" – the first time the ERDF will fund investments in human capital.

In line with the inclusive governance model of cohesion policy, local and regional authorities, as well as all local stakeholders, are involved at an early stage and are to play a key role in both the shaping and implementation of S3. A stronger involvement of HEIs in the design and implementation of S3 is expected to reach the new PO1, but also to support the entrepreneurial discovery process and to contribute to the creation of an innovative ecosystem. To support HEIs and regional authorities to co-operate in an effective way on the smart specialisation strategies, the European Commission has launched HESS (the Higher Education for Smart Specialisation initiative). HESS aims to encourage debate and understanding of the role of HEIs in implementing S3. It also offers advice for more effective spending of the European Structural and Investment Funds.

Source: EC (2021^[10]), "Higher Education for S3", European Commission, <https://s3platform.jrc.ec.europa.eu/higher-education>.

Box 1.6. Other EU initiatives that support HEIs' research and collaboration activities

To support HEIs' role in the post-pandemic recovery and the twin transition to a greener and more digital Europe, HEIs can draw on a number of EU opportunities:

- NextGenerationEU and the Recovery and Resilience Facility support the recovery and provide unprecedented aid for investments in skills, higher education, research and digitalisation.
- The European Green Deal aims 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 use of resources 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 addition, in 2020, the Commission adopted a number of Communications to give political orientations to Member States that are also highly relevant for the HEIs: communications on the European Education Area (EEA), the revitalised European Research Area and the new Digital Education Action Plan.

Source: EC, *Recovery and Resilience Facility*, https://ec.europa.eu/info/business-economy-euro/recovery-coronavirus/recovery-and-resilience-facility_en.

Results of the Higher Education Leaders Survey

As part of the HEInnovate country review process, senior representatives from all HEIs in Slovenia were invited to complete the HEI Leaders Survey, which focused on the eight dimensions of the HEInnovate framework. The HE Leaders Survey does not replicate the HEInnovate self-assessment tool, but seeks to understand HEIs' entrepreneurial and innovative practices, as well as the governance setting that supports this agenda. The response rate was moderate; 15 out of 49 HEIs completed the survey.

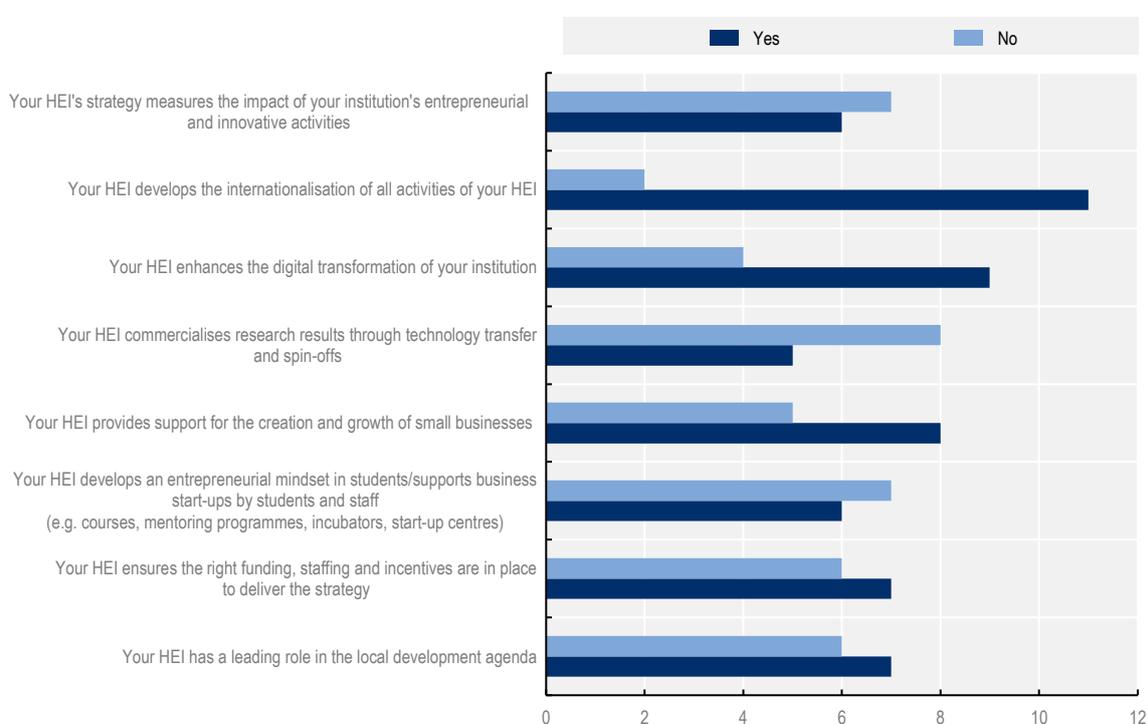
Leadership and Governance

Strong leadership and good governance are crucial in developing an entrepreneurial and innovative culture within an HEI. Without support from the leadership, the entrepreneurial and innovative agenda cannot be implemented.

Of 15 participating institutions, 13 indicated that they had a written strategy. Half of the HEIs include some form of third mission activity in their HEI strategy, including providing support for the creation and growth of small businesses, developing an entrepreneurial mindset in students, and commercialising research results through technology transfer and spin-offs. Most HEIs interviewed (11) are developing the internationalisation of all their activities, and nine of them are enhancing the digital transformation of the institution.

In addition, 13 HEIs reported having non-academic stakeholders in their governing bodies (mostly students, businesses and regional and local authorities). These results echo the findings presented in the leadership and governance chapters of this report, which address the type of governance settings in more detail.

Figure 1.4. Type of “third mission” activities included in the HEI strategy



Note: HEIs responded to the question: “Please indicate which of the following elements, if any, feature in your HEI’s strategy”.

Source: OECD (2021^[11]), *HEI Leader Survey of Slovenia*.

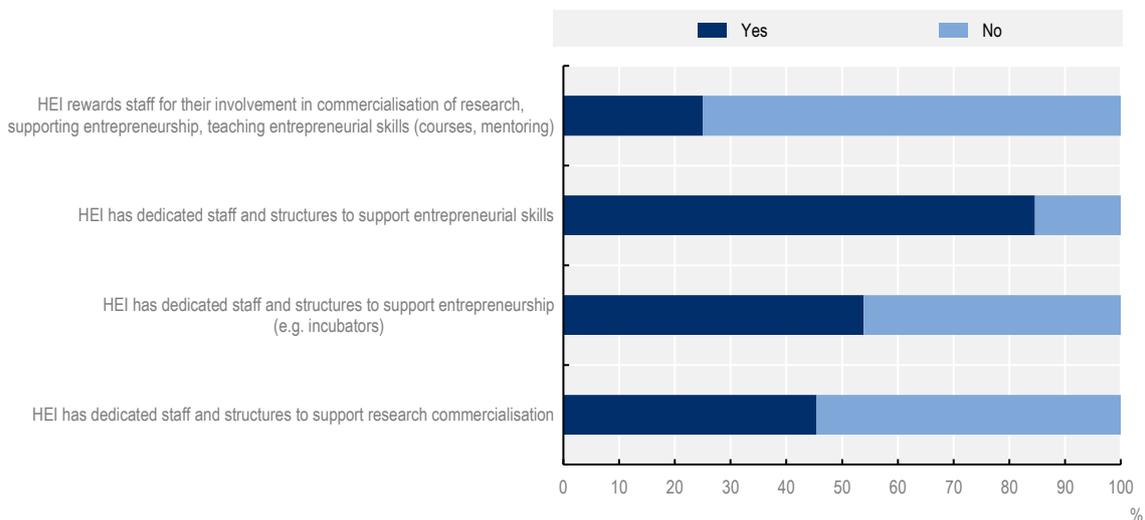
Organisational Capacity: Funding, People, Incentives

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

On average, a third of the respondents reported that their institution had dedicated structures and staff to support the commercialisation of research. However, almost 50% of HEIs have dedicated structures and professionals that support the creation of new firms through incubators and accelerators. Most HEIs support the development of entrepreneurial skills through courses and mentoring programmes.

Only three respondents (20%) said that staff members were offered rewards for becoming involved in commercialisation of research, supporting entrepreneurship or teaching entrepreneurship in addition to their standard job responsibilities.

Figure 1.5. Structures and staff dedicated to support “third mission” activities



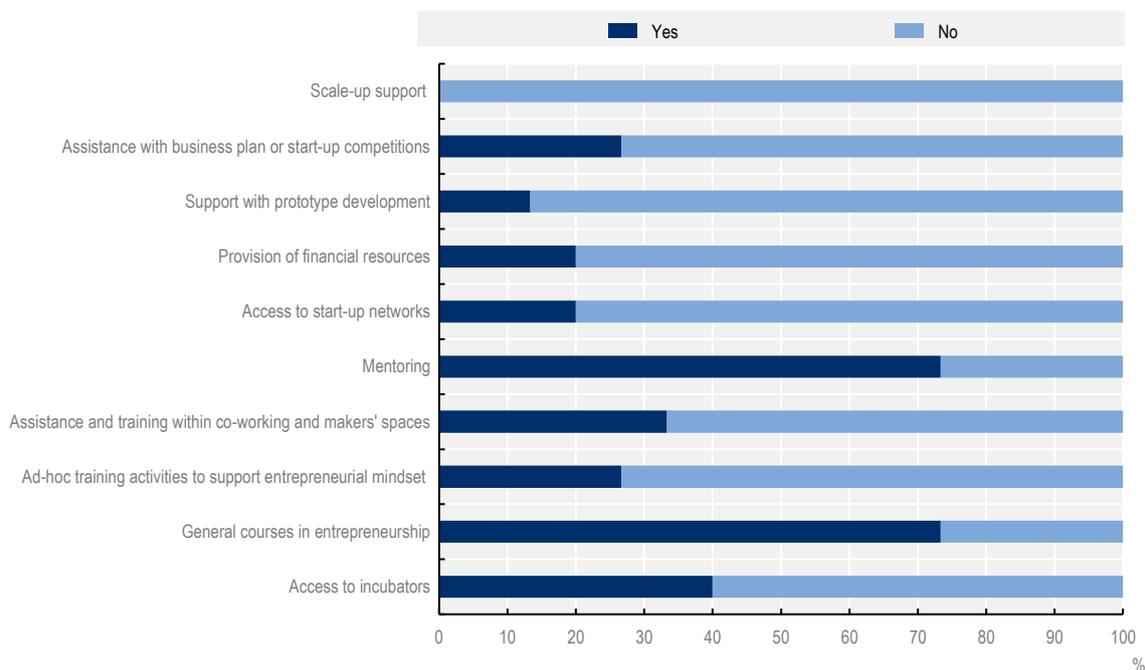
Note: This chart shows the responses to the following questions in the HEI Leaders Survey: “Does your HEI have dedicated staff and structures to support commercialisation of research (e.g. a technology transfer office)?”, “Does your HEI have dedicated staff and structures to support entrepreneurship (e.g. incubators)?”, “Does your HEI have dedicated staff and structures to support entrepreneurial skills (courses, mentoring)?”. Source: OECD (2021^[11]), *HEI Leader Survey of Slovenia*,

Preparing and Supporting Entrepreneurs

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

In Slovenia, most respondents reported developing entrepreneurship support measures for undergraduates and postgraduates. General courses in entrepreneurship (73%), mentoring schemes (73%) and access to incubators (46%) are the measures most often offered by HEIs (see Figure 1.6).

Figure 1.6. Types of entrepreneurial support measures offered in Slovenian HEIs

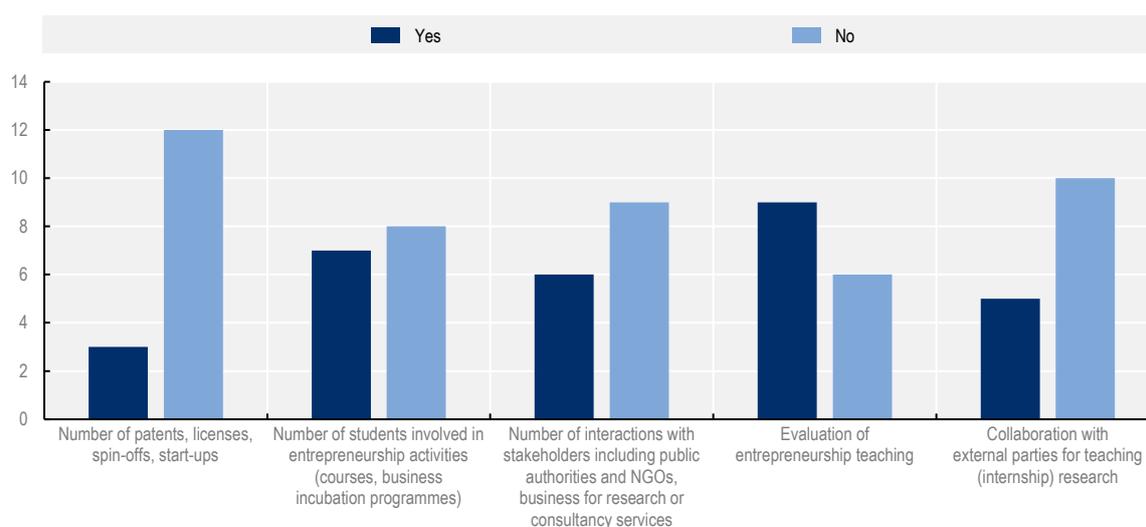


Source: OECD (2021_[11]), *HEI Leader Survey of Slovenia*

Measuring Impact

Entrepreneurial/innovative higher education institutions need to understand the impact of the changes they bring to their institution. An entrepreneurial/innovative HEI should use effective evaluation tools, such as combining institutional self-perception with external reflection.

Figure 1.7. Types of indicators used by HEIs for measuring the impact of their third mission activities



Note: What are the indicators that are measured or the dimensions that are assessed?

Source: OECD (2021_[11]), *HEI Leaders Survey of Slovenia*

Most respondents reported that their knowledge exchange and entrepreneurial support activities were evaluated, 38% through external evaluation (40%) or internal review for 60% of the HEIs surveyed. Most assessment activities are conducted on an ongoing basis (60%). On the other hand, 20% of respondents stated that they do not evaluate the activities noted. More than half of the HEIs use both quantitative and qualitative indicators. Most HEIs evaluate entrepreneurship teaching with indicators, such as the number of students involved in entrepreneurship activities (courses, business incubation programmes), number of interactions with stakeholders, including public authorities and NGOs, business for research or consultancy services.

Knowledge Exchange and Collaboration

Knowledge exchange is an important catalyst for organisational innovation, the advancement of teaching and research and local development. It is a continuous process, which includes the “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 about the effectiveness of the HEI in supporting local development, on a scale of 1 to 5 (where 1 = limited impact, 5 = strong driver of regional prosperity), 13 HEIs responded. Only two institutions considered that their HEI was a strong driver of regional development, and seven other respondents considered it had a moderate impact. Only one respondent stated that their HEI had little to no impact on regional prosperity.

