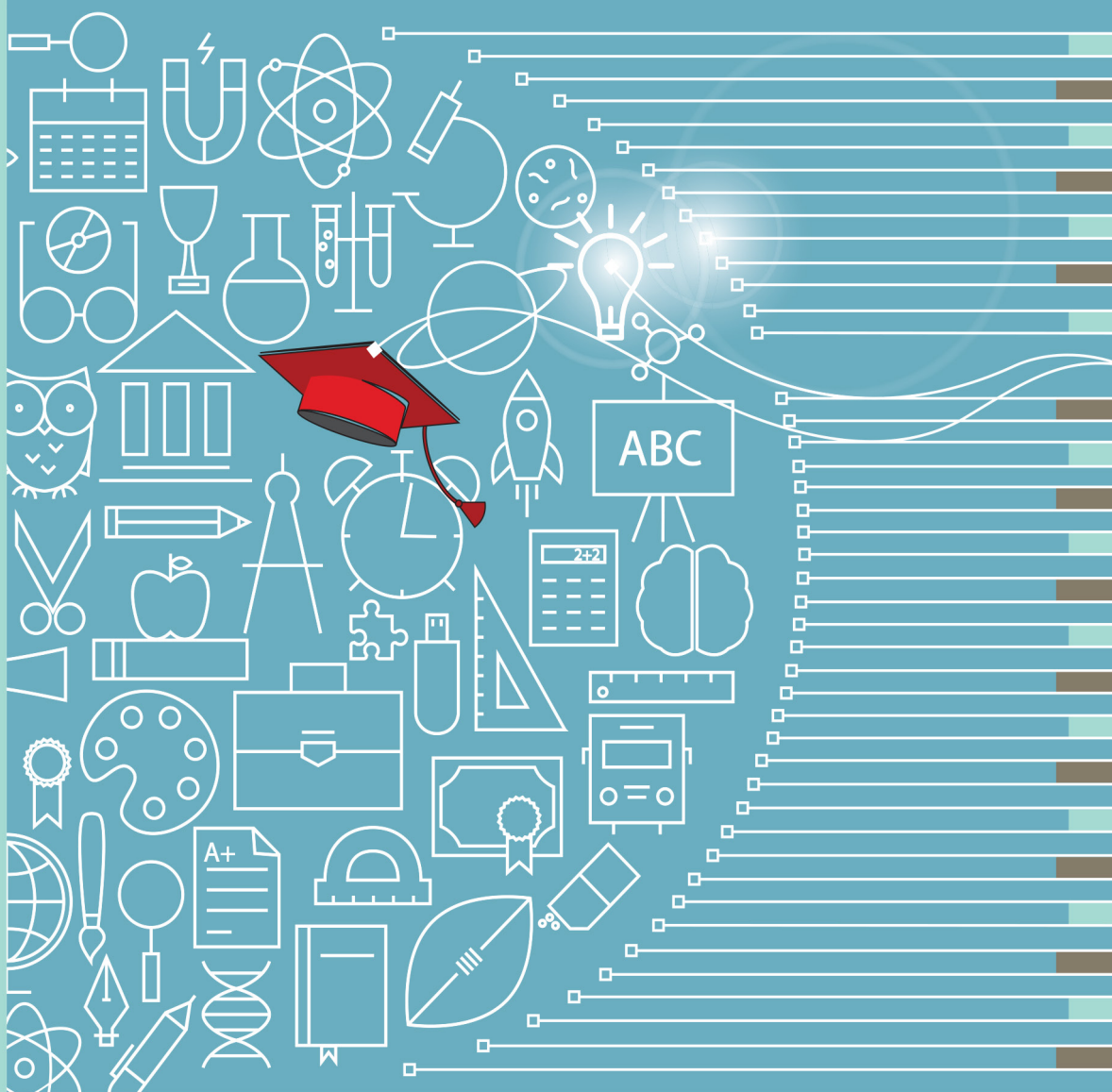


Supporting Entrepreneurship and Innovation in Higher Education in Lithuania



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Preface

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 innovation and entrepreneurship agenda features firmly in the higher education system of Lithuania, with a strategic commitment across the higher education sector. Lithuanian HEIs see themselves as connecting government, education and industry to create economic, social and cultural value. They have significantly improved entrepreneurial teaching over the past decade, with rich formal and informal learning opportunities for students at all levels. HEIs work with the private sector to provide teaching that addresses skills gaps in the labour market. There is an impressive level of collaboration between Lithuanian HEIs and public partners, with some HEIs working in hubs to support digital transformation in the wider entrepreneurial ecosystem.

For Lithuanian HEIs to realise their full potential however, they should look beyond individual good practice, to embed innovation and entrepreneurial activities into the culture of all HEIs. A key step forward will be opening up entrepreneurship learning opportunities to all students at all levels. Alongside this, HEIs should look to invest in long-term knowledge exchange and collaboration (KEC) activities, including training dedicated professionals to support knowledge exchange activities. Lastly, Lithuanian HEIs should capitalise on the experiences gained during the COVID-19 pandemic to strengthen, and mainstream their use of digital teaching tools.

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



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Abbreviations and acronyms

DIH	Smart Health Digital Innovation Hub
EC	European Commission
ECIU	European Consortium of Innovative Universities
ECTS	European Credit Transfer and Accumulation System
EIT	European Institute of Innovation and Technology
EU	European Union
FTMC	<i>Fizinių ir technologijos mokslų centras</i> (Centre for Physical Sciences and Technology)
GDP	Gross Domestic Product
HE	Higher Education
HEI	Higher Education Institution
IP	Intellectual Property
IPR	Intellectual Property Rights
ISO	<i>Integrali Skaidulinė Optika</i>
KE	Knowledge Exchange
KEC	Knowledge Exchange and Collaboration
KEF	Knowledge Exchange Framework
KTK	<i>Kauno Technikos Kolegija</i> (Kaunas University of Applied Engineering Sciences)
KTU	<i>Kauno technologijos universitetas</i> (Kaunas University of Technology)
LAMMC	<i>Lietuvos agrarinių ir miškų mokslų centras</i> (Lithuanian Research Centre for Agriculture and Forestry)
LEI	<i>Lietuvos energetikos institutas</i> (Lithuanian Energy Institute)
LITNET	Lithuanian Research and Education Network
LiU	Linköping University
LSMU	<i>Lietuvos sveikatos mokslų universitetas</i> (Lithuanian University of Health Sciences)
MIDAS	National Open Access Research Data Archive
MITA	Agency for Science, Innovation and Technology
NIEC	National Innovation and Entrepreneurship Centre
NFR	Research Council of Norway
OECD	Organisation Economic and Coordination Development
R&D	Research & Development
RIS3	Strategy for Smart Specialisation
RI	Research Institution
SF	Structural Funds
SKVC	Centre for Quality Assessment in Higher Education
SMEs	Small Medium Enterprises
SPEAR	Supporting and Implementing Plans for gender Equality in Academia and Research
TE	Technology-based Entrepreneurship programme
VAA	Vilnius Academy of Arts
VIKO	<i>Vilniaus kolegija</i> (Vilnius University of Applied Sciences)
UK	United Kingdom
US	United States of America

Executive summary

Higher education institutions (HEIs) and research institutions (RIs) in Lithuania have significantly increased their engagement with the innovation and entrepreneurship agenda in the past decade. Lithuania is considered to be a Moderate Innovator and there are signs that innovation is becoming a growing part of the Lithuanian economy. Students, staff and academics are personally committed to making sure their institutions become relevant contributors to the economy and society. In one compelling example, digital teaching for the wider community was introduced as a result of the COVID-19 crisis, with many examples of individual initiatives by Lithuanian institutions supporting the digital response of their communities to the pandemic. It is clear that Lithuania is on a journey towards an entrepreneurial mind-set, and the following analysis and recommendations consider how it can best leverage its own unique strengths and capacities.

The Lithuanian higher education system has been under a process of reform over the last decade, with efforts to both improve the quality of teaching and merge HEIs in order to be more efficient and focused in terms of funding. Funding of higher education and research significantly decreased in 2017, and it is only beginning to rebound. In particular, Lithuania has invested in improving the salaries of academic staff. Lithuania remains highly dependent on European funding for its research programmes, which in turn play a significant role in shaping how research is undertaken in the country.

Lithuania has seen a dramatic improvement in entrepreneurial teaching and learning over the past decade. The majority of the interviewed institutions offered some kind of formal entrepreneurship education at the undergraduate level, and two universities offered entrepreneurship education programmes at the master's level. HEIs are also active in offering informal and extracurricular activities that promote entrepreneurial skills. However, the connection between entrepreneurship and research is still feeble. Research institutes tend to provide doctoral students with more freedom to pursue their own ideas than their HEI counterparts do, but dedicated researchers in entrepreneurship are still rare in the Lithuanian system. Building relationships in entrepreneurial research is an important way to improve relevancy.

Lithuania demonstrated real strength in collaboration with public partners, including regional governments. There are opportunities to deepen collaboration with the private sector, so that the institutions' efforts are not simply seen as outsourced research. For Lithuanian HEIs to realise their full potential, they will need to move beyond individual good practice to embedding long-term knowledge exchange and collaboration (KEC) activities in the institutional culture. This includes professionalising the roles of those working in the field of engagement and conducting monitoring and evaluation. More specialisation and skills would also help diversify the kinds of collaboration they undertake. Lithuanian HEIs demonstrated that they are adopting a new culture of collaboration that is increasingly looking beyond economic drivers to KEC activities, and considering activities that can benefit communities and society as a whole.

A cultural shift was also required in optimising the potential of digital tools. Before the outbreak of the COVID-19 pandemic, there were low levels of digital teaching undertaken by Lithuanian HEIs, and most institutions reported that they had no online students. Nonetheless, they were able to shift successfully to online learning to finish the academic year 2020, and have continued blended learning in the 2020/21 academic term. Beyond the classroom, HEIs can play an important role as an innovator of digital transformation and as a hub to improve capacity of the wider entrepreneurial ecosystem. This was an area of particular strength in Lithuania, and the institutions interviewed shared a number of significant examples of the ways HEIs can support digital capacity in their networks and ecosystems. Despite their success, Lithuanian HEIs have expressed reservations about relying on digital teaching, in the long term.

HEIs and RIs described a strategic commitment to becoming more entrepreneurial. Being more entrepreneurial will allow HEIs to align their strategies and activities with the practical needs of society. They see themselves as playing a role in the so-called “triple helix” of government, education and industry, as they work to create economic, social and cultural value in Lithuania. A process of organisational transformation of HEIs and RIs will be needed to build and develop the capacity for innovation and entrepreneurship.

The report includes a number of considerations for next steps, for both policy makers and for HEIs. Box 1, below, displays these recommendations. The main points can be summarised as follows. First, HEIs should take steps to ensure that entrepreneurial teaching is offered and tailored to all HE students, from the undergraduate to the doctoral level. A diversity of approaches should be encouraged and applied as far as possible. Secondly, HEIs should increase the numbers of dedicated professionals who can take on the role of “knowledge brokers” or “linkage agents”. These brokers should be supported to have the training and time to build a shared understanding of successful knowledge exchange and collaboration, and to provide advice and practical support for HEI practitioners and their collaborators. Thirdly, to enhance digitally enabled teaching, HEIs should adopt a “pedagogy-first” approach that includes digitally-enabled teaching as a part of course design, rather than as a replacement for face-to-face teaching. Lastly, policy makers should work with organisations in Lithuania and Europe to establish a set of key performance indicators.

Box 1. List of considerations, organised by theme

This box lists the recommendations provided in the HEInnovate review of Lithuania. The recommendations are organised per HEInnovate dimension.

Entrepreneurial Teaching and Learning

- Policy makers at every level should acknowledge and support entrepreneurial teaching and learning.
- Policy makers should take steps to support entrepreneurship as an academic subject, and not only with the aim of establishing new firms.
- Policy makers should build on the informal knowledge sharing that is already occurring between a number of institutions.
- HEIs should make efforts to link their entrepreneurial teaching and learning to research activities in the field.
- HEIs should encourage the practice of international influence, including helping to enlist teachers who have participated in international exchanges to share what they have learned about entrepreneurial teaching practices.
- HEIs should take steps to ensure that entrepreneurial teaching is addressed and tailored to all HE students, from the undergraduate to the doctoral level. A diversity of approaches should be encouraged and applied as far as possible.
- HEIs and RIs should advocate for entrepreneurship teaching at the national level.

Knowledge Exchange and Collaboration

- Policy makers should reduce the fragmentation of national science support schemes to reduce difficulties for HEIs and their collaborators to meet the various eligibility, legislative and monitoring requirements.
- Policy makers can encourage embedding knowledge exchange in HEIs and RIs through structural and informal mechanisms and through meaningful discourse with HEIs and with their collaborators.
- The evaluation of knowledge exchange should be developed at the system and institutional level. Policy makers should take a leadership role to support a culture of evaluation, where HEIs actively and consistently reflect on what they want their KEC activities to achieve and how to assess their outcomes.
- HEIs should consider how to strategically widen KEC activity to promote a rewarding exchange of ideas, research, expertise and resources. Knowledge exchange and collaboration among researchers, businesses, public actors and civic communities requires a clear shared understanding of HEIs' roles in society.

Digital Capacity and Transformation

- Policy makers should ensure that institutions have the necessary frameworks to support digital transformation. In particular, in teaching, policy makers should consider targeted funding to support the development of teacher skills in digital pedagogy.
- Policy makers can help to create the conditions to maximise the benefit of open access and open science in Lithuania.
- Institutions should work on adopting the shifts in culture and mind-set to enable digital transformation.
- In the area of teaching, HEIs should consider moving on from a pedagogy-first approach, and consider digitally enabled teaching a part of course design, rather than a replacement for face-to-face teaching.
- As for supporting the wider ecosystems, the HEIs and RIs should continue to increase their activities supporting Lithuania's wider entrepreneurial and innovation agenda.

Organisation Capacity: Funding, Staff, Incentives

- Policy makers should work with organisations in Lithuania and Europe to establish a set of key performance indicators that would allow for a robust approach to benchmarking. This could help promote current entrepreneurial strengths, identify institutional comparators, ensure that any weaknesses are identified, create effective targets for improvement, strengthen institutional identity and ultimately enhance the international reputation of Lithuanian higher education and research.
- HEIs and RIs should maintain their efforts to diversify income through third-stream activities.
- HEIs and RIs should increase their efforts to promote the benefits of diversity and equal opportunity as a means of increasing organisational capacity and securing the long-term sustainability of HE and research.
- If HEIs and RIs are to achieve their stated aim of becoming more entrepreneurial, they should do more to address issues of efficiency, productivity and value for money. Institutions should ensure that their organisation-wide action plans can deliver improvements in the capacity for entrepreneurship and innovation.

- HEIs and RIs should strengthen their capacity for organisational transformation by making use of research literature, case studies and by learning from other exemplary organisations. However, each organisation will need to devise its own approach to its “entrepreneurial journey” and define what entrepreneurship means in relation to its own history, location, resources and future strategy.

1 Overview of higher education and innovation systems in Lithuania

The Lithuanian government has been reforming and strengthening its higher education and innovation systems. Most recently, it has taken steps to improve the salaries of teachers and researchers, although they remain lower than European averages. Higher education leaders responded engagement with all aspects of the HEInnovate framework, but there are areas where best practice is not yet embedded.

The higher education system in Lithuania

Since 2000, the Lithuanian higher education system has been split between universities and colleges, with the difference being that universities can award bachelor's, master's and doctoral degrees, while colleges award only professional bachelor's degrees. Both universities and colleges can also offer non-degree-granting studies. While the majority of students are enrolled at universities, the share of college graduates has been increasing. Lithuania currently has 38 recognised higher education institutions (HEIs). Eleven of these are public universities, 6 are private, 12 are public colleges, 9 are private colleges, and one is a branch of a Polish university.

Higher education in Lithuania is governed by the Law on Higher Education and Research, which states:

“The Lithuanian policy on higher education and research guarantees the quality of higher education and research, equal access to higher education for all citizens and favourable conditions for the best of them to conduct their research, and to seek academic and creative perfection; the said policy ensures that the system of higher education and research satisfies the demands of society and the economy, and supports its openness and integration in the international sphere of higher education and research.”

This law covers the key areas of:

- state regulation of science for research and teaching
- principles of quality assurance for research and teaching
- the legal basis for the establishment, termination and reorganisation of HEIs and research institutions (RIs)
- the awarding of higher education qualifications
- the management, organisation and supervision of HEIs and RIs
- the rights and obligations of academic staff and students
- principles of management, use and disposal of the property of public HEIs and RIs.

Higher education regulations are drafted by the government. They cover funding including allocation of funds, normative costs, support/scholarships for students, loan administration and compensation, research and development, or research & development (R&D), funds, as well as the issuance of study permits.

The Centre for Quality Assessment in Higher Education (SKVC) is responsible for the implementation of these regulations. The SKVC is an independent public body, whose activities include:

- evaluation of secondary and higher education acquired abroad
- providing information about higher education studies in Lithuania and abroad
- encouraging higher education institutions to improve the quality of studies
- preparation of draft legal acts relating to research and education.

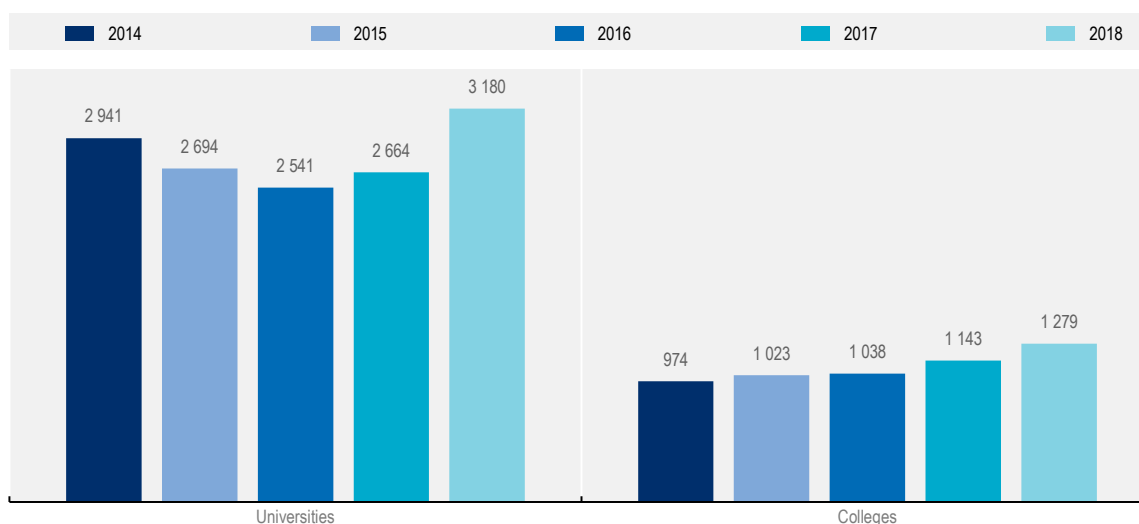
Alongside the regulation and the SKVC, the Ministry of Education, Science and Sport can also issue Ministerial Orders to HEIs. These typically cover procedures for the organisation of study, including assessment, admission, descriptions of study fields, general requirements for programs and the classification of fields.