The three most common KEC activities in HEIs, according to the respondents, are internship agreement with external stakeholders (53%), research with external partners (53%), and consulting services for external partners (46%).

Digital Transformation and Capability

The HEIs already use digital technology, but the uptake and integration varies among and within institutions. The HEIs should make the most of the opportunities presented by the digital transformation and consider digital technologies as a key enabler for driving the entrepreneurial and innovative agenda.

Almost 75% of respondents reported that their HEI would increase investment in digital technology/systems after the COVID-19 pandemic. Furthermore, 90% of HEIs will invest in new IT tools, 90% will develop the IT skills of staff, and 72% will use new digital platforms. This is congruent with investment digital tools that HEIs have been making in the past two years (see Figure 1.8).

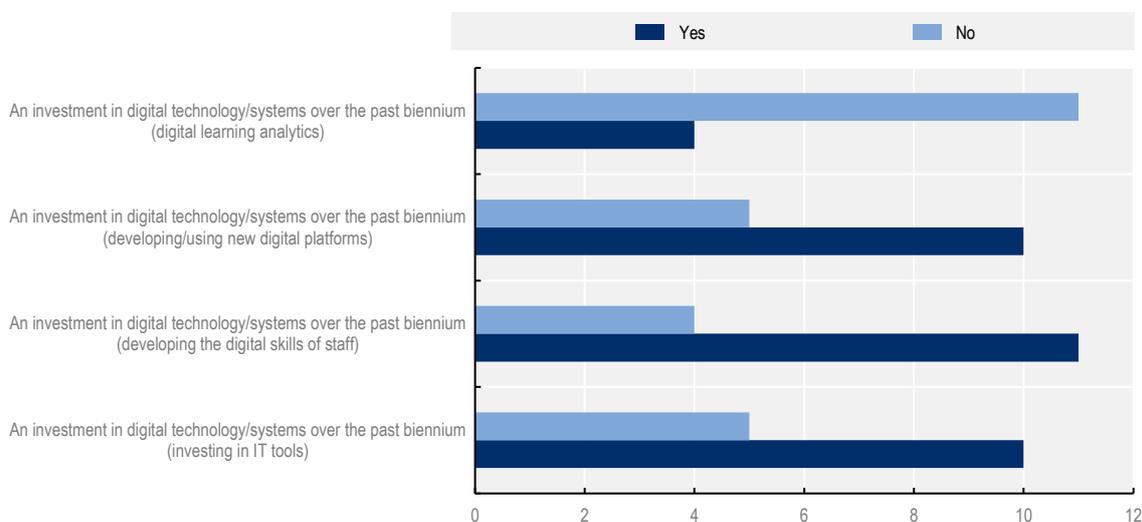
The Internationalised Institution

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 and questions traditional teaching methods.

In Slovenia, eight out of 15 respondents reported that their HEI had recruitment policies and practices to attract international staff. In addition, almost 90% of respondents reported collaborating both with domestic-owned firms with an international presence, as well as with foreign-owned firms.

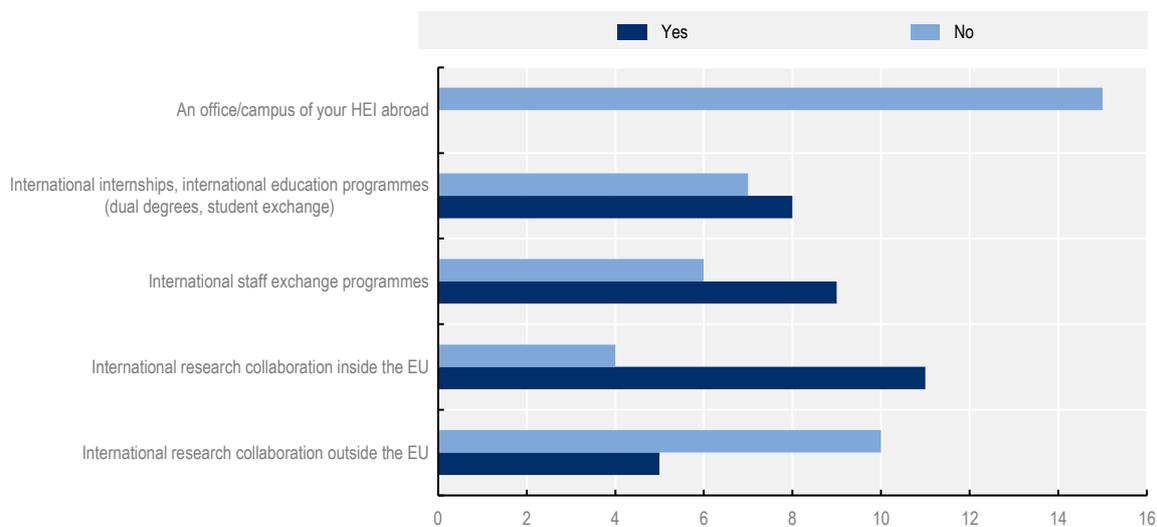
Lastly, more than half of the respondents said that internationalisation has affected their approach to entrepreneurship and innovation.

Figure 1.8. Main areas in which HEIs have invested in digital technology systems in the past two years



Source: OECD (2021_[11]), *HEI Leaders Survey of Slovenia*

Figure 1.9. International practices in HEIs



Source: OECD (2021_[11]), *HEI Leaders Survey of Slovenia*

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Notes

¹ *Official Gazette of the Republic of Slovenia* [Uradni list RS], No. 67/93 of 17 December 1993) amended in 2016.

² In particular, the national S4 focuses on promoting creativity, innovation and entrepreneurship among young people, and in developing their talent and improving the quality of human resources in general. HEIs are considered key partners, given their role of identifying and promoting the potential of young people and their skills. The national effort is developing a system for identifying talent for initiatives supporting innovative projects at various levels of education.

2 Enhancing the organisational capacity of higher education institutions in Slovenia

This chapter discusses findings related to the HEInnovate dimension Organisational Capacity, Funding, People and Incentives, in Slovenia. It also assesses the Measuring Impact dimension, which focuses on the evaluation of third mission activities. The chapter analyses the regulatory framework and the funding schemes of the higher education system, as well as the arrangements at the institutional level to support the entrepreneurial and innovative agenda. It also looks into the practices set up by Slovenian HEIs to measure the impact of higher education. Finally, the chapter identifies challenges, presents international practices and offers recommendations.

Introduction

This chapter analyses the Slovenian national framework, in particular funding, regulations and policies, as well as structures and incentives at the HEI level to support entrepreneurship and innovation. The chapter will also look at policies and incentives to support the measurement framework for “third mission” or collaboration and engagement activities, as well as some examples of measurement practices.

Box 2.1. Organisational Capacity and Measuring Impact according to the HEInnovate Framework

Organisational Capacity: Funding, People and Incentives

The HEInnovate framework defines organisational capacity as the ability of an HEI to deliver on its strategy. If an HEI is committed to carrying out entrepreneurial activities to support its strategic objectives, 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.

Characteristics of this dimension include:

1. Entrepreneurial objectives are supported by a wide range of sustainable funding and investment sources.
2. The HEI has the capacity and culture to build new relationships and synergies across the institution.
3. The HEI is open to engaging and recruiting individuals with entrepreneurial attitudes, behaviour and experience.
4. The HEI invests in staff development to support its entrepreneurial agenda.
5. Incentives and rewards are given to staff who actively support the entrepreneurial agenda.

The organisational capacity of an individual institution, however, is not the only determining factor. Organisational capacity needs to be considered not just from the perspective of an HEI, but also from the perspective of the national HE system as a whole, including funding, regulation and legal structures. For an HEI to achieve organisational capacity that supports innovation and entrepreneurship, a wider national framework needs to be in place to support those objectives.

Measuring Impact

Entrepreneurial/innovative higher education institutions need to understand the impact of the changes they can bring about in their institution. The concept of an entrepreneurial/innovative HEI combines institutional self-perception, external reflection and an evidence-based approach. However, impact measurement in HEIs remains underdeveloped. The current measurements typically focus on the quantity of spin-offs, the volume and quality of intellectual property generation and research income generation, rather than graduate entrepreneurship, teaching and learning outcomes, retaining talent, the contribution to local economic development or the impact of the broader entrepreneurial agenda. This section identifies the areas where an institution might measure impact.

1. The HEI regularly assesses the impact of its entrepreneurial agenda.
2. The HEI regularly assesses how its personnel and resources support its entrepreneurial agenda.

3. The HEI regularly assesses entrepreneurial teaching and learning across the institution.
4. The HEI regularly assesses the impact of start-up support.
5. The HEI regularly assesses knowledge exchange and collaboration.
6. The HEI regularly assesses the institution's international activities in relation to its entrepreneurial agenda.

Current state of higher education and innovation in Slovenia

The Slovenian research and innovation system has flourished and increased its international connections since its beginnings in the 1990s. With the Universities of Ljubljana and Maribor, the Academy of Science and Arts and a relatively large number of independent research institutes (including the Jozef Stefan Institute and the National Chemical Institute), Slovenia has a range of long-established and internationally recognised scientific institutions and universities. Support structures for business innovation and entrepreneurship were also created relatively early on: among others (see Chapter 1), the Technology and Development Fund of the Republic of Slovenia, which finances, among other things, young technology companies and founders, or several technology and business incubators in central locations.

However, until recently, research centres focused more on research than universities, which focus on teaching. The European Commission Report with recommendations for the Slovenian Ministry of Education, issued in 2017, states that “research and teaching are two separate areas”, with different strategies, regulation, steering processes and funds. Since then, the Ministry of Education Science and Sport and HEIs have worked together to ensure a more comprehensive vision. The provision of new sources of funding (under the development pillar) for knowledge transfer activities is a step in the right direction.

The higher education sector has evolved in a relatively short period, with the establishment of new faculties and postgraduate programmes. Some of these faculties subsequently merged, given the incentive of the prospect of the access to national institutional funding, and formed the new universities (New University, Nova Gorica and the University of Novo mesto). The system now consists of a juxtaposition of well-established universities, such as the University of Ljubljana, and research institutions, as well as very young faculties and private universities. The size of HEIs and the distribution of disciplines also vary widely. HEIs thus engage in different knowledge exchange activities, in accordance with their missions.

Interviews with HEI stakeholders showed that the Slovenian HEIs participate in international collaborations and projects and are knowledgeable about international good practices. They have a strong conceptual understanding of how to facilitate bridge building between higher education institutions and business or society. HEI stakeholders interviewed also interact pro-actively with their HEI administration and proposed innovative concepts on how collaboration can be developed, as noted in the discussions with both public universities and individual private universities (e.g. the University of Ljubljana and the Faculty of Polymer Technology).

The national policy framework for HEIs’ innovation activities

The legal framework is the basis for intellectual property and technology transfer

Over the past 20 years, Slovenia has issued a series of legal instruments to protect intellectual property and patent development, as well as to encourage the creation of technology transfer offices. The Research and Development Act (2002)¹ introduced the field for knowledge transfer in universities. The Job-Related Inventions Act (1995, last amended in 2006) sets the basis for intellectual property in public universities,

specifying that universities can claim the rights to a job-related invention.² Furthermore, publicly funded research results are available to the public and subject to limitations defined by laws on intellectual property rights. This is the system of institutional ownership of academic patents, i.e. the opposite of “Professor’s privilege” (PP) (see Box 2.2), This has stimulated public universities to engage more in knowledge transfer and especially in licensing agreements and patent development. Faculties are incentivised to engage in intellectual property development because they are allowed to keep a portion of the revenue that is developed through licensing of intellectual property (IP). Slovenian law requires that a minimum of 20% of the IP revenue be shared with the researchers who develop an invention, and University of Ljubljana shares 40% of the IP with its researchers, as a way of also incentivising staff without falling into the “professor’s privilege”.

Nevertheless, due to the Public Finance Act, public universities cannot hold shares in companies or obtain shares through payment, although this does not apply to private universities, which are allowed to hold shares in the companies. Within the HE context, knowledge transfer, commercialisation and co-operation with industry still have a negative connotation (and are considered “people with money”, as one of the interviewees put it). The dominant, long-established academic attitude considers corporate interests to have contaminated public research by prioritising economic growth and for-profit ventures, and by diverting research agendas from long-term uncertain but fundamental results to short-term incremental results (Bonaccorsi, Chiarello and Fantoni, 2020^[1]) (Collini, 2012^[2]). This law is an obstacle for the development of spin-offs or entrepreneurial ventures. Public universities get around this restriction to spin off development by setting up licensing agreements with researchers who own the spin-off.

Box 2.2. The ‘Professor’s privilege’

“The Professor’s privilege” is enshrined in an Intellectual Property regime (IPR) set up for the first time in 1980 by the U.S. Bayh-Dole Act. In Europe, the institutional ownership regime is the most common, while PP is applied only in Italy and Sweden (Geuna and Rossi, 2011^[3]). In the early 2000s, several European countries passed laws that ended the “professor’s privilege”, shifting substantial rights to the university (Germany, Austria, Denmark, Finland and Norway). Although it was inspired by the environment in the United States after the Bayh-Dole Act, this policy change was quite different from the Bayh-Dole Act, where rights were transferred from the government to the universities. In European countries, the transfer was from the researchers themselves to the HE institutions.

The debate on the effects of the two different modes on commercialisation, entrepreneurship and successful innovation experiences is far from over. The PP regime constitutes an incentive to patenting and entrepreneurship, letting the university researchers fully enjoy the rights to own inventions and business ventures they have created. However, supporters of the enforcement of the institutional ownership argue that, from the moment when universities become the main owners of the university-based innovations, they were granted the responsibility of transferring and exploiting them. Thanks to the scale advantages and by establishing technology transfer offices (TTOs), they are more successful at commercial innovation (Lissoni et al., 2008^[4]).

Source: Geuna, A. and F. Rossi (2011^[3]), “Changes to university IPR regulations in Europe and the impact on academic patenting”, *Research Policy*, Vol. 40/8, pp. 1068-1076; Lissoni et al., 2008^[4]

Funding schemes have helped universities set up knowledge transfer offices

As noted in the first chapter, Slovenia is currently encouraging performance-based funding for knowledge exchange activities, with a performance-based funding allocation that constitutes up to 3% of the basic

funding received. While this is a first step in the right direction, knowledge exchange, and transfer from universities to external stakeholders, depends largely on grant funding for applied R&D projects, and when the project ends, the funding is halted, leaving the university to cover the costs of the research facilities and equipment.

Both the Ministry of Education and Science and Sport and the Ministry of Labour, Family, Social and Affairs and Equal Opportunities repeatedly issue calls for tender to support the activities of intermediaries such as career centres or TTOs.³ This is relevant support for the intermediaries, but only in the short term, rather than in long-term programmes that can offer a stable, sustainable basis for financing and planning.