Since 2017, the Lithuanian government has made efforts to improve the efficiency of the higher education sector. The reform plan originally envisioned a reorganisation and consolidation of the university network, which ultimately did not take place, due to resistance to mergers in the HE sector. While a government review of HE study programmes was not completed, the number of HE programmes has been declining, due to cost-effectiveness requirements. In 2019, students were offered the choice of 614 undergraduate study programmes (down from 768 in 2017).

Funding for higher education

Lithuanian public spending on HEIs on a per-student basis is one of the lowest in Europe. Teaching is funded on a per-student basis, with the Ministry providing EUR 3 700 per university student and EUR 1 500 per college student. In addition to the state-funded places allocated to school leavers who satisfy the higher education entry requirements each year, HEIs can also accept self-funded students, both from Lithuania and abroad.

Figure 1.1. State spending per student (in EUR) – bachelor's to doctoral programmes



Source: (Ministry of Education of Lithuania, 2020^[11])

In 2016, there was a sharp decrease in funding of HEIs. Government funding fell by 11% and project funds by 72%. The Lithuanian government attributed this decline to changes in European Union (EU) Structural Funds. There has since been a rebound. In 2019, the revenues of the HE sector increased by 9% more than in 2018, but overall, funding was 4% less than in it was in 2016. Specific focus has been paid to increasing teachers' salaries, and in 2020, the Lithuanian government increased salaries by an average of 10% more than the previous year. In particular, in colleges, the government has also increased the funding for skills that are in demand, in information technology, engineering and technology. However, these priority areas are undersubscribed, with a significant number of places unfilled.

Students and staff in higher education

Lithuania has one of the highest rates of higher education graduates. Fifty-six percent of permanent residents in Lithuania of between 25 and 34 have a higher education qualification, the second highest in Europe after Ireland. The rate of employment of Lithuanian HE graduates is also above the European average, with 87.6% of graduates in employment three years after graduation, compared to the EU average of 85.3% in 2019. However, there is evidence of a skills mismatch. One year after graduation, only 42% of graduates with bachelor's degrees and 30% of college graduates are in highly skilled employment.

The number of HE students in Lithuania, however, has been declining for the past five years, reflecting both the decreasing number of secondary school students as well as an effort on behalf of the Lithuanian government to raise the entry requirements for higher education.

Lithuanian HEIs have three times more administrative staff members than academic staff, and this administrative apparatus is one of the largest in EU countries. While the need for administrative staff to support internationalisation, technology transfer and other functions is growing, there are also concerns about the declining numbers of teachers and researchers.

Research and innovation framework

Most R&D activities in Lithuania take place within public universities and R&D institutions and depend on public funding. Universities focus on basic, curiosity-driven research, while research institutions focus on applied research. However, the current laws only allow HEIs to have spin-off companies. In 2010, a reorganisation of the research institutes, both in HEIs and beyond, led to significant consolidation.

The Agency for Science, Innovation and Technology (MITA) is the main governmental institution responsible for implementing innovation policy in Lithuania. MITA provides services free of charge for clients from business, science and the public sector, and is interested in the possibilities for developing strong co-operative relationships with international partners, as well as for attracting financial support for research and innovation projects. Its main task is the co-ordination of national activities and international programmes, research, technological development and innovation and other financial schemes (innovation vouchers, protection of industrial property rights). MITA provides national financial support for project participants. It also promotes business and science co-operation, commercialisation of research and the protection of intellectual property rights.

In 2012, Lithuania began working on its Smart Specialisation strategy, which was approved by the European Commission (EC) in 2015. Public investment focuses on research, and innovation has been oriented to focus on this strategy for smart specialisation (RIS3) priorities, which represent industry sectors that account for 23.5% of Lithuania's gross domestic product (GDP). To increase investment efficiency and reduce the administrative burden, the RIS3 strategy was revised in 2019. The separate S3 action plans were consolidated into a single plan, and its 20 thematic areas were concentrated to seven priorities (EC, 2020^[2]).

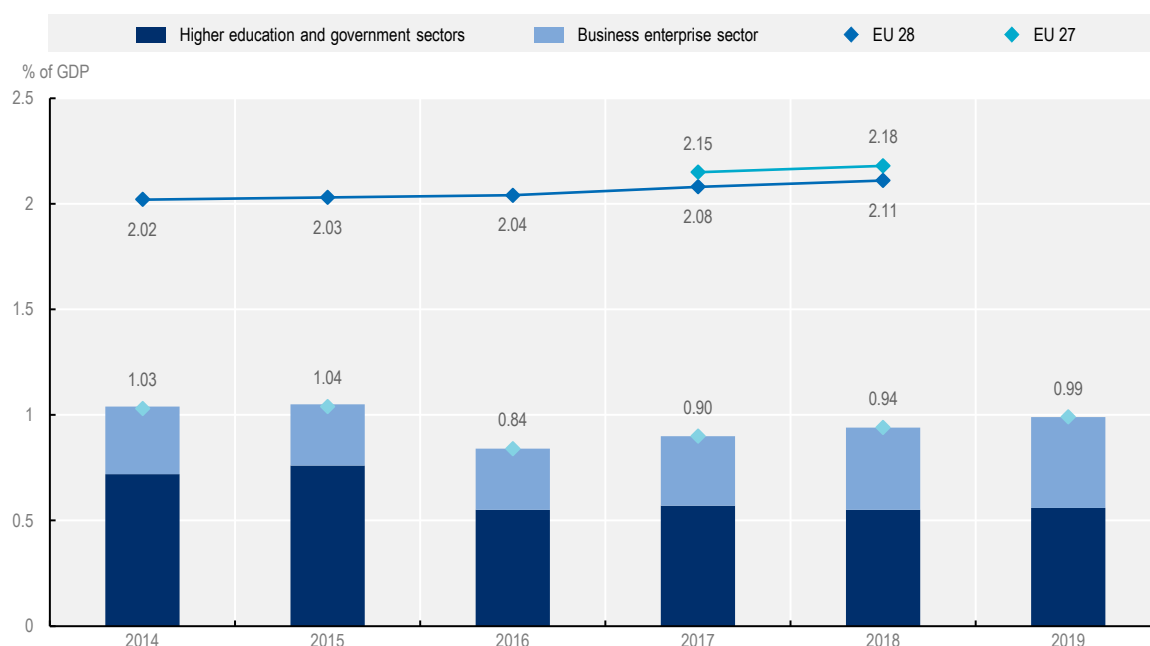
Innovation funding

In 2018, Lithuania's total R&D expenditure amounted to 0.88% of GDP (EUR 396.8 million), of which 0.55% was spent in higher education and government sectors and 0.33% was spent in the business sector. Trends over the last five years indicate that Lithuania is unlikely to reach its strategic goal for 2020 of 1.9% of GDP expenditure on R&D.

R&D in the higher education and government sectors is largely financed by government funds. In 2018, only 14% came from business or private not-for-profit organisations. However, public funding for R&D is fragmented and heavily dependent on the EU Structural Funds (SF). In 2019, 40% of the state budget expenditure for R&D came from the EU funds. Fluctuations in funding for R&D in Lithuania, especially in the higher education sector, have been significantly influenced by the cycles of the EU Structural Funds.

This reliance on EU funding also drives the types of investments in R&D in Lithuania. Investment in fixed tangible assets has fallen from EUR 131.5 million in 2015 to EUR 69.2 million in 2019. This reflects the fact that in the current EU SF period, the focus is not directly on R&D infrastructure design and development, although this opportunity is provided in addition to other project activities. In contrast to the structural funds, Lithuania's researchers appear to be underutilising the funding opportunities offered by the EU Horizon 2020 program. Lithuania ranks 25th in terms of participation and 27th among the EU countries in funding received.

Figure 1.2. Total R&D expenditure as a percentage of GDP



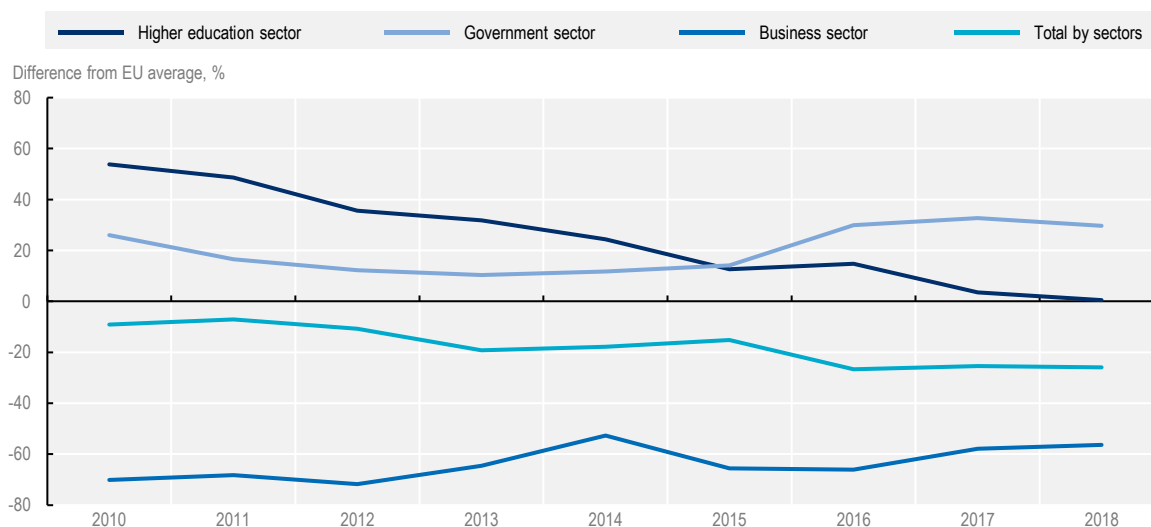
Source: Juozapaitienė, R. et al. (2019^[31]), *Review of the Lithuanian Innovation Ecosystem*, STRATA.

In 2015, the Lithuanian government introduced a new approach to assessing publicly funded R&D activities. Drawing on international best practice, it is based on an independent expert assessment of the R&D activities of HEIs and RIs. The experts assessed the research output and self-analysis questionnaires submitted by the institutions and also met with the administration, researchers and doctoral students of departments. This approach was further revised in 2017, and was broken into an annual, paper-based assessment and a comparative expert assessment every five years. This new approach also included stronger links to funding, with the results of the comparative expert assessment of R&D activities accounting for 60% of the budget and the remaining 40% being allocated based on the results of the annual formal assessment.

Research staff

The number of personnel employed full-time in R&D grew by almost 10% over the period 2015 to 2018, largely driven by the 41% increase in the number of researchers employed in the business sector. However, 70% of researchers in Lithuania are still paid from public funds. Since 2012, the number of researchers employed in the HE sector has fallen by almost 18%. Financial incentives (mainly from EU funds) for investments in research from 2007 onwards are likely to have had an impact on the increase in researchers in the business sector.

Despite efforts to increase the wages of researchers and teachers in the Lithuanian public sector, researchers express low satisfaction with the level of their salaries. A survey of working conditions of researchers conducted by STRATA (which involves strategic analysis of specific political issues) in 2020 revealed that, despite rapid wage growth, satisfaction of the country's researchers with the wage they receive is low.

Figure 1.3. Number of researchers in Lithuania by sector

Source: OECD calculations based on Juozapaitienė, R. et al. (2019^[3]), *Review of the Lithuanian Innovation Ecosystem*, STRATA.

Impact of research in Lithuania

In the past decade, the number of publications by Lithuanian researchers in Web of Science database has continued to grow year on year. However, they still produce only a small number of international publications, and they rank 21st in the EU. The situation appears in a better light when calculating joint publications with businesses, in terms of which Lithuania ranks in 11th place in the EU and in eighth place in terms of works published in open access journals.

In a 2018 government survey of 30 Lithuanian HEIs and RIs, researchers reported that the challenges to publishing in high-level papers include: 1) underdeveloped international co-authorship; 2) the lengthy process of preparation for publication; 3) the high cost of preparing a high-level publication; 4) the lack of high-level journals on the subject under investigation; and 5) the complications of publishing in publications attributed to prestigious databases.

In the context of the changing demographics, long-term reform programmes and consolidation efforts, the OECD and the European Commission decided to undertake the HEInnovate Review. Details on the review can be found in Box 1.1 below.

Box 1.1. HEInnovate Review of Lithuania

To support policy makers and HEI leaders, the OECD and the European Commission have jointly developed HEInnovate, a guiding framework to support HEIs in the development of their innovative and entrepreneurial capacities.

HEInnovate includes eight dimensions:

- Governance
- Organisational Capacity: Funding, People, Incentives
- Entrepreneurial Teaching and Learning
- Preparing and Supporting Entrepreneurs

- Knowledge Exchange and Collaboration
- Digital Capacity and Transformation
- The Internationalised institution
- Measuring Impact.

HEInnovate includes a self-assessment tool for HEIs, as well as the Policy Learning Network. The Country Reviews constitute a third strand of work. 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 Lithuania is rooted in the priorities of the Lithuanian national authorities, focusing on four key dimensions: Knowledge Exchange and Collaboration; Digital Transformation and Capabilities; Organisational Capacity: Funding, People, Incentives, and Entrepreneurial Teaching and Learning.

Lithuania also nominated ten case institutions to be interviewed for the review. These institutions were:

- *Vilniaus universitetas* (Vilnius University)
- *Kauno technologijos universitetas* (Kaunas University of Technology)
- *Lietuvos sveikatos mokslų universitetas* (Lithuanian University of Health Sciences)
- *Klaipėdos universitetas* (Klaipėda University)
- *Vilniaus dailės akademija* (Vilnius Academy of Arts)
- *Fizinių ir technologijos mokslų centras*, FTMC (Centre for Physical Sciences and Technology)
- *Lietuvos agrarinių ir miškų mokslų centras*, LAMMC (Lithuanian Research Centre for Agriculture and Forestry)
- *Lietuvos energetikos institutas*, LEI (Lithuanian Energy Institute)
- *Vilniaus kolegija*, VIKO (Vilnius University of Applied Sciences)
- *Kauno technikos kolegija* (Kaunas University of Applied Engineering Sciences).

At the request of the Lithuanian Ministry of Education, Science and Sport, the case study institutions included three Research Institutions, which share many of the teaching, research missions as HEIs, although focused primarily on practical research and PhD education. This HEInnovate Country Review, and the country review for Greece, include research institutions for the first time in an HEInnovate review.

Due to the COVID-19 pandemic, the OECD, EC and expert team not able to visit Lithuania. The review was conducted through video interviews and a survey of HE Leaders. The authors are grateful for the support and flexibility of Lithuanian colleagues in facilitating and supporting this assessment.

Results of the HE Leader's Survey

As part of the HEInnovate country reviews, the Lithuanian government administered an online HE leaders' survey on behalf of the OECD, to senior management of HEIs and RIs. The survey included questions on seven of the eight dimensions of the HEInnovate framework. (Entrepreneurial Teaching and Learning was assessed through an Entrepreneurship Education Survey of students administered separately, and the results will be discussed in the relevant chapter below.) The HE leaders survey does not replicate the HEInnovate Self-Assessment tool, and focuses on gathering factual descriptions of practices in HEIs and RIs.

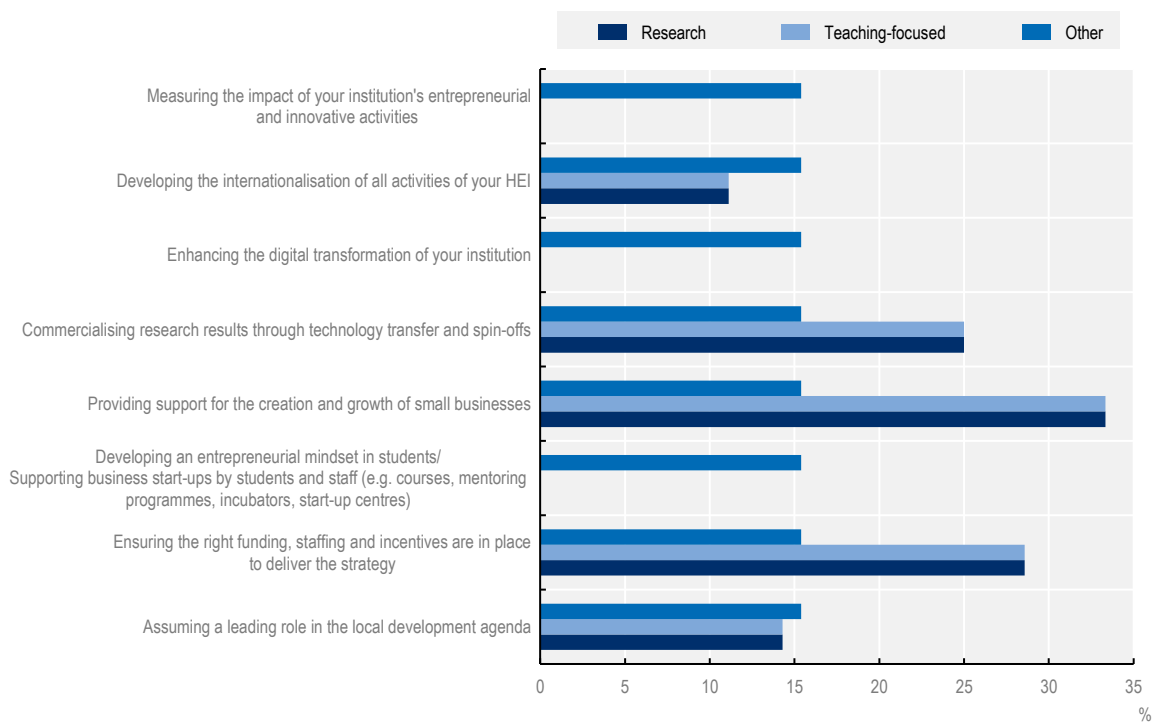
Consistent with past HEInnovate Country Reviews, the response rate was relatively low, with 10 out of a possible 38 institutions responding. The responses were anonymous, but based on the questions about funding for teaching and research; there were responses from both HEIs and RIs. It is worth noting that none of the respondents had completed an HEInnovate Self-Assessment.

Governance

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

All the respondents reported having an institutional strategy, with the majority also positively reporting that their strategy included a specific focus on areas of innovation and entrepreneurship. The lower priority placed on creating an entrepreneurial mindset is consistent with the response to another question in the survey, since only 50% of respondents identified entrepreneurship as relevant to their organisation.

Figure 1.4. Elements of the HEIs’ strategy



Source: Authors’ elaboration based on OECD (2021^[4]), *HEI Leaders Survey of Lithuania*, Unpublished, OECD, Paris.