The Slovenian Research Agency (*Javna agencija za raziskovalno dejavnost Republike Slovenija*, or ARRS) offers applications for co-funding of research projects and then funding of publications. Compared to larger funds and agencies in other countries that promote application-oriented and collaborative research in higher education, ARRS currently offers limited funding. However, the ARRS funds doctoral positions, which allow the university to employ highly qualified young researchers who deal with application-oriented research questions. In the international context, the Marie Skłodowska-Curie Programme necessarily plays an important complementary role in this context.

In addition, tenders for career centres or TTOs are often co-financed by the Structural Funds (ERDF and also ESF). Public and private universities in particular have benefited from this (see section below).

Knowledge transfer consortia encourage collaboration among public universities

In addition to the Employment Invention Related Act, which gives institutional ownership of inventions to universities, the government is helping to develop TTOs. At most universities, with the exception of the University of Ljubljana, the development of TTOs is still at an early stage and is often carried out by individual faculties. In the University of Primorska, the TTO is based in the Faculty of Management.

In the University of Ljubljana, a first attempt to establish a central TTO was made in 2006, but a breakthrough came with ministerial funding and the possibility of collaboration with other TTOs through the knowledge transfer consortium.

In 2017, the government launched the Knowledge and Technology Transfer KTT 2.0 programme, with the help of European structural funds (the European Regional Development Fund, or ERDF), which is intended to support not only the development but also the networking of TTOs at Slovenian universities and research institutions. Despite its limited funds, the programme proved successful in the first phase, since intermediary units (TTOs, career centres, etc.) were set up for the first time at some universities (e.g. at the University Primorska) with the help of the third-party funds. The project funding received by the Consortium for Knowledge Transfers should strengthen the commercialisation of existing scientific solutions, with the idea of uniting stakeholders and offering a “pooled overview of what Slovenian HEIs and Public Research Organisations offer to companies”.

KTT performs the activities of technology transfer for eight major Slovenian public research organisations (the University of Ljubljana, University of Primorska, the Jožef Stefan Institute, the National Institute of Chemistry, the National Institute of Biology, the University of Maribor, the Agricultural Institute of Slovenia and the Faculty of Information Studies at Novo mesto). The University of Ljubljana is the consortium leader, and through its central TTOs, supports the work of TTOs from the seven other PROs. The objective of the project is to promote connections and co-operation between public research organisations (PRO) and the business sector, and to strengthen the competencies of TTOs, researchers and companies.

It has succeeded in combining several elements in a five-year timeframe. This concerns first, setting up and financing of technology transfer offices. The impact of these structures for universities with their professional layer of skills and resources, is certainly positive, even if it is small (Fini et al., 2011^[5]). Secondly, the TTO consortium also undertakes the exchange of experiences and collective cross-

institutional learning from different (public and private) universities, as well as non-university research institutions, which is relatively rare internationally. Finally, even in its short existence, the TTO consortium has also succeeded in having an effect on the individual level (for researchers) through training and the exchange of good practices. The progress the TTO has made can also be seen in the number of ideas and inventions brought into the office, as well as the patent applications derived from them.

During the interviews with national experts, the conception and establishment of a TTO at the University of Ljubljana was noted as an example of Slovenia's success. The TTO was set up from scratch as a central unit and had to build up both awareness and structures (e.g. IP management) in the early days. Subsequently, special emphasis has been placed on the successes in promoting interdisciplinary and cross-institutional activities.

As it progressed, it became necessary to develop and professionalise the organisation and management structures. KTT project funds are currently the main source of finance, even though it is not a regular flow, which undermines the sustainability of the processes. The funding in the national consortium is a starting point for the TTOs to apply for further third-party funding (especially within the framework of EU projects). This contributes to the further development and implementation of the range of offers (vocational training webinars for research, idea competitions ("Innovation ideas for IP"), awareness raising and also concrete offers to companies and industry.

Incentives for staff engaging in collaboration activities

Criteria for habilitation, promotion and tenure are slowly beginning to change, to reward collaboration. In Slovenia, as in other European countries, the academic system of rewards is based on the habilitation process, focused on the measurement of excellence in research. Career advancement is based on scientific publications, while knowledge transfer and engagement do not produce any positive outcomes on an academic career. This generates fragmentation and lack of integration of the core missions, which do not encourage activities like co-operation with industry at all. The bulk of Knowledge Exchange and Collaboration activities are carried out as a result of the strategic orientation of institutions and the degree to which its individuals are proactive and resilient ("very ad hoc", as one interviewee put it).

There are promising dynamics, nonetheless. For example, the work of the Slovenian Quality Assurance Agency (NAKVIS), by advocating for constant improvement in quality in the HEIs, has certainly stimulated knowledge exchange with external stakeholders, by focusing on "co-operation with environment" and how stakeholders can be involved in the governance of the university.

Organisational structures of HEIs supporting knowledge transfer

Engagement takes different forms, depending on the HEI

Engagement, i.e. Knowledge Exchange and Collaboration, takes different forms, depending on the type of HEIs. The University of Primorska, the University Novo mesto (technical faculty) and the Faculty of Polymer Technology, which are well equipped thanks to their support from industry, have a stronger technical and natural-scientific orientation. Other universities, such as the New University or Novo mesto, are particularly committed to a regional focus and public affairs. For example, the New University of Nova Gorica in its present form was only very recently (2017) created from several previously independent faculties, the European Faculty of Law in Nova Gorica and the Government of State and European Studies in Kranj, as well as the newly founded *Fakulteta za slovenske in mednarodne študije* (Faculty of Slovenian and International Studies), also in Kranj. Given their thematic orientation, direct industry contacts are less relevant for the university than excellent relationships with public administration institutions, interest groups and other public or semi-public bodies. In recent years, the New University has thus concluded

co-operation agreements with more than 30 larger municipalities (including cities) and associations, which focus in particular on co-operation with the public sector.

In this context, both the possibilities for and the current demands on third mission activities are very different. Public universities (the University of Primorska, University of Ljubljana) have a broader perception of the third mission (knowledge transfer, collaborative research, entrepreneurship, etc.). The private small faculties (GEA College and the Environmental Protection College) focus on delivering market-oriented skills and co-operate with a network of public and private partners. Their emphasis is on a practically oriented education (placement of co-workers and theses), as well as on employability and the absorption of alumni. This means that their collaboration with external stakeholders is concentrated on delivering study programmes tailored to the needs of the industry and stakeholders.

Different support structures to support different needs

Substantial structure-building measures, i.e. in particular the establishment of an intermediary unit (such as career centres, TTOs) were introduced only a few years ago, and in most cases thanks to concrete project funding. The career centres are often financed by combination of funds from the Ministry of Education and the European Social funds, as well as complementary third-party funds from EU projects, among others. TTOs also have diverse combinations of funding.

Career centres of higher education institutions (2010-2020)

Since 2010, ten higher education institutions (including all three public universities, two private ones, and five independent higher education institutions) have been involved in the “Career centres of higher education institutions” initiative funded by European cohesion policy. Career centres were created to improve professional guidance and counselling in higher education institutions and to connect HEIs with employers. In line with the objectives set out by the Europe 2020 strategy, career centres aimed to ease graduates’ transition into the labour market and their first employment.

Since 2010, the career centres have organised promotional and training activities, like networking events, workshops and seminars). These focused on topics related to the entrepreneurship and entrepreneurial skills and competences for students (including doctoral candidates, future students and graduates).

However, their activity is aimed not only at preparing and placing students for salaried employment, but also at promoting entrepreneurship and entrepreneurial spirit. Indeed, the career centres have organised promotional and training activities (such as networking events, workshops and seminars). These activities focused on topics related to the entrepreneurship and entrepreneurial skills and competences for students (including doctoral candidates, future students and graduates).

For instance, the Career Centres of the University of Ljubljana has organised a wide range of activities and developed the supporting environment to encourage students in an entrepreneurial career (how to identify entrepreneurial potential, how to enter the world of the entrepreneurship, support for start-ups, networking events etc.). The Career Centre of the GEA College Faculty of Entrepreneurship organised short workshops enriched with new entrepreneurial content for students, trainings for secondary school teachers of business with related curricula and competition on national level. A notable example is the Youth Entrepreneur Competition. In addition, GEA College introduced the “Entrepreneurship Test”, which aims to identify the level of entrepreneurial mindset among their first year and future students (making it easier to identify entrepreneurial competencies and upgrading them at a later stage of their studies).

The Career Centre at the New University also engages in co-operation with the ecosystem, for example participating in the “POPRI” competition in co-operation with the Primorska Technology Park, to increase the entrepreneurial skills of students. In addition, the career centre has also tried to increase participation in individual public tenders that pursue third-mission goals. An example of this was the PKP – *Po kreativni poti do praktičnega znanja* (“The Creative Path to Knowledge” programme) funding call, which promotes

the connection of higher education institution and students with their ecosystem (Republic of Slovenia, 2021[5]). The Career Centre of the New University itself was funded by two national tenders, which financed a significant part of its activities.

Smaller HEIs have central support structures

The numerous private faculties in Slovenia, for which a merger into a state-supported one was not possible or necessary, fulfil the third mission in a completely different way, given their different designs and organisational capacities. The dean of GEA College has set up and oversees a department for external co-operation (i.e. with industry and other institutions), as has the Environmental Protection College. A separate centre has also been set up at the Faculty of Polymer Technology, which focuses on the process of industrial co-operation and contract research, and is supported by the competitive pressure and the demands of the Slovenian polymer industry. In addition, the career centre at the Faculty of Polymer Technology also handles issues relating to the placement of students, as well as awareness raising and training for entrepreneurship.

However, with a few exceptions (e.g. GEA College or the Faculty of Polymer Technology), the private faculties focus on the networks with co-operation partners (municipalities, industry, alumni) driven by the professors and teachers. The third mission and the organisational capacities associated with it thus appear to be in direct connection with the business models oriented towards the first mission (career-oriented teaching). Because of their small size, the private faculties in particular are less able to set up central structures and lack the resources to develop knowledge transfer activities fully. The Environmental Protection College (EPC), for example, reported that it needed to co-operate with a patent firm on patent development.

Measuring the impact of third mission activities in Slovenia

In the Slovenian HE context, knowledge exchange activities undertaken by HEIs and their related impact on society are not systematically monitored or evaluated. Assessing the outcomes and impact of the innovation and entrepreneurial agenda, using a systematic, indicator-based approach, has not yet become routine in Slovenian HEIs. Some un-coordinated, local efforts are, however, under way, and some new developments in this direction are evident in the HEIs surveyed. Stakeholders report that their HEIs are introducing performance indicators for the entrepreneurship objectives, knowledge exchange activities and related societal impact.

Box 2.3. EU report on measuring impact practices in Slovenia

The European Commission Report with recommendations for the Slovenian Ministry of Education, issued in 2017, states that in order to establish a modern teaching, research and innovation system, able to guarantee access to higher education and quality, HEIs should integrate the different missions of universities: research, teaching and the third mission, connecting universities and society (2019). For historic reasons, “research and teaching are two separate areas” with different strategies, regulation, steering processes, and funds (ibid., 10). The ministry and the HEIs agree that the interdependence of the two core missions is “strengthened by the third mission of HEIs, since the relations to and impacts on society are determined jointly by teaching and research” (ibid., 10). The alignment and integration of core missions develop in a long-term process and are favoured by multidimensional goals and associated key performance indicators (KPIs). HEIs should be free to decide for themselves on the goals, how to reach them and how to measure the results achieved. Within the framework of the monitoring system and process, indicators should focus on outputs, outcomes and impacts, rather than simply checking whether the activities have been done. The Recommendations section of the Report

mentioned above (2019), stresses from the beginning that the monitoring process should not involve the production of a formal document but be considered as a formal duty, a “living document”. It should instead involve continuous dialogue between university and stakeholders, leading to adaptations of goals or directly to actions. In fact, the process is cumbersome, demanding a significant amount of documentation and data collection. This generates an administrative burden and cost, or “review fatigue”. The risk of bureaucratisation goes far beyond the regulators’ intentions (Blasi, Romagnosi and Bonaccorsi, 2018^[6]). Impact assessment agenda has recently been described as a “Frankenstein monster” (Martin, 2007^[7])

Source: (Blasi, Romagnosi and Bonaccorsi, 2018^[6]); (Martin, 2007^[7])

Box 2.4. The ongoing debate on metrics for collaboration

The discussion of which metrics to use and what type of impact to capture is still in flux even in many innovation-intensive OECD countries. Several studies have investigated the scientific quality and impact of research, but less evidence is available on the impact that universities have on society and on innovation processes (Donovan, 2008^[8]). For research evaluation, the criteria, even if they are discipline-based, are generally agreed upon and shared. Assessment of societal impact shows greater heterogeneity, given the diverse stakeholders and specific objectives, expertise, values, interests, expectations and culture. It is also limiting to consider the innovative process in linear and unidirectional terms, and it is difficult to identify the cause-effect link between research and the impact generated. The time scale can also pose a problem, since the innovation scale can be lengthy and premature measurement can produce distortions (e.g. in terms of employability outputs). Finally, data poses the greatest problem: quantitative data are scarce and not necessarily comparable, and the choice of which indicators are most useful for revealing the impact of HEIs is still in question (Martin, 2007^[7]). Terminology is still evolving, and such terms as third mission, technology transfer, knowledge exchange and impact are often considered interchangeable. The givens used require a continuous process of clarification (Molas-Gallart and Castro-Martínez, 2007^[9]).

In fact, collaborations can be formal (collaborative research, contract research, consulting) or informal activities (networking with practitioners). Academics engage in a variety of activities outside their university, often spontaneous, not always managed at the institutional level, nor necessarily reported in administrative records. Instead, conventional approaches to the issue – e.g. the simple counting of newly established companies, licensed research and patenting – systematically underestimate the extent of scientists’ relevant activities (Perkmann et al., 2015^[10]). Moreover, the emergence of a broader entrepreneurial and innovation agenda is paving the way for the inclusion of social and cultural dimensions and on the contribution to local economic development, as well as on aspects related to teaching and learning outcomes, the attraction and retention of talent and graduate entrepreneurship.