Another positive sign from the respondents concerned the makeup of their governing boards. All respondents confirmed that their governing bodies included external representation, and 70% included representation from business. This offers important opportunities for HEIs to ensure that their organisations are relevant to their wider entrepreneurial ecosystem.

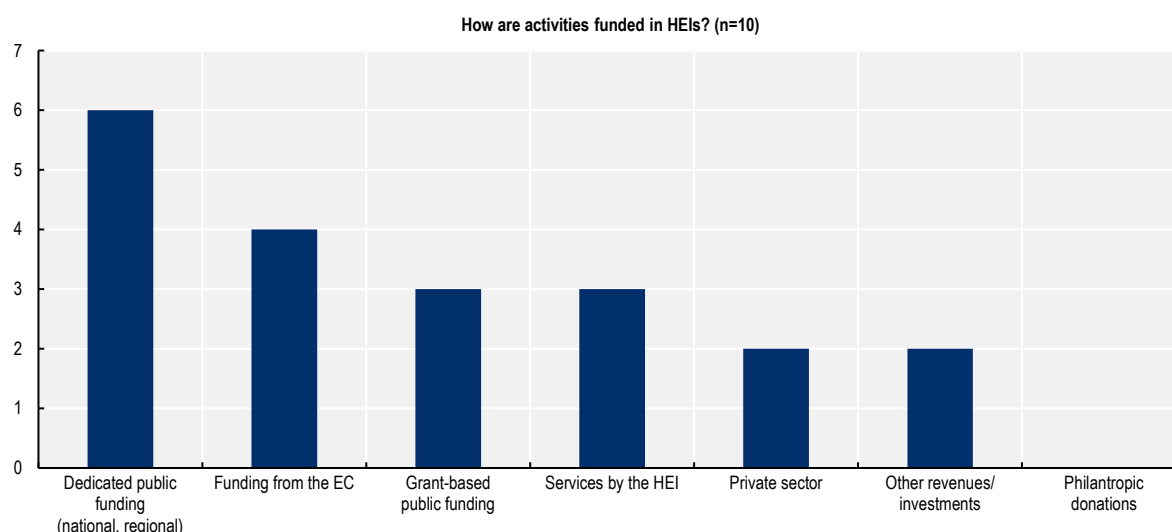
Organisational Capacity: Funding, People, Incentives

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

All the respondents to the survey reported that their institution had staff dedicated to the commercialisation of research and 60% of respondents confirmed they had dedicated staff for supporting entrepreneurial skills. (This may reflect the fact that research institutes do not focus on teaching.)

Figure 1.5. Incentives for staff to undertake innovation and entrepreneurship activities



Source: Authors' elaboration based on OECD (2021^[4]), *HEI Leaders Survey of Lithuania*, Unpublished, OECD, Paris.

Of the respondents, 80% confirmed that they offered incentives for staff to undertake innovation and entrepreneurial activities. This mainly took the form of financial incentives, although it was also a factor considered in promotion.

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 importantly, finding team members and acquiring access to appropriate funds and effective networks.

Of the respondents, 60% stated that they undertake activities to support start-up creation and growth. The target audience of the support varied, and interestingly, administrative staff ranked the highest. Only 20% of respondents, however, are targeting entrepreneurship to alumni.

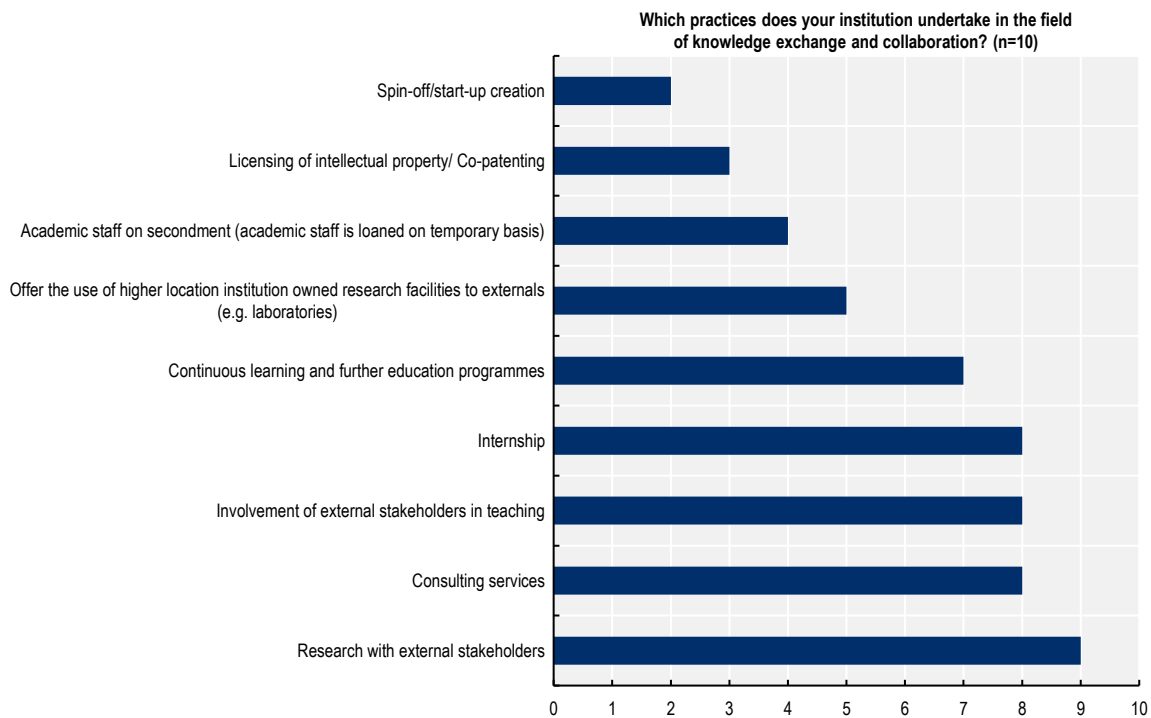
Knowledge Exchange and Collaboration

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.

All but one respondent confirmed that they undertook knowledge-exchange practices. The most common practices were those that related to the traditional missions of HEIs, of specific research and teaching. Opportunity for growth is apparent in a number of areas relevant to knowledge exchange, in particular on

leveraging infrastructure and supporting the wider entrepreneurial ecosystem through co-patenting and start-up creation.

Figure 1.6. Knowledge-exchange practices



Source: Authors' elaboration based on OECD (2021^[4]), *HEI Leaders Survey of Lithuania*, Unpublished, OECD, Paris.

Digital Capacity and Transformation

HEIs already deploy digital technologies, but their uptake and integration varies among institutions. HEIs should make the most of the opportunities presented by digital transformation and consider digital technologies as a key asset.

Of the respondents, 90% confirmed that they will be investing in digital technology and systems after the COVID-19 pandemic. (The other organisation replied that the question was not applicable.) Those planning on investing reported that investment in tools, upskilling staff and developing new platforms were the chief priorities, highlighting the specific gaps that have been brought to light by the pandemic.

The Internationalised Institution

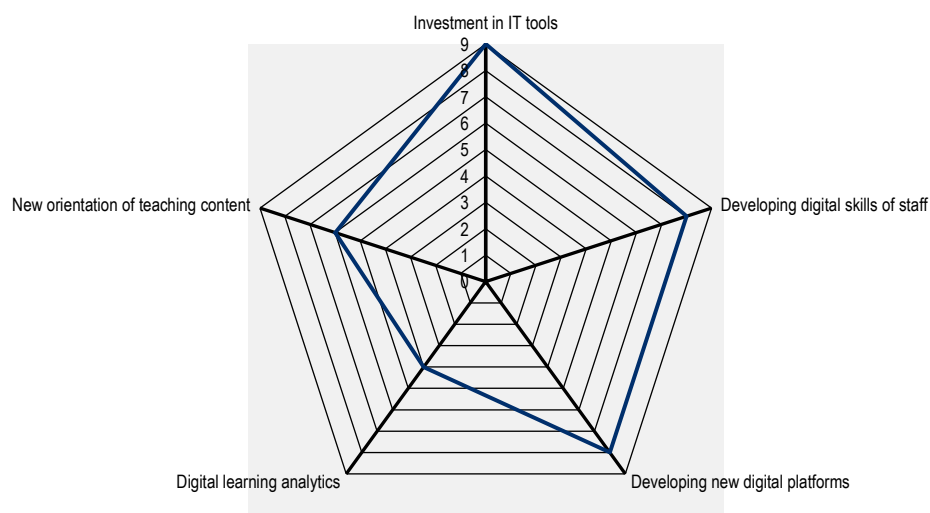
Internationalisation is the process of integrating an international or global dimension into the design and delivery of education, research, and knowledge exchange. Internationalisation is not an end in itself, but a vehicle for change and improvement. It introduces alternative ways of thinking, questions traditional teaching methods, and opens up governance and management to external stakeholders.

Respondents had a positive response rate concerning internationalisation activities, 70% reporting that they undertake research collaboration outside the EU, and 80% that they collaborate on research with EU partners. Exchange activities were also very popular for both staff-exchange activities (80% of respondents) and student exchanges (90% of respondents). Only one respondent did not undertake any international activities.

Of the respondents, 40% confirmed that their internationalisation specifically supported their entrepreneurship activities.

Figure 1.7. Areas of digital investment post-pandemic,

N=10



Source: Authors' elaboration based on OECD (2021^[4]), *HEI Leaders Survey of Lithuania*, Unpublished, OECD, Paris.

Measuring Impact

Entrepreneurial and 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.

All but one respondent assessed their knowledge exchange and collaboration activities, and 80% of respondents relied either on quantitative measures or a combination of quantitative and qualitative metrics.

The most common metrics used concerned the number of interactions with stakeholders, with 70% of respondents reporting they use that as a measurement tool. 50% of respondents monitored the number of patents and licenses, and 40% measured the number of students in entrepreneurship courses.

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2 Entrepreneurial Teaching and Learning

The teaching of entrepreneurship is a recent development in Lithuania, and the HEIs interviewed in Lithuania are actively engaged in informal and extracurricular activities aiming to increase entrepreneurial learning. There remain areas for improvement, including more entrepreneurship courses for doctoral students and to more peer-learning to deepen expertise in teaching entrepreneurship.

Introduction

Lithuania has seen a dramatic improvement in entrepreneurial teaching and learning over the past decade, although there remain areas for improvement and further embedding of entrepreneurship and innovation teaching.

Entrepreneurial teaching and learning involve exploring innovative teaching methods and finding ways to stimulate an entrepreneurial mindset. It is not simply involve learning about entrepreneurship; the goal is to expose students to entrepreneurial experiences so that they can acquire the skills and competences to develop an entrepreneurial mindset, for and through entrepreneurship.

Faced with the current economic challenges, many governments are making efforts to stimulate entrepreneurial activity (European Commission, 2008^[1]). Most agree that education is a useful tool (Aronsson, 2004^[2]; Lyons and Zhang, 2018^[3]) and that university programs should aim to develop the capacity and mindset for entrepreneurial endeavour (Rasmussen and Sørheim, 2006^[4]; Bosman and Fernhaber, 2017^[5]). The skills developed in an academic education, including a broad understanding of the economy, help to prepare these entrepreneurs to coordinate high-growth firms and become responsible for job creation on a large scale (Klofsten and Jones-Evans, 2013^[6]). An academic education that provides additional skills, new business models and in-the-field exposure prepares entrepreneurs for promoting innovation at advanced levels (Minniti and Lévesque, 2008^[7]).

Studies of Lithuania have found that the topic of entrepreneurship has only recently been considered, mainly as part of study programmes on management (Zuperka, Simanskiene and Zuperkiene, 2017^[8]). In addition, Kazakeviciute, Urbone and Petraite (2016^[9]) found the country to be below the EU average in recognising business opportunities and above average in fear of failure and of entrepreneurial intentions.

Box 2.1. Entrepreneurial Teaching and Learning in the HEInnovate Framework

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

The dimension is identified as having the following five characteristics:

1. The HEI provides diverse formal learning opportunities to develop entrepreneurial mindsets and skills.
2. The HEI provides diverse informal learning opportunities and experiences to stimulate the development of entrepreneurial mindsets and skills.
3. The HEI validates entrepreneurial learning outcomes which drives the design and execution of the entrepreneurial curriculum.
4. The HEI co-designs and delivers the curriculum with external stakeholders.
5. Results of entrepreneurship research are integrated into the entrepreneurial education offer.

Source: HEInnovate (n.d.^[10]), *Home Page*, <https://heinnovate.eu>. Access: 7 Oct 2021

Entrepreneurship education in higher education institutions

In the past two decades, entrepreneurship education and the number of courses offered have experienced exponential growth, as governments and policy makers have shown a growing interest in the role that entrepreneurship can play as a catalyst for both economic and social development (Valerio, Parton and Robb, 2014^[11])

Discussions in the past few decades have been dominated by a focus on different aspects of entrepreneurship education, as well as of identifying who would benefit most or might be most suited to becoming an entrepreneur (Landstrom et al., 2021^[12]). Whether entrepreneurship could or could not be taught was an issue raised in the early stages of the debate by (Drucker and Noel, 1986^[13]). He contended that entrepreneurship is a discipline like any other and that it can be learned and taught in a traditional education system. The modern view of entrepreneurship education holds that entrepreneurship is a skill that can be learned through training and education (Fayolle and Gailly, 2008^[14]; Klofsten, Jones-Evans and Pereira, 2021^[15]). Consensus has emerged that entrepreneurship education should not be confused with general education in economics and business (Kirby, 2004^[16]). Entrepreneurship is not about administering organisations or maintaining the status quo, but about change through experimentation and creativity (Politis, 2005^[17]; Norrman et al., 2014^[18]).

Recent research shows that there is a consensus that entrepreneurship can be taught, and the debate has now shifted to what should be taught and how it should be carried out (Gerba, 2012^[19]). Entrepreneurship education should facilitate and encourage an entrepreneurial mindset, as well as building entrepreneurial knowledge, skills and ability. The aims of entrepreneurship education may seem promising, but implementing it has proved challenging (Kazakeviciute, Urbone and Petraite, 2016^[9]). There is no one best way to teach entrepreneurship, nor should there be. The way to teach entrepreneurship should be an alignment between five interrelated factors: 1) the objectives, 2) the students, 3) the assessment, 4) the content, and 5) the pedagogy (Fayolle and Gailly, 2008^[14]). The methods and pedagogy for teaching entrepreneurship in a particular course are determined after all other four factors have been clarified. A large difference separates teaching entrepreneurship as a compulsory course to a large group of undergraduate students, with the aim of raising their awareness of entrepreneurship, and instructing a small group of graduate students who have chosen to pursue entrepreneurship and are already engaged in nascent entrepreneurship (Kjos Longva, 2019^[20]). Since there is no one best way to teach entrepreneurship, the education needs to be tailored to the context it is delivered in (Kjos Longva, 2019^[20]). This involves talking about learning “about”, “for” and “through” entrepreneurship (c.f. (Gibb, 1987^[21]), (Klofsten, 2000^[22]; Fayolle and Gailly, 2008^[14])).

Learning about entrepreneurship

The content of entrepreneurship education is related to traditional pedagogic forms of educational practice, and these approaches are usually driven by the desire to create awareness (Henry, Hill and Leitch, 2005^[23]). Pittaway and Edwards (2012^[24]), found that learning about entrepreneurship was the primary approach in 59% of the 117 US and UK courses they examined. The approach is theoretical in its form and explores, for example, what entrepreneurs do, why they do it, and the implications of entrepreneurship for the economy and society (Johansen and Schanke, 2013^[25]; Lackéus, 2015^[26]). Learning about myths, team roles and theoretical perspectives such as the individual-opportunity nexus (Shane and Venkataraman, 2000^[27]), effectuation (Sarasvathy, 2001^[28]) or bricolage (Baker and Nelson, 2005^[29]) are examples of possible content. The focus is thus on imparting a general understanding of the phenomenon and its implications, emphasising knowledge rather than skills and experience.

Learning for entrepreneurship

The objective of learning for entrepreneurship is to teach participants the practical skills required for starting a business. Courses are often oriented towards the preparation of a business plan (Henry, Hill and Leitch, 2005^[23]). In the study by Pittaway and Edwards (2012^[24]), 27.4% of the courses analysed had learning for entrepreneurship as the primary form of pedagogy. Honig (2004^[30]) found that 78 of top 100 US universities offer courses in business planning in the area of entrepreneurship or small business management. In a business planning course, students typically develop a written document that outlines a new product, service, concept or organisation. The document summarises strategies on marketing, production, operations, financing and organisation, and is often pitched in class or to external judges in business plan competitions. Business plan courses with a process view focus on ideas and see entrepreneurship as a linear process, and have for this reason been criticised for creating a gap between what is taught in entrepreneurship courses and what entrepreneurs do in practice (Kjos Longva, 2019^[20]). Neck and Greene (2011^[31]) claim that students consequently learn less about the practice and the complex, chaotic and nonlinear aspects of entrepreneurship.

Learning through entrepreneurship

Learning through entrepreneurship is receiving increasing attention, and scholars have argued that this ought to be the preferred method of teaching entrepreneurship and the best way of preparing students for entrepreneurship in the real world (Gibb, 1996^[32]; Heinonen and Poikkijoki, 2006^[33]; Neck, Greene and Brush, 2014^[34]). Learning through entrepreneurship entails learning through doing entrepreneurship in practice. This helps students acquire entrepreneurial competencies and skills applicable beyond the entrepreneurial context. Learning through entrepreneurship can take place, for example, through student start-up companies, interdisciplinary practical projects or collaboration with local businesses to solve real-life problems (Johansen and Schanke, 2013^[25]). Since no entrepreneurship education is applicable to every context, it needs to be adapted to the overall objectives of the course and the students participating in it (Fayolle and Gailly, 2008^[14]).

Learning about, for and through entrepreneurship are thus not mutually exclusive, but should rather be thought of as complementary pedagogies that can be present in the same course (Blenker et al., 2011^[35]). The aim is not to choose one or the other, but to build a course with pedagogies that are suited to the particular context it is taught in. It is thus important to understand these different approaches to teaching entrepreneurship, since they are likely to lead to quite different outcomes.

HEIs offer formal learning opportunities to develop entrepreneurial skills

Entrepreneurship as described above can be supported, educated and trained in many different ways. In this section, we present a description and a discussion of activities and practices carried out in diverse formal courses by HEIs in Lithuania, based on the data available. This section considers teaching entrepreneurship at undergraduate, master's and doctoral levels.

Of the case study institutions, the colleges that have formal entrepreneurship education offer the subject at the bachelor level, while only universities have formal entrepreneurship education at all levels. Naturally, research institutes only offer training at the doctoral level. Informal and extracurricular activities are presented later in the chapter.

Undergraduate level

The majority of the interviewed institutions offered some kind of entrepreneurship education at the undergraduate level. There are however, some examples of earlier pilot testing in our interviews with Lithuanian HEIs, in particular the pioneering technology-based entrepreneurship education developed by the Kaunas University of Technology (Kazakeviciute, Urbone and Petraite, 2016^[9]).