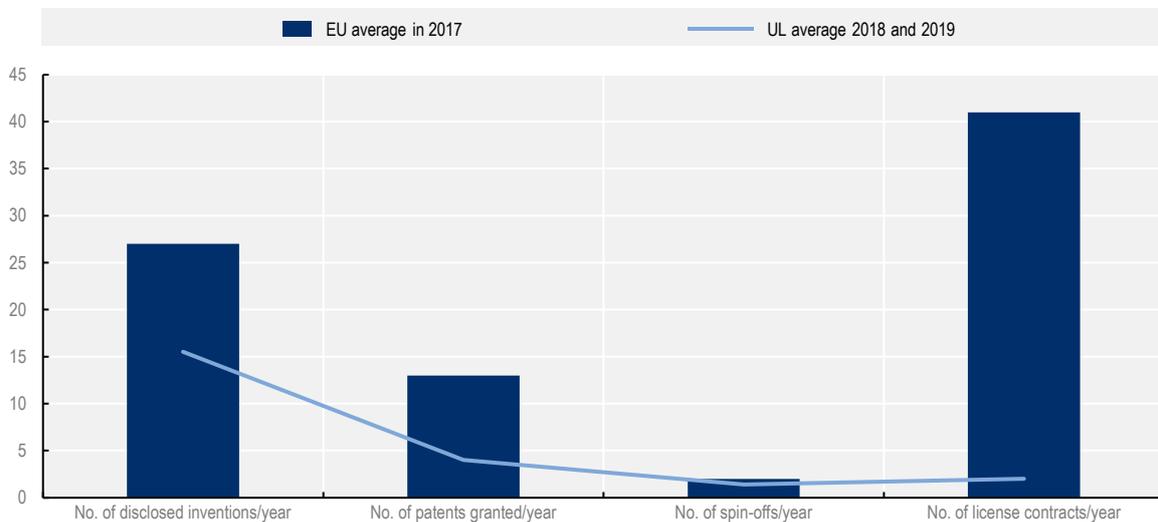
Source: Donovan, 2008^[7]; Martin, B. (2007^[7]), “Assessing the impact of basic research on society and the economy”, Relazione presentata alla conferenza internazionale WF-EST, “Rethinking the impact of basic research on society and the economy”, 11 May 2007, Vienna, Austria; Molas-Gallart and Castro-Martínez, 2007^[7]; Perkmann et al., 2015^[8]

In general, the lack of incentives at the national level in Slovenia is generally acknowledged. This makes it difficult for Slovenian HEIs to put in the extra effort to evaluate their KEC activities. For example, some of the case study HEIs already track the spin-off/start-up companies’ performance, even though no established practice has been determined on how to define and to monitor these aspects.⁴ It is important

to monitor and evaluate not only the number of start-ups/spin-offs, but also the companies' performance in terms of revenues, employability, ability to survive and to leave the university and on the role played by start-ups and spin-offs in the economic sector. It is also important to observe how much institutional support is forthcoming, whether it is appropriate, and how effective it is.

The universities, then, are starting out on the path and are developing a vision, and the first elements are already in motion. As many of the interviewees reported, a movement toward entrepreneurship has begun with the support of the ministry, including international workshops, OECD initiatives, EC projects and also, at the beginning of 2020, the creation of the first national Strategic Council for entrepreneurship education. Their effects are not yet evident, but progress can already be seen. It includes more invention disclosures, more researchers seeking support from the central TTOs, changes in management and reorienting of strategies.

Figure 2.1. Average Knowledge transfer activities of the University of Ljubljana compared to EU average



Source for EU data: ASTP (n.d._[11]), *2019 Survey Report on Knowledge Transfer Activities in Europe (ASTP PROTON)*, Financial Year 2017 & 2018.

The cultural change involves not only the traditional core of knowledge transfer, STEM, but new topics associated with the social responsibility of universities, such as those related to inclusion and Agenda 2030 (e.g. projects related to human rights, creativity, social innovation and environmental protection). Related activities are increasing (e.g. new outreach activities, creation of dissemination websites for projects and events) and so is reporting on them (e.g. how many people participate in such events, and how many training programmes are organised with external stakeholders).

Box 2.5. The United Kingdom's new knowledge exchange framework

In 2017, the U.K. government commissioned Research England to produce a "Knowledge Exchange Framework" (KEF) to evaluate universities' contribution to the exploitation of knowledge and to support HEIs' knowledge interactions with business, public and third-sector organisations, community bodies and the wider public. This request was aligned with the UK's ambition to increase research and development (R&D) spending as share of GDP. The framework was intended to prepare the R&D

system as a whole to meet the goals set out in the UK Industrial Strategy. In addition, the goal was to ensure that knowledge exchange funding was allocated effectively through the Higher Education Innovation Fund (HEIF), and to obtain accessible and comparable information on the performance of different HEIs in knowledge exchange.

To consolidate this framework, Research England organised a consultation process with the higher education sector. The proposed framework was well received by participants in the consultation process, who validated the inclusion of qualitative metrics in the form of HEI narrative statements, and made some suggestions on quantitative metrics. In addition, Research England selected 21 English HEIs, taking into account the type of institutions and their geographical location, and invited them to participate in a pilot exercise consisting of a series of workshops held from March to May 2019, to test the new refined framework and the revised metrics emerging from the consultation process. The pilot exercise worked well. HEIs provided positive feedback on the KEF and suggested areas of improvement for the metrics used.

After the consultation and pilot exercise, the first knowledge exchange framework iteration took place in the academic year 2019/2020. All HEIs eligible for knowledge exchange funding participated in this exercise. For this iteration and the subsequent ones, the KEF is evaluating HEIs based on quantitative metrics and qualitative metrics (narrative statements). These knowledge exchange metrics are grouped into seven different categories (research partnerships, working with business, working with the public and third sector, skills enterprise and entrepreneurship, local growth and regeneration, IP and commercialisation, public and community engagement).

To measure comparability between HEIs, the institutions were grouped in clusters by capability (research institutions versus teaching-oriented institutions), by size and discipline (STEM, non-STEM, arts). The KEF assesses seven clusters of universities: five general clusters, the STEM cluster and the “Arts specialist” cluster. The results of this first exercise were published in early 2021 and are accessible on Research England’s website (<https://kef.ac.uk/dashboard>). An interactive dashboard presents results per metric category by cluster and by institution.

Data for the KEF is collected by the Higher Education Statistics Agency (HESA). Higher education providers that receive public funding in the UK are required to contribute to the HESA data collection exercise.

Source: Research England (2021^[12]), *Knowledge Exchange Framework (KEF)*, <https://re.ukri.org/knowledge-exchange/knowledge-exchange-framework/> (accessed on 2 June 2021); Research England (2021^[13]), *Knowledge Exchange Framework: Dashboard*, <https://kef.ac.uk/dashboard> (accessed on 2 June 2021); HESA (n.d.^[14]), *Higher Education Provider Data: Business and Community Interaction*, Higher Education Statistics Agency, <https://www.hesa.ac.uk/data-and-analysis/business-community>.

Fragmentation of initiatives

Individual disciplines or faculties at HEI in Slovenia, are often in the vanguard of the third mission and are already developing good practices. However, the rest of the HEIs so far have neither the awareness, the strategy, nor the implementation in place. On the one hand, this is due to the pronounced prioritisation of education that has been suggested to university administrations by the public sector (e.g. within the framework of the national research strategy). It is also related to the fact that HEIs essentially do not have the resources for broad-based, top-down processes and structural development, because the funding schemes chiefly support teaching. Acquiring additional project-based funding (for knowledge exchange, transfer, co-operation, etc.) is then carried out at the faculty level (for university) or by individual researchers who see a particularly high demand for knowledge exchange and the third mission. Examples of this are the technical faculties, such as the Primorska Institute of Science and Technology and the Mechanical Faculty of the University of Novo mesto. Examples can also be found in other disciplines, as

shown by the commitment of the Faculty of Management at the University of Primorska, which created an independent TTO.

Since they were founded, most Slovenian universities have had a relatively short history. Typically, they were originally independent faculties and research institutions, with a lack of financial resources. This may explain why third mission and intermediary support has often been fragmented.

The current (2021) draft research bill has now been taken up by some universities (e.g. Primorska) as an opportunity for the first steps and discussions toward the development of a central strategy driven forward or actively supported by the rectorates. TTO experts interviewed expressed the hope that the third mission will also formally be supported by the university rectorates with the ongoing legal and strategic developments (see Chapter 3, “Leadership and governance”) and that the organisational (intermediary) capacities necessary for this can be continued through funding and also internally endowed funds.

The third mission, as the Slovenian example shows, ties in with the perception and framework conditions for the first and second missions, where the Slovenian higher education system is involved in a dynamic process of development and reform.

Lack of sustainable funding

Lack of funding for knowledge and technology transfer, and also collaborative research, is cited by the HEIs interviewed as the biggest challenge for third mission activities in the Slovenian higher education and innovation system. The successful development and use of competitive funding requires at the very least, access to basic stable funding to cover the (transaction) costs of applying for grants and participating in public tenders. Basic funding is also necessary to ensure continuity of activities (see background chapter).

Handling intellectual property

A major challenge, as stressed by the experts interviewed, is the financing of patenting costs. This is especially the case for smaller HEIs (e.g. GEA College and the Environmental Protection College) which, given their small size, cannot employ corresponding specialists on a permanent basis and, for example, have to hire IPR experts externally when the need arises.

The limited monitoring system

Slovenian actors have started tracking partnerships with industry and international co-operations, the lifelong learning activities for local industry and public sector organisations. Labour market outcomes of graduates are monitored by career offices. Nevertheless, co-ordination of data collection and creation of a monitoring system, as well as the measurement of impact, is limited. Evidence on the social aspects of the impact is rare. Researchers are more motivated to focus their efforts on more easily measurable activities than on activities that, although they are more useful to society, are difficult to report and account, and can produce behavioural distortions.

Conclusions and recommendations

The Slovenian higher education system has been able to make progress in third-mission activities, even though not all its framework conditions are optimal. This can be explained by its dynamic development, the heterogeneity and diversity in a relatively small country, and the commitment and collaborative attitude of HEIs.

The broad commitment to networking and co-ordinating with local ecosystems and stakeholders is impressive. This applies not only to the transfer of scientific work from students to practitioners (companies

but also public institutions or municipalities), and to joint applications for funding, but also to the co-ordination and co-operative integration of external structures (e.g. public and private incubators). Given their flexibility and economic needs, this applies even more to private institutions than to public universities.

Particularly noteworthy is the fact that targeted project funding has succeeded in developing several interesting examples simultaneously, which are also worth mentioning in the international context. They include the KTT 2.0 project and also the cross-institutional consortium (universities and non-university research) co-ordinated by the University of Ljubljana. This not only led to setting up TTO structures at some institutions, but to collective learning and transfer of good practice to third parties.

Many of the Slovenian institutions are small, which makes it difficult for them to support their own, differentiated intermediary structures (e.g. career centres, TTOs, start-up centres or incubators). In view of the size of the country, intensive co-ordination and co-operation between HEIs and other functioning state and regional support structures is one potential solution.

Recommendations

For policy makers

- Ensure sustainable funding for collaborative applied research or knowledge transfer, and increase performance-based public funding allocated to HEIs to develop third-mission activities.
- Pursue development of intermediary structures with appropriate funds and training for staff engaging in technology transfer offices. In this sense, smaller HEIs could replicate the Knowledge Transfer (KTT) consortium by collaborating with the other HEIs to mutualise knowledge-transfer activities.
- Give the quality Assurance Agency for Higher Education (NAKVIS) the authority to reward HEI faculty for their engagement in research and collaboration activities. This would require making knowledge transfer a criterion for evaluation. The preparation of a new Research and Innovation Strategy, to follow the one in force between 2011-2020, offers the opportunity to introduce new incentives for universities, faculties and the surrounding ecosystem.
- Create a monitoring framework so HEIs can measure their own impact in knowledge-transfer activities. The government could offer some guidance to HEIs to help them improve their capacity to monitor and evaluate impact. HEIs should measure all their activities in a systematic way and with agreed metrics and narratives that take into account the diversity of HEIs.

For higher education institutions

- Support the development of structures (such as technology transfer offices) and incentives to strengthen collaboration activities.
- Invest resources to establish monitoring and evaluation capacity in HEIs. The initial investment in time and resources may generate a virtuous cycle, positively affecting research and innovation capabilities at the institutional level.

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Notes

¹ See <http://pisrs.si/Pis.web/pregledPredpisa?id=ZAKO3387#>.

² Inventions that require patent protection (http://www.uil-sipo.si/fileadmin/upload_folder/zakonodaja/Job-Related-Inventions_Act.pdf) and other sources (*Zakon o izumih iz delovnega razmerja, Uradni list RS, št. 15/07 – UPB*).

³ See <https://www.eu-skladi.si/sl/razpisi/pretekli>.

⁴ It is important to define what is and what is not a spin-off or a start-up (e.g. If companies set up by faculties are included, should companies set up by graduates also be included? Should companies whose core business is strictly connected with the university's research results be the criterion? Should this link be expressed in the possession of shares?).

3

Leadership and governance

This chapter discusses leadership and governance arrangements in Slovenian HEIs. It analyses how the leadership is articulating its mission statements to promote innovation and entrepreneurship (I&E) in HEIs. It also looks into the governance arrangements supporting the implementation of the I&E agenda, particularly co-ordination and communication strategies. Finally, the chapter discusses the way in which Slovenian HEIs connect with the national and regional ecosystem to promote entrepreneurship and innovation.

Introduction

The HEI leadership and the way its governance is organised are key to developing an innovative and entrepreneurial culture within the higher education institution (HEI). As noted in the HEInnovate Concept Note (OECD/European Union, 2017^[1]), positive and responsive leadership is what maintains a dynamic and successful organisation, particularly in times of uncertainty, unpredictability and complexity. This is often the case as HEIs implement new ways of working to innovate and become more entrepreneurial (see Box 3.1).

Box 3.1. The Leadership and Governance dimension of HEInnovate

Strong leadership and governance are critical to the creation and development of “entrepreneurial universities”, by providing support and incentives for entrepreneurship and innovation activities of faculty, staff and students and ensuring that such activities are undertaken in a structured and systematic manner, rather than being sporadic or relying too heavily upon the personal initiative of any set of individuals.

Many HEIs include the words “enterprise” and “entrepreneurship” in their mission statements, but in an entrepreneurial institution, this is more than a reference. To strengthen its entrepreneurial agenda, an HEI may consider:

1. Entrepreneurship is a major part of the HEI’s strategy.
2. There is commitment at a high level to implementing the entrepreneurial agenda.
3. There is a model in place for co-ordinating and integrating entrepreneurial activities across the HEI.
4. The HEI encourages and supports faculties and units to act entrepreneurially.
5. The HEI is a driving force for entrepreneurship and innovation in regional, social and community development.

Source: HEInnovate (2021^[2]), *Home Page*, <https://heinnovate.eu>, accessed in June 2021

Within the HEInnovate framework, governance is primarily analysed at the level of individual institutions, where leadership refers to the ability of the rector, deans or heads of departments to lead the institution and fulfil their duty. Governance is the organisational control and distribution of responsibility, power and authority for the purpose of making decisions and taking action. This review thus shows that governance supports the development of the Innovative and Entrepreneurial (I&E) activities. Evidence about strategic documents and processes to support I&E activities was gathered from institutional documents and in interviews with HEIs representatives. This chapter’s findings complement those of Chapter 2, which focused on the HE system-wide policies and incentives to support I&E activities, as well as organisational structures developed by HEIs.

Innovation and entrepreneurship in HEIs’ strategic documents

A strategy for I&E in HEIs: Ensuring a vision and process for alignment

For all HEIs, articulating a mission and vision that includes I&E can provide focus to faculty, staff and students and help them see how their activities contribute to the larger mission. For larger institutions with

many different faculties, a vision and mission, that emphasises innovation and entrepreneurship can align different faculties around the vision. This can inspire a collective conversation about how the institution supports these goals and encourage cross-faculty collaboration, where needed, to attain them. Developing common but flexible definitions of innovation and entrepreneurship—and how they apply to a variety of disciplines—can generate creative approaches showing how the teaching, research and partnerships with the public and private sectors might contribute to the goal. It can also generate two-way accountability between the faculties and the central administration for providing the supporting structures, incentives and resources to ensure progress on the mission.

It can be very helpful to involve external stakeholders in the development of these strategic documents, because their input can provide important insight about partners' needs. Participation might also help the stakeholders understand how the university's interests might align with theirs. It can reveal to them the assets that the university brings to the table and help them understand where and how they might better connect with those assets. In addition, it can generate positive political support for the university when stakeholders see the important contributions the university is making to the local economy. Each faculty within an HEI can generate its own strategic plan on entrepreneurship and innovation that aligns with the mission of the larger HEI. This alignment provides a signal to potential partners that the HEI is speaking with one voice and is interested in partnerships that can further this mission.

Box 3.2. Including I&E in the strategic plan: International examples

Tampere University of Applied Sciences in Finland's commitment to the entrepreneurial agenda

Tampere University Applied Sciences in Finland has a major programme in entrepreneurship education named Proacademy. The programme is in line with the Finnish Ministry of Education's "Guidelines for Entrepreneurship Education". The university's strategic plan focuses strongly on entrepreneurship and has resources to support initiatives for entrepreneurship education.

Source: Gareis, K. (2015^[3]), "Case Study no. 19: Tampere University of Applied Sciences, Finland: "Team Learning and Team Entrepreneurship"", <https://heinnovate.eu/en/download/file/697>, <https://heinnovate.eu/en/download/file/697>.

East Carolina University's new Innovation and Economic Prosperity plan led to rethinking on incentives

East Carolina University began working on an Innovation and Economic Prosperity (IEP) plan in 2014, designed to align with the university's strategic plan. Strategic plans of individual units were examined to identify programmes that can be leveraged to advance I&E objectives. One of the benefits of this alignment was the discovery of overlapping contacts—faculty from different academic units working with the same partners without co-ordinating their outreach or activities. The inventory of partnerships accomplished during the development of the IEP plan helped them achieve clearer internal alignment on their objectives for engagement with the partner. It also helped highlight the need for change in the faculty reward structure, so that I&E activities could be rewarded in the promotion and tenure process.

Slovenian HEIs include I&E activities in their mission aligned with their priorities

Each of the Slovenian HEIs interviewed in the review process had developed strategic plans with internal and external stakeholders. For example, at the University of Primorska, one point of connection is the Board of Trustees, which is closely involved in the development of the strategic plans. Many of the trustees come from industry and other stakeholder groups. Co-operation with society and industry is an explicit goal in the mission, and the ten mission pillars in the strategic plan include one that specifically calls for co-operation with society and industry.

The University of Ljubljana is working on a new strategic plan that will have a strategic focus on technology transfer and engagement with the external environment. It will include specific goals for company spin-offs, patents and other evidence of I&E activity.

At least a part of the strategic plan in each case refers to innovation, knowledge transfer and entrepreneurship. For example, GEA College of Entrepreneurship has a mission that focuses specifically on entrepreneurship. Its strategic plan is developed in collaboration with all stakeholders, and co-operation with industry is one of the pillars of the plan.

For the larger universities, the focus on Innovation and entrepreneurship varies by faculty. For example, at the University of Ljubljana, transfer of knowledge is one of three strategic pillars. While there is a strong focus on entrepreneurship for the Faculty of Economics, the faculties in the natural sciences focus more on innovation and knowledge transfer to industry.

At the University of Novo mesto and at the New University, each faculty has its own strategic plan, but these are integrated into an institutional plan. In some cases, co-operation and knowledge transfer is targeted to the public sector, to enhance policy and public administration. For example, the New University works closely with municipalities to modernise public administration—a different but very important type of innovation.

Co-operation with industry seems to be a greater focus for private than for public universities, thanks in part to the regulatory environment that restricts public universities' ability to spin off companies and retain an equity stake in the spinoff.

Table 3.1. I&E agenda in strategic documents of Slovenian HEIs

University	Entrepreneurship and Innovation references in strategic documents	Strategic plans
Primorska	"Strengthening co-operation and establishing new partnerships with industry and users of knowledge in the local, national and international environment."	Mid-Term Development Strategy of the University of Primorska 2021-2027 (https://www.upr.si/en/university/39-about/mid-term-development-strategy-of-the-university-of-primorska-2021-2027/)
Ljubljana	"UL encourages interdisciplinary and multidisciplinary study, exchanges results of achievements in science and art with other universities and scientific research institutions. This contributes to the Slovenian and world treasury of knowledge, as well as to the transfer of these achievements among the students and other users. The UL co-operates with organisations from economy and service in the public and private sector, with state organisations, local communities and civil society. Such co-operation accelerates the use of own research and educational achievements and contributes to social development."	University Of Ljubljana Strategy 2012-20 (https://www.uni-lj.si/university/strategy/)
Faculty of Polymer Technology	"By providing a vibrant learning environment, inspiring innovative research and outstanding value for partners from the industry, the Faculty of Polymer Technology (FTPO) will become an internationally recognised technical faculty and Centre of Excellence for Polymer Technology. As the only academic institution focusing on polymer technology in Slovenia, FTPO bases its activities on three pillars: Education, Research and Industry co-operation. "We provide our students with the necessary knowledge and skills to become innovative and competent engineers who are fit for responsible tasks in their future assignments. We support the society and industry in Slovenia and beyond to cope with the increasingly competitive and rapidly changing technological environment by creating knowledge through innovative, application-oriented research on	Strategy (https://www.ftpo.eu/en/About-us/Our-strategy) https://www.ftpo.eu/en/About-us/Our-strategy)

	polymer materials and technologies, know-how transfer and opportunities for lifelong learning.”	
GEA College	“Our mission is to equip entrepreneurs with new entrepreneurial knowledge and skills in the field of business, so that they can be one step ahead of their competitors and thus pursue a successful career in the modern market economies. We research and develop new knowledge, transfer existing knowledge and offer education and training to ambitious people.”	Mission, Vision and Values and Strategic Goal (https://gea-college.si/en/o-gea-college-2/mission-vision-and-values/)
New University	“New University enables and promotes a problem-oriented type of education and its connection with economic practice, local and regional environment and benefits of the state. New University firmly believes that practice is an excellent way of understanding theory on a whole other level. New University’s goal is to educate critically thinking students”.	New University Action Plan (https://www.nova-uni.si/en/about-university/)
Maribor	“The mission of the University of Maribor is based on honesty, curiosity, creativity, freedom of spirit, co-operation and knowledge transfer in science, art and education. Concerned with mankind and sustainable development, the University of Maribor expands knowledge, raises awareness and promotes humanistic values, as well as the culture of dialogue, quality of life and global justice.”	Strategy of the University of Maribor 2021-2030 (https://www.um.si/en/about/mission-vision/Documents/Strategy%20of%20the%20University%20of%20Maribor%202021-2030.pdf)

One challenge facing Slovenian HEIs in developing co-ordinated strategic plans are the evolving priorities over time, as the leadership at the university changes. Because innovation and entrepreneurship depend on sustained encouragement and cultural change, a consistent focus is necessary to achieve sustainability.

Implementing the I&E strategy throughout the HEI

Ensuring communication and co-ordination to implement the I&E strategy

Once I&E is incorporated into strategic plans, its implementation requires specific actions to be developed, measures of success to be formulated and tracked, and resources allocated to make the plan a reality. Communication of the plan to all stakeholders—external and internal—is important to ensure that all those involved understand their role in implementing the plan. This is especially important for faculty, staff and students who have a role in implementation, since they need to understand their role in the plan and how the university’s success will be judged. Sharing with external stakeholders helps them to understand how they might fit into these I&E activities through partnerships with the HEI. Connecting with external stakeholders also allows HEIs to secure more funding.

Many of the world’s most difficult social and scientific challenges require multidisciplinary solutions. A university’s strategic planning activities should thus be co-ordinated across units in a university to ensure a multidisciplinary approach to innovation, entrepreneurship and partnership with the community. HEIs can accomplish this with an office that co-ordinates these efforts, or through an I&E council that includes representatives from each unit with significant activity in I&E. This office or council then becomes responsible for tracking progress on the strategic plan and data for the strategic plan KPIs. Ideally, there is also co-ordination across HEIs within a region, to prevent duplication of effort and to co-ordinate research resources.

Slovenian HEIs have made progress implementing the I&E objectives in their strategic plans. At the University of Primorska, the strategic plan and activities around I&E are developed separately for each faculty, with some co-ordination by the administration. Activities to fit the strategic plan are sometimes

initiated with the aim of improving co-operation with industry and society. For example, Slovenian HEIs are working toward better communicating research areas developing more research partnerships; and developing systems and support for knowledge transfer activities.

Box 3.3. Implementing the I&E strategy: good international examples

Defining and implementing a strategy, GUT Gdansk University of Technology in Poland

The GUT Gdansk University of Technology makes entrepreneurship explicit in its strategy. Seeing itself as an “entrepreneurial university”, its mission definition gives education, research and innovation equal weight. Its mission includes the objectives of “realising innovative undertakings to contribute to society”, in particular in science and technology, in line with its motto: “History is wisdom – future is challenge”.

The third mission strategy has strong support from the rector. In addition, GUT has a vice-rector in charge of Co-operation and Innovation, which is unusual in the governance models adopted by Polish HEIs. It also relies on the close collaboration of the deans of the different faculties, as well as a number of professional and fully dedicated units for innovation and entrepreneurship promotion. Since 2008, GUT has been managed with a matrix system, where a vertical hierarchical structure is crossed with horizontal processes. External contributions are provided by an Advisory Council of 38 members.

This governance model offers a clearly defined, well-structured and systematic approach to innovation and entrepreneurship activities. It outlines responsibilities and processes to be carried out (e.g. commissioned research, scientific industrial consortia, direct or indirect commercialisation of R&D results, including incubation, development and divestment stages), and also defines sets of key performance indicators.

Source: OECD/European Union (2017^[1]), *Supporting Entrepreneurship and Innovation in Higher Education in Poland*, <https://doi.org/10.1787/9789264270923-en>.

The University of Utah’s PIVOT Center co-ordinates university-wide engagement activity

The University of Utah, after a process of extensive self-study, realised that its many assets in economic engagement were not well co-ordinated. This was addressed by creating the Partners for Innovation, Ventures, Outreach and Technology (PIVOT) Center to lead its centralised and integrated strategy and operation for technology commercialisation, corporate engagement and economic development. The new office builds on the work by the Center for Technology and Venture Commercialisation (TVC), to serve as a hub to encourage partnerships between industry, university and government entities. Operations previously led by TVC will continue to assist the university’s faculty inventors in bringing their innovations to market, spearheading all aspects of invention management, patent prosecution, licensing, start-up formation and support, equity management and early-stage funding. The new office will leverage these existing resources and manage economic development and corporate engagement.

Source: Business Wire (2020^[4]), “University of Utah establishes Partners for Innovation, Ventures, Outreach & Technology (PIVOT) Center as lead for innovation and economic engagement”, <https://www.businesswire.com/news/home/20201001006076/en/University-of-Utah-Establishes-Partners-for-Innovation-Ventures-Outreach-Technology-PIVOT-Center-as-Lead-for-Innovation-and-Economic-Engagement>.

Interdisciplinary research is common in some HEIs. At the University of Primorska, interdisciplinary research is an explicit part of its action plan, implemented by centres such as the Innorenew Center – a notable research programme that supports regional innovation priorities. Incubators at the University of Ljubljana, at the University of Primorska and at GEA College are developing companies and providing

entrepreneurship support to faculty to support a stronger innovation ecosystem in line with their strategic goals.

The GEA, Faculty of Polymer Technology and the Environmental Protection College work closely with industry in the career centres to ensure that students are prepared to work in local industry. At the GEA, the faculty of entrepreneurship works closely with industry and to develop field trips and training opportunities for students. The “student challenge” developed in partnership with local companies gives students the possibility of competing for an internship opportunity, by working on solutions to corporate challenges under the mentorship of a faculty member. At the Faculty of Polymer Technology, students and faculty work with over 200 companies a year as part of their technical training.

HEIs are implementing plans through better communication with the external environment. They each hold conferences and mixers where faculty and industry are invited to share ideas about what is needed to move the economy forward. This was a specific activity in the University of Primorska’s action plan, with resources allocated to the activity. The University of Ljubljana’s UniMinds festival is another example. The Environmental Protection College has a special department that manages partnerships, and significant resources are allocated to this effort. At the University of Ljubljana, each faculty has advisory committees with business members, and most partnerships are formed at the faculty level. Individual faculty members sign contracts with industry independently from the university.

The University of Ljubljana supports faculty development of research proposals—particularly those applying for EU structural funds. Its technology Transfer Office assists faculty with the protection and marketing of intellectual property and has produced a guide to help faculty understand the process. The University of Ljubljana and the University of Primorska also offer seed funding for proof-of-concept research.

Supporting the development of regional and national innovation ecosystems

HEIs support their regional and national economies through innovation and entrepreneurship activities in three primary ways:

- Talent and workforce development, including developing the entrepreneurship and other talent that is required to support the local supporting economic clusters and their talent needs (Box 3.4).
- Innovation, and technology-based economic development – supporting new and emerging regional industries with advances in technology, company spin-offs and support for technology entrepreneurs.
- Place development through public service activities, outreach and extension, and engagement with community organisations to improve the quality of life.

Box 3.4. Montana State University’s Optical Technology Centre

Montana State University in Bozeman, Montana, offers an example of strong engagement with a local economy. The university established the Optical Technology Center in the early 1990s, as the optics industry began to grow in the state. The Center facilitated the growth of the industry, feeding it talent and innovation. It required an interdisciplinary approach – physics, electrical and computer engineering and chemistry had to collaborate to meet the needs of the growing and evolving technology of the industry.

Today, the result is a significant cluster of over 30 optics and photonics companies near Bozeman – a dense concentration for a sparsely populated state like Montana and a small university town like

Bozeman. The university's research and the industry grew up together, and the university fed the industry with the talent that it needed. The centre was established just as the industry was getting off the ground. The industry grew from three to 30 companies with the assistance of the university's research; MSU faculty and graduate students started many of these. Almost 100 patents, millions in research funding, and over 600 graduate and undergraduate students have been trained, and now the centre is collaborating with MSU and has an affiliated two-year college to offer associates' degrees for photonics laboratory technicians that includes an internship at a local company.