The Kaunas University of Technology has a long history of teaching entrepreneurship and has been offering a bachelor's programme in the subject for 30 years. A significant step in the advancement of entrepreneurship education was taken in 2013, when the university introduced the Technology-based Entrepreneurship programme (TE). The curriculum design was inspired by four examples of international "best practices", after the leading university teacher spent time at Stanford University in California.

The design of this programme was based on a comparative analysis of internationally acknowledged entrepreneurship education programmes. Kaunas University of Technology in Lithuania developed a cross-disciplinary and cross-cultural approach to technology entrepreneurship curriculum development for undergraduates at the university. The approach and the method rely on the sequential development of individual, team-based and business skills, which are core entrepreneurship skills. These three levels of competence development build the framework for the curriculum design, and the course focuses on mixed group work, international curriculum design and teaching, and participation in international innovation challenges.

The first course in TE was already implemented in 2013. In the first year, it was completed by 63 students, working in 12 teams. An evaluation of the course showed a positive and in many cases significant change in the development of student knowledge, skills and abilities in TE after taking the course.

The success of the TE course and its approach has led to a continuing development and expansion. Today, around 600 students take the course each year (300 each semester). An interdisciplinary team of teachers (representing eight different areas) participate in the course. Despite its success, the student reactions and evaluations are mixed. The response of different students might be negative or positive, but they often report that although they find it hard initially, they eventually grow to appreciate the skills they develop.

In one of the larger universities, Vilnius University has recently joined the so-called Arqus European University Alliance (<https://www.arqus-alliance.eu/>), which aims to stimulate an entrepreneurial mindset and creativity, reinforce regional engagement, and build on complementary strengths and cross-sectoral collaboration. To run this initiative, the university has used HEInnovate as a facilitation tool. The results of the analysis show that the university is engaged in establishing and sustaining relations with internal and external partners, in order to conduct different entrepreneurship teaching activities. While this exercise showed a positive, high-level commitment to the entrepreneurial agenda, it also made clear that Vilnius University needs to invest more in supporting staff who want to be engaged in entrepreneurial teaching and learning missions.

In the interview, both students and teachers at Vilnius University emphasised the importance of their common elective subject in entrepreneurship. This initiative started in 2013 as an experiment at the university's International Business School, with the aim of promoting creativity, innovation and self-employment. It was based on experiential learning and on three main pillars: the decision to become an entrepreneur, setting up a business and business development. The goal of the common elective subject module is to encourage, stimulate and cultivate students' individual competencies in entrepreneurial activities and their effective engagement in business, by enacting various roles, including an employee, a partner or a co-owner. The study activities are designed as lectures, seminars, as well as individual assignments and teamwork. The aim is to enable the students to accumulate knowledge on a number of key topics, and to develop personal and professional competencies and skills that are critical for entrepreneurial activities, related to creativity, innovativeness, foresight, effective communication,

leadership, influence, business ethics and managing uncertainty. The course is intended for undergraduate students, and about 50 students participate annually.

The Lithuanian University of Health Sciences (LSMU) is offering a similar elective course in biomedical innovation and entrepreneurship for third-year students in the Faculty of Medicine (for Lithuanian and foreign students). About 20 students a year take the course. Its objectives are to develop innovative and entrepreneurial skills based on the transfer of healthcare and biomedical knowledge on an innovative business model. Students are able to identify and develop biomedical business opportunities, and make investment and management decisions, while developing innovative projects. Students analyse the market situation from a clinical as well as a consumer-patient perspective, study national and international regulation challenges and opportunities, and acquire the necessary entrepreneurial and investment competencies to generate and develop a successful business model. They consider the interaction of biomedicine, healthcare and technology with the aim of creating user-patient value at the intersection of healthcare, information and communication technologies, life sciences, pharmaceutical and biotechnology, including personalised healthcare, telemedicine, artificial intelligence and health initiatives, and integrate them into their business plan.

A different approach is taken by the Vilnius University of Applied Sciences (VIKO), in the Creativity and Business Innovation Platform, an initiative of the Faculty of Business Management. The initiative focuses on supporting entrepreneurial individuals to exploit new opportunities and manage change. Participants come from different study programmes and faculties, and about 700 students have taken the course since 2014.

The aim is to develop individual and organisational creativity, originality, expression of free thought, talent, tolerance and flexibility in generating radically new ideas for the problems and challenges presented by business, according to the unique creative platform methodology inspired by a best practice from Denmark.

The course designer shared that one of the benefits of the Creativity Platform is that it eliminates barriers between disciplines, cultures and allows students and lecturers to apply their knowledge without restriction. Elimination of judgement in the process and provision of different stimuli had a clear influence on the participants' fluency and flexibility. Cultural diversity and interdisciplinary knowledge within the groups generate a better result in terms of quantity and quality, and should be continuously used to develop the participant's "soft" skills and to achieve creative and innovative results. Close collaboration with businesses in the process helps students to understand the significance of creativity and entrepreneurship so that they can be ready to innovate.

Both Klaipėda University and Kauno Technikos Kolegija (KTK) have also incorporated entrepreneurship subjects into their undergraduate curricula. Notably, their courses maintain close relationships with firms and entrepreneurs. Vilnius Academy of Arts (VAA) does not offer any entrepreneurship subjects in its formal education, but entrepreneurship is instead encouraged in extracurricular activities.

Master's level

Of the case studies, only two universities had entrepreneurship education programmes at the master's level (Vilnius University and Kaunas University of Technology).

Vilnius University has an MBA in Entrepreneurship, as well as a 60 European Credit Transfer and Accumulation System (ECTS) course that started in 2019, organised by Vilnius University Business School in collaboration with Vilnius University Life Sciences Centre and the National Cancer Institute. The programme is said to be "perfectly balanced for those who are interested in Life Sciences". The course is designed for students with a bachelor's degree and at least three years of business or management work experience, with fluency in English at the B2 level. It is intended for students who are hoping to transform their idea into a business, and for those responsible for product/service development in their organisations. Approximately 10 students take the course annually.

Kaunas Technical University has been preparing to include teaching from real-life entrepreneurs in its master's programme for students in the innovation and management programme. Klaipėda University integrates practical entrepreneurial training at the master's level in collaboration with companies. The Vilnius University of Applied Sciences (VIKO) intends to introduce master's level education in entrepreneurship but has not yet done so.

Entrepreneurship courses for doctoral students

The interviews with case studies found few examples of pure entrepreneurship courses for doctoral students. Vilnius University previously offered a course entitled “Academic Entrepreneurship”, and Kaunas Technical University offers a course called “Knowledge Economy and Innovation” that is partly taught by real-life entrepreneurs. It also offers a more theoretical course at the doctoral level, “Global Knowledge Economy and Innovation”.

The research institute FTMC requires doctoral students to have at least three ECTS in a subject that gives them broader skills. This might include entrepreneurship, innovation or intellectual property rights. These initiatives are in many cases organised by the technology transfer offers, with the help of experts from the surrounding ecosystem, and are in many cases oriented towards utilisation of research ideas. Doctoral students are seen as future employees of the research institute, and entrepreneurship is perceived as a valuable skill. It was noted that doctoral students at research institutes have more freedom to be entrepreneurial and to pursue their own ideas than their university counterparts.

The international arena offers many approaches to teaching entrepreneurship to doctoral students. For example, the “Entrepreneurship in Theory and Practice” course offered by Linköping University in Sweden. Since 2016, more than 200 PhD students have taken the course, attracting students from a broad spectrum of research fields, including management, computer and information sciences, engineering, medical and health sciences, biomedical engineering and social and welfare studies, as well as thematic studies. The course has also led to the creation of a number of start-ups, three of which have attracted a total of EUR 15 million in venture capital. One was recently acquired by Microsoft for EUR 90 million.

Box 2.2. Doctoral course in Entrepreneurship in Theory and Practice at Linköping (Sweden)

This 7.5 ECTS course, which was started in 2006, is organised by the Department of Management and Engineering at Linköping University (LiU).

The course is primarily intended for research students at the Institution for Economic and Industrial Development, but doctoral students in other fields at LiU and from other universities may also apply. The course has enrolled substantial numbers of PhD students over the 15 years of its existence, over 200 in total. The course is an elective and has relied on “market pull” to meet enrolment requirements each year.

By the end of the course, participants are expected to be able to: 1) discuss and reflect on the meaning of entrepreneurship in various settings and situations; 2) formulate, develop and present a business idea for a new firm, organisation, process or project; 3) co-operate with colleagues in other disciplines and fields of research during idea development; and 4) understand how an entrepreneurial approach contributes to the development of each student as a researcher and teacher.

Content:

- entrepreneurship in various contexts and situations
- evaluation of the potential of new ideas and developing growth projects

- marketing and sales of new and different ideas
- protection of ideas (intellectual property rights)
- innovation and entrepreneurial ecosystems: the various kinds of actors, organisations and resources available for promoting the benefits of research
- examples of successful and failed firms
- coaching of teams to support idea development and the drawing up of “business plans”, for which each team meets with an experienced coach for a minimum of two one-hour sessions during the course
- presentation of a “business plan” for commercialisation or development of an idea.

In evaluations of the many courses in entrepreneurship theory in the last 15 years, four key components of good practice in entrepreneurship education have emerged: entrepreneurial teaching must 1) offer inspiration, 2) provide learning tools, 3) assemble boundary-spanning networks and 4) take advantage of interdisciplinarity. Experience shows the importance of balancing theory with practice, in order to attract students from a wide range of science and technology fields.