Source: Montana State University (2017^[5]), "Case study: Optical Technology Center (OpTeC)", https://www.aplu.org/projects-and-initiatives/economic-development-and-community-engagement/innovation-and-economic-prosperity-universities-designation-and-awards-program/IEP_Library/montana-state-university-optical-technology-center-optec/file. https://www.aplu.org/projects-and-initiatives/economic-development-and-community-engagement/innovation-and-economic-prosperity-universities-designation-and-awards-program/IEP_Library/montana-state-university-optical-technology-center-optec/file.

Slovenian HEIs connect with national and regional ecosystem

Slovenian HEIs are encouraging their students and faculty to gain experience in industry. This prepares students to work in industry, transfers new technology to industry, and helps faculty gain perspective both on research that can be helpful for industry and on the skills most relevant to teach in the classroom. This establishes a great connection between talent, innovation and place.

Many of the smaller HEIs and individual faculties work with companies through associations and chambers of commerce. They may also work with the ministry to understand what the talent needs are for the country (for instance GEA College takes part in the Strategic Council for Entrepreneurship Education set by the ministry).

Many HEIs also work with local companies to assess the HEIs' programme delivery. They conduct focus groups, interviews and a graduate survey. Moreover, their incubators offer an opportunity for local companies to gain practical assistance for growing their enterprises.

Universities also engage in cross-border research projects with other universities and research centres in European countries. For example, from 2007-2013, the University of Nova Gorica conducted a cross-border programme with the physics research centre Sincrotron in Trieste, which led to the creation of the Centre for Microscopy and Spectroscopy at that university. Similarly, the University of Primorska is participating in a project to support innovation of start-ups and SMEs in the Slovenian-Italian border area and hosts a research centre, INNOLab, dedicated to venture creation (see Chapter 4 on Entrepreneurial Teaching and Learning).

Conclusions and recommendations

Slovenian HEIs are incorporating goals related to entrepreneurship, knowledge transfer and engagement in their strategic documents (in mission statements and development plans). These goals vary according to the type and academic orientation of the HEIs. Small, specialised faculties such as the Faculty of Polymer Technology, for instance, aim to collaborate more with external stakeholders. GEA College aspires to develop entrepreneurship. Some HEIs develop their strategic plans in concert with internal stakeholders and in co-operation with industry, to ensure their priorities align with and reflect the needs of the ecosystem.

Implementation of these strategic goals throughout the institutions works well. The University of Primorska, for example, makes sure that its faculties co-ordinate with the central administration in setting their objectives. The University of Ljubljana, which is larger in size, is also working to improve co-ordination amongst its faculties.

This strong commitment from the HEIs' leadership has encouraged HEIs stakeholders to collaborate more closely with their local ecosystem. Some collaborate with the government or chambers of commerce to develop entrepreneurship, and many also work with companies to ensure that their curriculum is adjusted to the system's needs.

Our review of leadership and governance practices in HEIs in Slovenia leads us to several recommendations:

- *For policy makers*
 - Support HEIs in implementing the entrepreneurial and innovative agenda throughout their institution. For all HEIs, articulating a mission and vision that includes I&E can provide focus to faculty, staff, and students and help them see how their activities contribute to the larger mission.
 - Build stronger connections to regional and national innovation ecosystems and among HEIs. This could help develop research and knowledge transfer activities that mirror actual innovation needs at the national and regional level. Leverage the Smart Specialisation Strategy (S4) to promote co-operation amongst HEIs for research and entrepreneurial development.
- *For HEIs*
 - Explicitly define the objectives of innovation, knowledge transfer, and entrepreneurship within the strategic documents of HEIs. Involve external stakeholders in the setting of these objectives.
 - Ensure that the innovation and entrepreneurship agenda is mainstreamed throughout the HEI. Harmonise faculty-level strategies to institutional priorities. To generate value, HEIs should close the gap between faculties and their HEIs if one exists.
 - Generate employment and career opportunities (faculty contracts) to incentivise staff to undertake innovation and entrepreneurship activities.

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- OECD/European Union (2017), *Supporting Entrepreneurship and Innovation in Higher Education in Poland*, OECD Skills Studies, OECD Publishing, Paris/European Union, Brussels, <https://doi.org/10.1787/9789264270923-en>. [1]

4 Entrepreneurial 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 with real-life experiences. This chapter discusses entrepreneurial teaching and learning practices in Slovenia, analysing the current state of play of entrepreneurial teaching and learning practices and approaches. The chapter then outlines the main characteristics and challenges of entrepreneurial education and concludes with recommendations for policy makers and representatives from higher education institutions.

Introduction

The entrepreneurial teaching and learning dimension of the HEInnovate framework focuses on the need to provide academic communities (i.e. students, teachers and staff) with an entrepreneurial mindset. An entrepreneurial HEI equips students with a combination of cognitive and non-cognitive skills to empower them relative to the future of work and society. The non-cognitive skills that students learn from any well-executed project, problem-based teaching and learning strategies are applicable far beyond starting a business or a career in business.

HEIs that offer entrepreneurship teaching and learning opportunities can consider the statements from the HEInnovate framework (Box 4.1)

Box 4.1. Entrepreneurship Teaching and Learning dimension of HEInnovate

According to the HEInnovate Framework, entrepreneurial teaching and learning involves exploring innovative teaching methods and finding ways to stimulate an entrepreneurial mindset. It is not just learning about entrepreneurship; it is also about being exposed to entrepreneurial experiences and acquiring the skills and competences to develop an entrepreneurial mindset.

The dimension is identified as have the following five characteristics:

1. The HEI offers diverse formal learning opportunities to develop entrepreneurial mindsets and skills.
2. The HEI offers 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.
5. Results of entrepreneurship research are integrated into the entrepreneurial education.

These statements represent the lenses and perspectives used in this chapter to assess the Slovenian practices, based on the information collected and the interviews conducted with the sample of seven HEI selected as case studies for the preparation of this HEInnovate Country Review.

Source: EC/OECD, the HEInnovate Framework <https://heinnovate.eu/en>, accessed in June 2021.

Although the development of entrepreneurial mindsets, skills and knowledge can depend on a large number of factors, evidence shows that they can be also taught and learnt (Saraiva, 2016^[1]). Individuals can acquire entrepreneurial mindsets at a very early age and throughout lifelong training. There are also various examples on how entrepreneurship teaching and learning opportunities can be organised in HEIs (Volkman and Audretsch, 2017^[2]). Nonetheless, certain challenges in this area remain that have yet to be addressed (Crammond, 2020^[3]).

The majority of European countries have engaged with entrepreneurship education at different levels (Eurydice, 2012^[4]) within HEIs. In Slovenia, activities to stimulate entrepreneurship have managed to achieve some interesting results. Among other things, the movement toward entrepreneurship education has positively affected lingering negative perceptions in Slovenia about being an entrepreneur.

This chapter analyses the dimension of entrepreneurial teaching and learning in the Slovenian HE system and selected institutions. It starts by describing the current situation, good practices and results achieved, as well as the identification of challenges and areas for improvement. The chapter will provide international good practices, as well as evidence to support ideas for improvement, highlighted in the final section.

Setting the scene: Gaps and national/international examples

Main findings: A diversity of realities, approaches and initiatives

The diversity of Slovenian HEIs and its implications for teaching entrepreneurship

Slovenia has a wide range of practices and policy initiatives supporting entrepreneurial teaching and learning in higher education (HE). Its HE system includes different categories of HEIs, and each type of institution approaches entrepreneurial teaching and learning in a different way. Such diversity can depend on the following factors:

- *Age of existing HEIs:* While the University of Ljubljana is over 100 years old, the majority of other HEIs were created in the past 20 years.
- *Size of HEIs:* Many small-scale HEIs have fewer than 200 students, unlike public universities such as the University of Primorska, which has around 6 000 students. The University of Ljubljana educates more than 40,000 students a year.
- *Scope of HEIs:* Some HEIs focus on a specialty, like the Faculty of Polymer Technology and the Environmental Protection College, which focuses on sustainability; and the GEA College of Entrepreneurship. Other HEIs offer programmes in varied domains of knowledge, such as the Universities of Primorska and Ljubljana.
- *Legal status:* In addition to its large public universities, Slovenia has a significant number of smaller, specialised and more recently established private universities and colleges (45 out of the 49 HEIs are private).

Slovenian HEIs have a wide variety of realities and missions, and benefit from many different approaches to entrepreneurial teaching and learning. Thus there is not, neither should there be, a “one size fits all” approach for this HEInnovate dimension. A range of ongoing efforts were found in the HEIs studied for this report, demonstrating many good practices on the national level.

Slovenia’s economy is fertile ground for entrepreneurial teaching and learning

Slovenia is a small, open economy in a region of Europe specialised in manufacturing, with a dense concentration of SMEs, including family-owned businesses. The national productive sector favours entrepreneurial attitudes, knowledge and skills, both for workers in SMEs and in larger companies. Employers can benefit from intrapreneurship (that is, being an entrepreneur inside any already existing organisation).

The GEA College of Entrepreneurship in Ljubljana has a long tradition of promoting an entrepreneurial mindset in Slovenia both among young people (through entrepreneurial workshops in high schools, the Young Entrepreneur competition, and so on) and among adults. Students learn entrepreneurial skills through a variety of practical activities, such as elective courses dedicated to entrepreneurship, but also lectures from entrepreneurial guest speakers, visits to companies, problem-solving challenges and teaching methods intended to encourage an entrepreneurial mindset. In addition, GEA College has a Centre of Vocational Schools that promotes lifelong learning opportunities. These profession-directed and practically oriented programmes also offer elective courses dedicated to entrepreneurship. Around 200 part-time students attend one of the six different courses offered. For example, the Catering and

Tourism programme aims to provide “advanced knowledge in the field of the promising industries of catering and tourism, and to train an individual for successful work and development of innovative ideas in these and related fields”. In the tourism sector, family-owned businesses and self-employment are common and can benefit from professionals with entrepreneurial skills and initiative.

Small HEIs play an important role in Slovenia. Small cities and urban areas, typical of the human geography of the country, are enlivened by vibrant HEIs, colleges and their related ecosystems. Their presence helps to create enterprising, innovative and attractive places (Saraiva, 2016^[1]). A good international example of the value added by HEIs is offered by the State University of Applied Sciences in Elbląg, Poland (OECD/European Union, 2017^[5]).

Box 4.2. PWSZ contributes to the local entrepreneurial ecosystem in Poland

The State University of Applied Sciences (PWSZ) at Elbląg, a small city in Poland, has helped to create a robust local entrepreneurial ecosystem (OECD/European Union, 2017^[5]).

Co-operation with companies, including teaching activities as well as the use of company laboratories for hosting classes, is intensive, and produces mutual benefits. Companies in the surrounding area occupy seats on the university’s Advisory Board, which meets quarterly and provides useful insights and contributions to reinforce entrepreneurial teaching and learning at PWSZ.

Triple and quadruple helix arrangements provide a networked ongoing community of practices, with strong institutional collaboration that also involves local authorities, a science park, NGOs and the regional labour offices, together with databases that give PWSZ a good understanding of the needs and trends of the local job market. This helps contribute to a high rate of employment for its graduates.

The role PWSZ plays in local development is recognised by the international HEIs U-Multirank platform. PWSZ scores very well in this dimension.

This has led to some impressive outcomes and results, thanks to the close and intensive placement of PWSZ students in the area around Elbląg. Over 70% of student internships are located in the region, over a thousand agreements have been established with external public or private entities, and over 50% of PWSZ teachers have practical professional experience.

As a result of entrepreneurial teaching and learning activities at PWSZ, its graduates have gone on to create new start-ups, based on PWSZ courses associated with sectors of high local demand (e.g. IT, kindergartens, security-related activities).

Source: OECD/European Union (2017^[5]), *Supporting Entrepreneurship and Innovation in Higher Education in Poland*, <https://doi.org/10.1787/9789264270923-en>.

Initiatives at the system level support a culture of entrepreneurship

Support structures

Entrepreneurial teaching and learning practices in Slovenia have changed the perceptions and culture in the country towards entrepreneurship and entrepreneurs (Ellermann, 2017^[6]). Reinforcement of entrepreneurial teaching and learning in its HE and HEIs is well aligned with the priorities of several public policies, agencies and programmes. The following initiatives demonstrate some of the results:

- The Ministry of Education, Science and Sport is engaged in the HEInnovate Country Review, and aims to encourage a sustainable and creative society of lifelong learning, as well as to promote entrepreneurial skills and an innovative culture amongst students in Slovenian HE and HEIs.
- The National Higher Education programme proposal for 2021-2030, an extension of the previous programme for 2011-2020, cites as a top priority promoting coverage of entrepreneurship in all study programmes and fields.
- Slovenia's Development Strategy 2030 makes explicit the need to include curriculum on creativity, innovation, critical thinking and entrepreneurship in educational programmes at all levels.
- The Slovenian Smart Specialisation Strategy also cites as a priority promoting creativity, innovation and entrepreneurship among students throughout the educational process, by redesigning and updating study programmes with topics related to innovation, creativity and entrepreneurship.
- Projects promoted by the Slovenian government, such as INOVUP (innovative learning and teaching in higher education), are intended to help HEIs become more entrepreneurial, and have allowed Slovenian HEIs to create and consolidate their career offices. This has had a positive effect on entrepreneurial teaching and learning, and is likely to be reinforced in the future.

Overall, the consensus amongst the different players and public policies is that building a “Young and Creative Slovenia” means enhancing entrepreneurial teaching and learning in Slovenian higher education. This chapter presents examples, suggestions and recommendations on how to put this into practice.

Training for teachers of entrepreneurship

Slovenian HEIs have created entities, institutions and other facilities to support entrepreneurship teaching and learning. Career development offices have been set up to promote extracurricular activities (such as seminars, talks, workshops and support for entering the job market) and developing entrepreneurial skills. The offices conduct a large number of activities in each academic year, including job fairs, skill development and events focused on entrepreneurship, as well as the opportunity to interact with entrepreneurial guest speakers (for examples, see Chapter 2 on Enhancing the Organisational Capacity of Higher Education Institutions in Slovenia).

Incubators, either in HEIs or in external structures that partner with HEIs, also play an important role. Such incubators promote new startups related with the HEI communities of students, alumni and faculty members, and offer additional experiences, knowledge, mentorship support or business idea challenges, among other activities, such as running contests for business ideas or entrepreneurial hackathons, with enthusiastic student participation and engagement.

For example, the University of Primorska participates in a project to support innovation of start-ups and SMEs across the Slovenian-Italian border. The project, entitled Nuvolak2, is supported by the European Union through the European Regional Development Fund (ERDF).¹ Nuvolak2, the second edition of the Nuvola project, supports SMEs in Slovenia and at the Italian border with tailored marketing services. In addition, the University of Primorska hosts the INNOLab, which promotes students' creativity, innovation and entrepreneurial skills, by using these facilities to help them generate and test new ideas. The INNOLab is equipped with 3D printing and scanning capabilities, as well as augmented and virtual reality devices. The learning environment allows the participating students (around 60 per year) to co-create new ideas, using Design Thinking approaches that are then prototyped and tested. The University of Primorska also hosts the Humans Interacting with Computers Lab (HICUP). This laboratory involves a group of international researchers who are trying to make the digital world fit for humans, by using similar technologies, but also examining the scientific basis of cognition and perception. HICUP includes a Maker Studio as well as a Mixed-Reality/Immersive-Analytics Lab, including a wide variety of equipment and devices. This facility can be a useful tool for people interested in entrepreneurial opportunities based in digital transformation.

The University of Primorska's INNOlab illustrates the potential of establishing a national network of HEIs that provide dedicated spaces to promote interactions, creativity, innovation and an entrepreneurial mindset. This approach is characteristic of the FabLabs and their networks in many countries, as discussed in Box 4.3.

Box 4.3. Internationally networked spaces for prototyping fabrication in HEIs

Practical exposure and the possibility of “making things” are important in achieving more efficient entrepreneurial teaching and learning in HEIs (Saraiva, 2016^[1]). Dedicated spaces intended to encourage creativity, innovation and entrepreneurial projects by “making things” have been created in many HEIs, some of which are linked by international networks that share common goals and good practices.

One such network is associated with the FabLab concept, which originated at the Massachusetts Institute of Technology in 2001, in its Media Lab's Center for Bits and Atoms. FabLab stands for Fabrication Laboratory, a small-scale, dedicated space where solutions can be easily prototyped and tested, so that through personal fabrication one can make “almost anything”. Such spaces have been recreated all over the world. National and international networks now connect over 2 000 FabLabs in more than 120 countries, supported by the Fab Foundation.

In a similar vein, Design Factories are spaces designed to support creative product designs inspired by Design Thinking principles and co-creation, and involving students who “share the passion for doing” and address real product or service design challenges presented by companies that partner with the Design Factories.

This concept was originally developed and tested at the Aalto University in Espoo, Finland, in 2008. The Design Factory Global Network links 30 Design Factories in many different HEIs and countries, supported by a co-ordinating team from the University of Aalto.

Source: Saraiva, P. (2016^[1]), *Empreendedorismo: Do conceito à aplicação, da ideia ao negócio, da tecnologia ao valor*, Third edition, Coimbra University Press, Coimbra, Portugal.

In the sample of Slovenian HEIs interviewed, well-qualified and trained faculty members, including full professors, are leading or contributing to entrepreneurship teaching and learning activities. In some cases, the HEI also have Entrepreneurship Departments, or a Faculty of Entrepreneurship (as does GEA College).

Faculty members are given the opportunity for additional training and exposure to other experiences of entrepreneurial teaching and learning (in programmes such as INNOVUP). This includes learning experiences through exchange programmes at internationally renowned HEIs (such as Babson College or the University of Stanford), as well as the possibility of bringing in guest speakers or international leading individuals to discuss entrepreneurial teaching or life experiences. However, a more structured approach is needed for improving the teaching skills and pedagogical approaches of teachers in the HEIs involved in entrepreneurial teaching and learning. Experts from industry or outside the HEIs involved in teaching activities may not have the necessary teaching skills.

Experience gained through the ongoing INNOVUP-Innovative Learning and Teaching in Higher Education project,² could inspire the creation of a dedicated track for entrepreneurial teaching and learning. This could help provide additional training for any interested or qualified entrepreneurship teachers.

Box 4.4. Babson College pioneers ways to train HE entrepreneurship educators

With over 100 years of experience, Babson College is known as a leading institution in entrepreneurship teaching in the US. Its principles of “Entrepreneurial Thought & Action” and “Entrepreneurship of All Kinds” are deployed in many programmes at the undergraduate and graduate levels, as well as in executive education.

To expand its influence, Babson College created the Babson Academy to advance Global Entrepreneurial Learning, organising courses and initiatives to encourage faculty members at various HEIs to teach more entrepreneurially. This is achieved through programmes designed for HEIs (for example, its Global Symposia for Entrepreneurship Educators, Modules for Entrepreneurship Educators and the Babson Collaborative for Entrepreneurship Education, a network of almost 30 HEIs from 20 different countries). It also has programmes for further training of faculty members (e.g. Babson Fellows Program for Entrepreneurship Educators, Building an Entrepreneurial Education Ecosystem, Entrepreneurial Mindshift for Educators, Innovating How We Teach Innovation, the Price-Babson Symposium for Entrepreneurship Educators, or the monthly One Hour Entrepreneurship Educators webinars).

In 2020, Babson Academy ran 11 programmes involving 593 entrepreneurship educators, who will diffuse what they learned in the almost 40 countries participating in the programmes. This fulfils Babson’s mission of “providing access, inspiration, and connection for institutions and educators who desire to grow entrepreneurship education ecosystems to accelerate the development of current and future entrepreneurial generations”.

Source: (Babson College, 2021^[7], Babson Academy For the Advancement of Global Entrepreneurial Learning, <https://www.babson.edu/academics/babson-academy/>, accessed in June 2021)

Entrepreneurial teaching and learning in Slovenian HEIs are well established

Curricular activities

In the sample of Slovenian HEIs interviewed, comprehensive curricular coverage of entrepreneurial teaching and learning was offered both for undergraduate and MSc students.

Formal degree programmes in entrepreneurship

Slovenia offers formal degree programmes in entrepreneurship, such as GEA College’s three-year BSc in Entrepreneurship and the two-year MSc in Entrepreneurship at the University of Ljubljana. This is a unique practice, rare in other countries.

The GEA College focuses on entrepreneurial teaching and learning (“Business education with a focus on entrepreneurship and management”), in a variety of programmes, including lifelong learning activities, an MSc, a new, dedicated MBA, as well as an undergraduate BSc Entrepreneurship degree. Offered by its Faculty of Entrepreneurship, this three-year BSc Entrepreneurship programme uses a variety of teaching approaches, including seminars, case studies, workshops, presentations, group discussions and project work. It offers both mandatory and elective courses that provide comprehensive coverage of entrepreneurship and can be completed by presenting a diploma thesis or a degree examination on solving an entrepreneurial challenge.

The University of Ljubljana also runs an MSc programme in Entrepreneurship, which was created in 1992 and is led by a full professor in the field. Full professors running this programme are acclaimed, with international exposure to US universities renowned in the field of entrepreneurship (such as Babson College and the universities of Stanford and Harvard). The two-year programme has over 100 enrolled students, of whom 7% are international students. A variety of teaching methods are used, relying on practical methods and co-operation with over 10 different companies. Courses offered in this programme include Contemporary Entrepreneurship, Financing Growing Ventures, New Venture Creation, Social Entrepreneurship, Entrepreneurial Leadership or Entrepreneurial Networks and Cluster Dynamics. Among the alumni of this programme, some are now CEOs of Slovenian companies, (such as MojaCokolada or Dogodki za Samske), while other graduates have received prestigious awards and recognitions.

Entrepreneurship mandatory or elective courses

Depending on the different programmes, a variety of mandatory and elective courses are offered that are fully dedicated to entrepreneurship. Many interesting examples explicitly covering entrepreneurship exist. The courses use a variety of learning approaches at different levels of the curriculum. The diversity of approaches show that it is never too early or too late for such topics to be taught in HE BSc programmes.

The University of Novo mesto, through its Faculty of Economics and Informatics, has been offering a first-year, first-semester mandatory entrepreneurship course since 1997. The course includes 30 hours of lectures and 30 hours of tutoring support for students, who develop a business plan over the semester. It covers a comprehensive curriculum including intrapreneurship (acting as an entrepreneur inside an existing organisation), family-owned businesses and social entrepreneurship. Students from this course in past years have worked on business ideas recognised by winning business ideas contests.³ These contests are also promoted by the University of Novo mesto, notably in its annual Entrepreneurial Competition of the Faculty of Economics and Informatics. Now in its fourth year, its winners present their business ideas during the University Students' Day.

A variety of entrepreneurial teaching and learning methodologies, as well as their curriculum, were identified. These methodologies were aligned with the current trends in the field, such as the coverage of CANVAS Business Models (Osterwalder and Pigneur, 2010^[7]), Lean Startup (Ries, 2011^[8]) or Design Thinking (Kelley, 2001^[9]) principles and tools. Practical hands-on experiences, combined with project-based learning, are often used for teaching and learning in entrepreneurship courses. For example, the University of Ljubljana combines and applies Design Thinking for teaching Entrepreneurship (Ellermann, 2017^[6]).

The Faculty of Economics of the University of Ljubljana (FELU) began to apply Design Thinking to entrepreneurial teaching and learning in 2006 (Ellermann, 2017^[6]), after a visit to the University of Stanford in California, where the methodology was first conceived. This allowed FELU to move away from a more traditional “business plan” approach to ideation, co-creation and prototyping of entrepreneurial solutions (with dedicated rooms made available to students), start-up weekends and three-euro challenges. Furthermore, FELU also brought entrepreneurial teaching using Design Thinking principles to primary school students and the unemployed. Today, most of the 20 and more entrepreneurship courses offered by the FELU follow such Design Thinking paradigms, including large groups with 400 students. Quite apart from its impact on learning, this approach has also contributed to the creation of successful start-up companies such as Printbox and Optiprint (Ellermann, 2017^[6]).

Contribution to entrepreneurial mindsets through other courses

Examples of entrepreneurial teaching and learning can also be found in the curricula through coverage of relevant topics in courses that are not dedicated to entrepreneurship. Such examples can be found at the

Environmental Protection College, the Faculty of Polymer Technology or the New University, where the approach is even being taught to law students.

The New University aims to establish itself by adapting internationally based links and innovative approaches to teaching. For instance, the European Faculty of Law relies on case studies, simulations and real contexts, combined with teachers who have professional experience of ways of developing a more entrepreneurial mindset among their students. The New University is also developing blended and online learning contents in its E-UNIVERSITY initiative, a Web portal with recorded lectures, multimedia presentations, articles and quizzes that are available to all members of the university (New University, 2021^[10]). E-UNIVERSITY includes a section dedicated to Business and Entrepreneurship. The New University YouTube Channel contains recordings of contents of debates conducted regularly with up to 150 participants, which are also used to support classroom discussion and analysis (New University, 2021^[11]). This interactive approach to teaching and learning, based on real-life entrepreneurial experiences, helps students become more innovative and creative by learning from role models and examples that deal with entrepreneurial challenges, difficulties, successes and failures.

Exposure to real life challenges, course assessments based upon projects, pitches, teamwork and group presentations are other common components that contribute to entrepreneurial teaching and learning. This is reinforced through contributions made by guest speakers, real problems, projects or challenges provided by companies, as well as the participation of professional experts from industry. Invited professors or mentors can act as role models, offering their experience to help students reinforce their entrepreneurial skills and knowledge.

The Faculty of Polymer Technology benefits from strong connections with companies in the field and from the participation of around 40 teachers from industry, who contribute to both the BSc and MSc programmes in polymer technology. This practical focus has helped students attain high rates of employment. Of its graduates, 98% find a job less than six months after completing their studies, in over 1 500 companies involved in plastics processing and 200 tool-manufacturing plants. Their exposure to real-life challenges and problems helps its students develop important innovative and entrepreneurial skills and knowledge. The faculty also collaborates with other schools, including primary schools, with joint initiatives that create awareness of the roles of materials and polymers in our world and their contributions to sustainability.

Box 4.5. MIT segmented approach to Entrepreneurial Teaching and Learning

The Massachusetts Institute of Technology (MIT) is known as one of the most entrepreneurially oriented American universities, particularly in science and technology-based entrepreneurship initiatives and outcomes (Saraiva, 2016^[11]; Rose and Patterson, 2016^[12]). At MIT, entrepreneurial teaching and learning takes place in many different ways and in its different faculties, benefiting from an integrated effort co-ordinated by the Martin Trust Center for MIT Entrepreneurship (MTC).

MTC was established to formulate and develop MIT entrepreneurial efforts, using a holistic but segmented perspective. Its perspective is that an entrepreneurial mindset matters, but that well-defined workflows, steps and procedures should be followed, in what is known as the “Disciplined Entrepreneurship” (Aulet, 2013^[13]) perspective.

In addition to a generic offer of basic entrepreneurship courses, MIT has built a much broader portfolio, focused on students’ specific expectations, needs and profiles. Students might have different motivations, depending on whether they are simply curious about the topic, ready to go, amplifiers or intrapreneurs. Different projects may have different needs, depending on how mature a possible entrepreneurial project is, with nucleation, product definition or venture development as some possible

stages. Finally, different sectors of activity may lead to topics that might be covered, for example entrepreneurship in energy, health care, biotech, fin-tech, social challenges, developing world needs, real estate, transportation solutions or media. This three-dimensional space was used to come up with segmented entrepreneurial teaching and learning solutions. In 2020, over 50 000 students were directly involved in these initiatives, with 24 500 in inspiration and engagement activities, 5 500 in exploration and events, 1 248 in learning fundamentals through courses, 173 as program and competition participants, and 56 in acceleration programmes.

Overall, and by following this segmented approach, MIT offers over 60 different entrepreneurship courses, allowing students to customise their own entrepreneurial learning. All these programmes, courses and offerings, co-ordinated by MCT, have as their guiding principle that entrepreneurship education needs to cover in a balanced way the student's heart (spirit), head (knowledge), hand (capability) and home (community). MIT offers its students moments for inspiration, exploration, fundamentals, application and acceleration, and they can blend these components according to their own needs, priorities and expectations. An online platform, Orbit, was developed to guide interested students in this variety of entrepreneurship learning opportunities. It offers all the relevant information, taking into account each user's past experience and current interests.

This segmented, well-structured approach has been a key factor for MIT in maintaining and reinforcing its entrepreneurial achievements and the creation of an impressive number of start-ups both in the US and across the world. MIT alumni have launched over 30 000 active companies, which employ 4.6 million people and generate annual revenues of almost USD 2 trillion.

Source: Massachusetts Institute of Technology, 2021, "Martin Trust Center for MIT Entrepreneurship (MTC)", <https://entrepreneurship.mit.edu/>, accessed in June 2021; Aulet, B. (2013^[13]), *Disciplined Entrepreneurship*, Wiley, Hoboken, New Jersey; Saraiva, P. (2016^[11]), *Empreendedorismo: Do conceito à aplicação, da ideia ao negócio, da tecnologia ao valor*, Third edition, Coimbra University Press, Coimbra, Portugal; Rose, D. and C. Patterson (2016^[12]), *Research to Revenue*, University of North Carolina Press.

Slovenia has somewhat limited opportunities for entrepreneurial teaching and learning for doctoral students. In general, the curricular coverage is limited, together with less structured approaches and low participation among PhD students.

The University of Ljubljana offers a Technological Entrepreneurship graduate course, a programme that includes curricular units dedicated to science-based, industrial property management and Design Thinking.

Box 4.6. NOVA efforts to create entrepreneurial PhD students

The NOVA University of Lisbon (UNL) is an entrepreneurial public university, with nine different faculties. In order to provide increased multidisciplinary support and development opportunities to its PhD students, a Doctoral School was created at UNL, with contributions from all its faculties.

Among other initiatives, it was found important to give all the UNL PhD students and researchers the chance to become more entrepreneurial and think about more structured ways to turn the science and technology they are working on into opportunities for value creation. To this end, the NOVA Doctoral School launched the Sciencepreneur programme, a Science-Based Entrepreneurship course (Saraiva, 2016^[11]; Rose and Patterson, 2016^[12]) that offers PhD students basic concepts and knowledge, as well as hands-on experience, applied to the topics they are researching.

In a first component, Sciencepreneur: The Basics, students acquire insights from theoretical lectures, case studies and discussion sessions with successful science-based entrepreneurs, investors and corporate CEOs. These sessions give them a better understanding of the process of knowledge-driven

innovation and idea generation. It also creates an awareness of the impact scientists can have from an economical and societal perspective, and of the need to protect intellectual property rights whenever appropriate. The course, given every year, has sessions of two hours a week for 11 weeks. The course covers: Innovation and Value Creation Processes; Evaluating Market Needs, Market Analysis and Segmentation; Value Proposition and Business Models; IP Protection, Patent Strategy and Licensing; Product Development; Technology Readiness Levels; Creating Social and Societal Impact through Science and Technology; Business Development, Scaling and Fundraising; Team Management; and Science-Based Elevator Pitches. Almost 40 PhD students and researchers participate in this elective course.

As a follow-up, PhD students can also participate in the associated course, Sciencepreneur: Hands-on. In this course, students are paired with a mentor with whom they meet every week. They start with a specific technology and are asked to come up with a Business Case, which is ultimately presented to a panel of investors and entrepreneurs. In these Science-Based Business Cases, spin-off creation is one possibility to consider, but others may be patent licensing, establishment of partnerships or guidance for pursuing further research activities to increase possible future opportunities for value creation.

UNL Entrepreneurial Teaching and Learning activities have helped create 85 active start-ups in the past 15 years, which have raised over EUR 500 million of investment. Of these, 18 were recognised as being NOVA spin-offs, and one of them became one of the few Portuguese unicorns (Outsystems), start-ups that reach a market value of over USD 1 billion.

Source: Saraiva, P. (2016^[11]), *Empreendedorismo: Do conceito à aplicação, da ideia ao negócio, da tecnologia ao valor*, Third edition, Coimbra University Press, Coimbra, Portugal; Rose, D. and C. Patterson (2016^[12]), *Research to Revenue*, University of North Carolina Press.

Some interesting research activities and projects on innovation and entrepreneurship were found in the Slovenian HEIs interviewed. However, few examples were noted of such research results being used to improve teaching or as drivers for entrepreneurial teaching and learning. Entrepreneurial teaching and learning could benefit from setting up further linkages between entrepreneurship research and teaching activities.

Extracurricular activities

The sample of case-study Slovenian HEIs include a large number and variety of extracurricular activities that contribute to entrepreneurial teaching and learning. This includes guest speakers, alumni presentations, talks, seminars, workshops, roundtables, challenges, business ideas contests, boot camps, and hackathons. These activities are often open to all students from the HEI, to participants coming from other Slovenian HEIs, or even from other countries. Career development offices and incubators play an important role in promoting these initiatives, some of which have been quite successful in recent years.

Short-term awareness initiatives

Overall, extracurricular activities have a short duration and are aimed essentially at raising awareness and building more entrepreneurial mindsets. Extracurricular activities promote entrepreneurship by providing participants with experiences and role models, as in the case of the University of Novo mesto's roundtables or the Festival of Innovation at the University of Primorska.

Since 2013, the University of Novo mesto has held regular roundtables involving a variety of invited guests and covering a wide range of topics. The roundtables are held every month. Examples of themes covered in recent years include “An entrepreneurial mindset among young people”, “Co-

operatives and social enterprises in Slovenia”, “The role of NGOs in society” and “Career competencies, entrepreneurship and digital marketing”.

The Festival of Innovation organised by the University of Primorska has become a well-established annual event, now in its 12th year, in promoting entrepreneurial teaching and learning. Supported by Interreg funding, it attracts over 800 participants, from Slovenia, Italy and other countries. During a full day dedicated to celebrating and sharing innovation, speakers from Slovenia and abroad cover a variety of topics, and interactive sessions take place. The event is complemented by INNOtalks, INNOtools (a free online platform of tools for entrepreneurs), INNOSchool (international exchanges of expertise) and INNOfits (workshops and advise sessions), which have all contributed to the INNOworld, one of Slovenia’s winners of the European Enterprise Promotion Awards.

Longer-term development initiatives

Other extracurricular activities include courses of a week to three months, with weekly meetings and challenges. These initiatives cover relevant topics and provide a chance for participants to apply the knowledge and tools they have learned in classes or participating in specific projects. One example is the one-week Entrepreneurship Summer School for undergraduate students at the University of Novo Mesto. In the same vein, the New University offers Summer and Spring Schools, like the three-month Summer School offered by the Faculty of Polymer Technology, and the Schools of Entrepreneurship provided by the Environmental Protection College in partnership with Ustvarjalnik, a well-known Slovenian private organisation focused on Entrepreneurship Teaching and Learning.

Every two years, the Environmental Protection College offers a 17-week School of Entrepreneurship, which covers topics in Modern Entrepreneurship. This initiative was developed in partnership with Ustvarjalnik.

Participants in this School of Entrepreneurship have two hours of class every week to connect with a tutor and accomplish teamwork during the week. The programme covers such topics as ideation, project management, business models, value creation, customer acquisition, monetisation and funding, and closes with student presentations. Feedback from participating students has been encouraging, and some present interesting sustainability-related Business Cases.

Online initiatives and international contributions

Numerous efforts provide online content for remote or blended entrepreneurship teaching and learning, as well as for materials that can be used in the classroom. The impetus that the COVID-19 pandemic gave to this area is likely to be its lasting legacy for higher education. One example, the New University YouTube channel mentioned earlier, includes regular debates that showcase current developments in this field.

Given the rapid worldwide developments in Entrepreneurial Teaching and Learning, it is important for Slovenian HEIs to establish and benefit from exposures and mutual sharing of existing practices in different countries. Exchanges of teachers, participation in international events or joint projects are some of the ways to achieve such a goal, another one being to invite teachers from abroad or seeking out the insights of international experts, entrepreneurs and entrepreneurship teachers.

The GEA College, for example, draws on the expertise of international experts, both entrepreneurs and professors of entrepreneurship, who are invited as keynote speakers for the GEA Scientific Conference and also participate in joint projects. They may stay for longer periods at GEA, where about five international experts a year are involved in teaching or research activities, from a wide variety of countries. The college also connects with international experts on extracurricular activities. The ENR (Entrepreneurship in New Reality) programme, for example, involved several international experts in GEA activities, supported by the US Embassy in Slovenia. ENR has held ten successful workshops involving

international and Slovenian experts, promoting trans-Atlantic co-operation and mutual entrepreneurial opportunities. The seminars were held every Tuesday for two months, with over 700 participants.

Promoting entrepreneurial mindsets in primary and secondary level schools

It is never too early to begin teaching entrepreneurship, as many initiatives across the world show (Saraiva, 2016^[1]; Eurydice, 2012^[4]). Many of the case-study Slovenian HEIs have ongoing youth initiatives, most focused on secondary schools. Other initiatives aim to build an entrepreneurial mindset at younger ages, such as the University of Ljubljana's efforts in collaboration with primary schools.

Since 2013, the University of Ljubljana has been involved in an initiative to promote entrepreneurial thinking in students aged 12 to 15 (Ellermann, 2017^[6]). This program is focused on creative problem solving through Design Thinking approaches and learning by doing, through real-world challenges. Primary schools were involved, and in each, two teachers received training from the University of Ljubljana to act as student coaches. By observing the world around them, student teams are asked to come up with the problems they want to try to solve. This was found to be motivating to the participating students, who formulated a number of ideas and solutions that were subsequently implemented.

Slovenia's secondary schools have many initiatives that involve HEIs, including entrepreneurship competitions like those promoted by the University of Novo mesto, as well as the well-established GEA College Initiative for Young Students.

Other initiatives in secondary schools include the GEA College's annual Youth Entrepreneur Competition, created in 1997, which is celebrating its 25th year and attracts secondary school students from all over Slovenia. Over the years, more than 1 300 students and 160 mentors from 80 secondary schools have participated, with numbers increasing every year. About 100 students and 20 teams are challenged to formulate and develop business ideas, producing short videos that are assessed by a panel of experienced entrepreneurship experts. Teachers mentor the teams of students through the academic year. Interested high schools are also offered a set of 20 free workshops by the GEA College, open both to students and their mentors, running from September to March, and covering topics related to entrepreneurship, innovation and creativity. The mentors are all invited for specific training in an annual workshop led by a professor of entrepreneurship. The best ideas are chosen every year, and the top four projects are shared at a national final event in April. Winning teams are awarded scholarships and support for developing their ideas at the GEA College Incubator.

Slovenian HEIs are thus involved in a comprehensive set of extracurricular Entrepreneurship Teaching and Learning initiatives. Although they include many students with the Faculties of Management or Economics, mostly derive from different backgrounds, and some additional gains may be obtained by leveraging such efforts and having them further diffused into all areas of knowledge and faculties.

Conclusions and recommendations

Slovenia HEIs benefit from a variety of well-established set of entrepreneurship teaching and learning initiatives, including both curricular and extracurricular activities, which rely on existing support services, facilities and resources. These initiatives use different methods to stimulate the entrepreneurial mindset among students, ranging from theoretical approaches to hands-on, project-based learning. These initiatives range from short-term seminars to full entrepreneurship BSc or MSc programmes, from mandatory or elective curricular units to a wide range of extracurricular opportunities, as well as online content. An effort to connect with the surrounding ecosystem has also been made, through courses that

stimulate intrapreneurship or aim to help local small and medium enterprises (SMEs) and family-owned businesses. Some of these initiatives are in the early stages, but others have been in place for over a decade, and many take into consideration the latest developments in the field. Several examples of good practices were identified.

Nevertheless, entrepreneurial teaching and learning activities involving different faculties and programmes and delivering dedicated courses, are more frequently found in Slovenia's Schools of Management or economics departments in universities. Entrepreneurship education could potentially be mainstreamed in all HEIs, faculties and programmes, both at the undergraduate or graduate levels, ensuring that every student has exposure to entrepreneurial teaching and learning. It may be interesting to complement coverage in the curriculum of generic entrepreneurship topics with advanced or specific courses, customised to the needs of particular groups of students. To do so, and given the small size of many Slovenian HEIs, joint efforts, involving networks and partnerships with several HEIs, may be the best way to merge the resources and aggregate students' demand for attending such courses, which may deal with more specific topics, always addressed from the entrepreneurial perspective.

At another level, depending on the nature, underlying technologies, sectors of activity or ownership, similar networked efforts can be made to provide courses that cover entrepreneurial opportunities relevant for Slovenia, such as manufacturing, digital transformation, science-based entrepreneurship, family-owned businesses and micro-entrepreneurship, intrapreneurship in SMEs or large companies.

Recommendations

Widening the scope for Slovenian Entrepreneurial Teaching and Learning

Slovenia has few targeted entrepreneurial courses, in particular specialised courses for doctoral students. Curricular coverage of generic entrepreneurship topics could be supplemented by more advanced or specific courses, tailored to particular groups of students. Topics that could prove useful for Slovenian HEIs include Industrial Property; Legal and Regulatory Affairs for Start-ups; Incubation, Acceleration and Scaling of New Ventures; Digital Marketing for New Ventures; Unicorns and High Impact Entrepreneurship; Teams of Founders and Start-up Human Resources Management.

Entrepreneurship courses in Slovenia could reflect more closely the needs of the national and regional innovation ecosystem. More courses could focus on entrepreneurial opportunities related to Slovenia's productive sector, such as manufacturing, digital transformation, science-based entrepreneurship, family-owned businesses and micro-entrepreneurship, intrapreneurship in SMEs or large companies. Lifelong training for professionals, concentrating on sectors of strategic importance for Slovenia, would be one other promising avenue to explore. Promising instances of such practices in Slovenia include the efforts of the Faculty of Polymer Technology or the Environmental Protection College.

Given the small size of many Slovenian HEIs, joint efforts, involving networks and partnerships with several HEIs, might be the best way to pool their resources. It would also be a good way to aggregate students' demand for such courses, to offer a wider range of topics, addressed from the entrepreneurial perspective.

A number of recommendations and suggestions for further improvement are presented in this section, both for Slovenian higher education as a whole and for Slovenian HEIs:

- *For policy makers*
 - Slovenia's Quality Assurance Agency for Higher Education (SQAA-NAKVIS) could consider implementing mandatory requirements for coverage of Entrepreneurship Teaching and Learning in all programmes that apply for accreditation.

- Establish national consortia and entrepreneurship networks to promote the exchange of experiences, to generate opportunities for networking amongst teachers, mentors and students.
- Encourage partnerships between HEIs, businesses of all sizes, municipalities and local communities, to single out local challenges and opportunities for innovation. Such local examples can feed into entrepreneurship teaching and learning opportunities at HEIs.
- Promote entrepreneurial teaching at all levels of HE by developing PhD programmes (for scientifically based avenues for entrepreneurship), in addition to targeted courses, for example on intellectual property management.
- Continue to develop entrepreneurial teaching at all levels of higher education. Offer courses that stimulate entrepreneurship, with pedagogical methods that encourage initiative, creativity, ability to solve challenges, experiential learning and apprenticeships.
- *For HEIs:*
 - Leverage existing initiatives, ensuring that entrepreneurship teaching and learning activities are embedded in all schools and faculties of an HEI, rather than being limited to the Faculties of Management and Economics.
 - Offer access to entrepreneurship education in lifelong learning courses, to allow working professionals to develop entrepreneurial skills.
 - Promote joint monthly events with high-level speakers from Slovenia and elsewhere, involving all interested HEIs and inviting participants from outside academia, including entrepreneurs, angel investors, venture capitalists, etc.
 - Create resources to support teachers and mentors involved in entrepreneurial teaching and learning activities, including experts and industry professionals.
 - Leverage national initiatives like INNOVUP (**Innovative Learning and Teaching for Quality Careers of Graduates and Excellent Higher Education**), which could be replicated at the HEI level.

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Notes

¹ As part of the Interreg V-A Italia-Slovenia 2014-2020 Programme.

² This programme is designed to enhance the quality of higher education by introducing more flexible, modern forms of learning and teaching (with the goal of increasing students' ability to face challenges, as well as encouraging analytical thinking, independent learning, creativity and entrepreneurial skills).

³ Definition of intrapreneurship.