Source: Klofsten, M., D. Jones-Evans and L. Pereira (2021^[15]), “Teaching science and technology PhD students in entrepreneurship-potential learning opportunities and outcomes”, <http://dx.doi.org/10.1007/s10961-020-09784-8>.

It should also be noted that little research has appeared in the literature on the teaching of entrepreneurship in doctoral programs (Muñoz, Guerra and Mosey, 2020^[36]). As a relatively unexplored area, this contrasts with the large numbers of entrepreneurial doctoral students who, as members of research groups that may have utilised results, may one day be playing vital economic roles (Bienkowska and Klofsten, 2012^[37]). Many doctoral students will be qualified senior researchers and able to exert substantial influence on scientific developments in various ways at universities (Bienkowska, Klofsten and Rasmussen, 2016^[38]). Universities interested in becoming entrepreneurial will find entrepreneurship education models at the doctoral level an essential tool (Klofsten, Jones-Evans and Pereira, 2021^[15]). Such models would not focus solely on new business creation but would also cover a broad range of teaching practices, with settings and aims that include entrepreneurial skills and attitudes (ibid). Students who have completed an entrepreneurship course could become boundary-spanning scholars able to spread entrepreneurship through the university and enhance the entrepreneurial culture (Youtie and Shapira, 2008^[39]). The large number of students now studying and receiving their PhDs in entrepreneurship exceeds the available jobs in academia, making it necessary for them to seek employment outside universities (Brush et al., 2003^[40]). However, the PhD exam itself should be an incentive for them to consider alternative careers as start-up entrepreneurs or as industrial or public sector employees responsible for entrepreneurial activities.

Embedded entrepreneurship education, as shown in the example above, can be incorporated into non-business courses or programmes and helps to provide students with the awareness and experience of entrepreneurship in the context of their own discipline (Pittaway and Cope, 2007^[41]; Pittaway and Edwards, 2012^[24]). In Lithuania, Kazakeviciute, Urbone and Petraite (2016^[9]) suggest that a cross-disciplinary approach to entrepreneurship education is essential to create a diverse teaching team that can design a university-wide curriculum and provide students with both business knowledge (a function of the business school) and with specific contextual knowledge (a function of the engineering school) and industry experience (provided by guest speakers). The application of innovative teaching methods, the cultivation of experience-based learning and new ways to assess progress help to create an environment in which entrepreneurship is not only taught but has an opportunity to flourish (Kazakeviciute, Urbone and Petraite, 2016^[9]).

Results of the Entrepreneurial Student Survey

One innovation of the HEInnovate Review of Lithuania was a survey of students taken entrepreneurial courses, providing them the opportunity to contribute directly to the analysis of the report. There were 38 student responses.

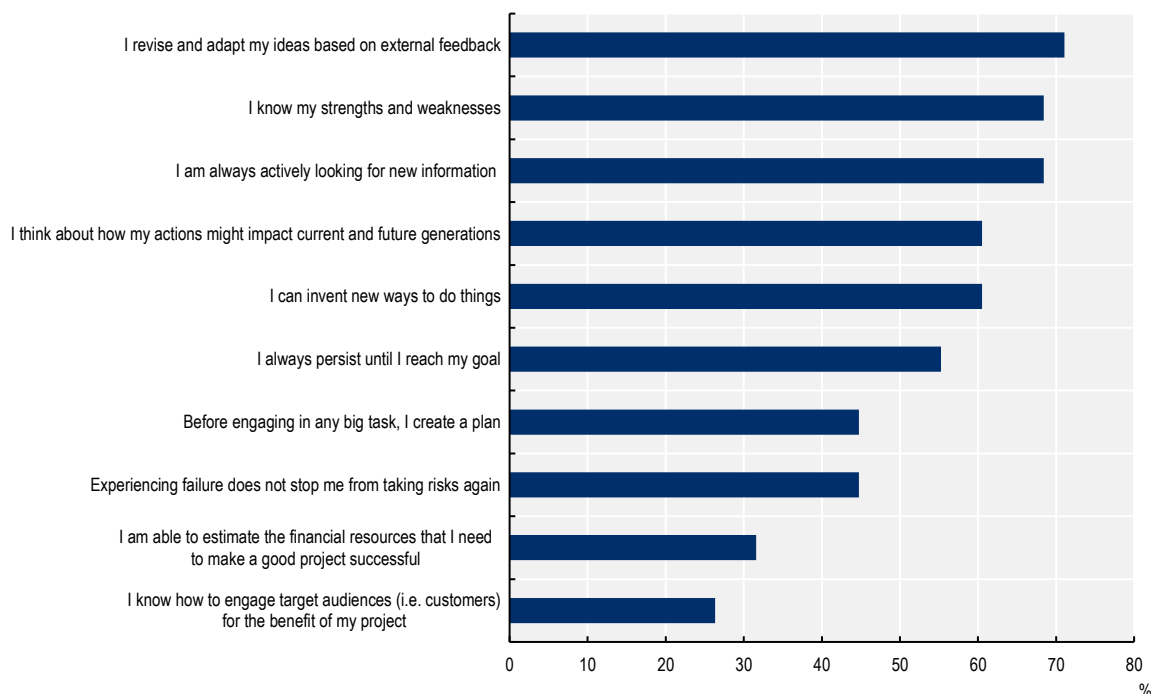
The views of entrepreneurs were broadly positive. Of the respondents, 74% agreed with the statement that “Entrepreneurs create new products and services that benefit many of us”, and 66% agreed with the statement that: “Entrepreneurs are job creators”. Students also reported that their views of entrepreneurship were shaped by the entrepreneurs they were in contact with, with 47% reporting that close family members shaped their views, and 42% stating that close friends did. Only 26% said that university contacts influenced their perspective on entrepreneurship.

However, only 21% of respondents said they had learned about entrepreneurship at the HEI. This probably reflects the limited number of respondents who replied to the survey.

The survey respondents also self-assessed themselves positively against a number of different important entrepreneurship competencies (based on frameworks such as the European Commission’s Entrecomp). The survey draws from existing and validated instruments whenever possible, which measure:

1. the extent to which students report feeling that they are capable of identifying and creating ideas and opportunities,
2. whether they can mobilise internal resources (such as self-awareness and perseverance) and external resources
3. whether they can combine ideas and resources to launch and nurture projects.

Figure 2.1. Students’ self-assessment of their entrepreneurial skills



Source: Authors’ elaboration based on OECD (OECD, 2020^[42]), Entrepreneurial Education Students Survey of Lithuania (Unpublished).

Lithuanian respondents assess themselves most highly with respect to openness to feedback and collaboration, self-awareness and curiosity, with 68% to 71% of respondents saying that they strongly agree or agree that they demonstrate an example of that characteristic. Financial literacy, and networking and mobilising others were assessed at lower rates, at 26% and 32% respectively.

These survey results are preliminary, but demonstrate interesting trends in entrepreneurship education that should be explored more deeply. Lithuania policy makers may want to consider how different survey tools could include student input in the assessment of entrepreneurship education.

Entrepreneurship research should influence entrepreneurial education

To stay current and retain relevancy, an entrepreneurial curriculum must be continuously reviewed and updated. An HEI should, therefore, integrate the results of entrepreneurship research into its teaching. Only a few Lithuanian HEIs have dedicated entrepreneurship researchers on their staff. The only examples in our interviews were in KTU, Klaipėda University and Vilnius University. KTU appears to be the most advanced in integrating entrepreneurship research into entrepreneurship teaching and learning.

KTU is a good example of how entrepreneurship research can be integrated into entrepreneurial education. Its international-quality entrepreneurship research is reflected in teaching and connected to the local environment. Both the Rector and the Vice Rector of the University are determined that entrepreneurship research and education is necessary. Their ambition is to offer entrepreneurship education at all teaching levels, i.e. at the bachelor's, master's and doctoral level, and also across disciplines. A research group of around 15 (associate and assistant) professors, and about 10 PhD students, are active in the field. Full-time teachers normally spend 30% of their time on research. This is accompanied by smaller national research grants, as well as funding in EU Horizon 2020 programmes. KTU also collaborates with other HEIs, both inside (e.g. LSMU and Vilnius University) as well as outside Lithuania (e.g. Hamburg University, Technion University in Haifa, Israel, and the University of California, Berkeley). Entrepreneurship education is considered a “moving target” that continuously needs to be improved.

Klaipėda University's management department has about 20 teachers, but only two in entrepreneurship (including one PhD student). They trust external stakeholders, such as international practitioners, to a relatively high extent.

There were also examples where even HEIs with strong entrepreneurship teaching had a lack of support in research capacity. For instance, Vilnius University has no professor in entrepreneurship, and only one full-time lecturer in entrepreneurship. While she is able to hire practitioners, she is the only entrepreneurship academic in the institution. At one point, two PhD positions were in play, but their funding was discontinued. Entrepreneurship research has had difficulty being accepted as an academic discipline at Vilnius University. Instead, the focus is mainly on creating start-ups.

Rather than engaging entrepreneurship researchers, several HEIs enlist teachers from neighbouring disciplines (e.g. management, small business organisation and marketing) to include entrepreneurship in the curricula. Both VIKO and KTK are examples of HEIs with a deep interest in entrepreneurship education but few dedicated entrepreneurship researchers. In both HEIs, it is most often staff from management disciplines who teach entrepreneurship.

All the HEIs interviewed make use of external stakeholders and practitioners (national as well as international) in their entrepreneurship education. External stakeholders are an important source of expertise that can – and should – be used in entrepreneurial teaching and learning. Regular engagement with external stakeholders encourages long-term collaborative relationships that can also provide useful input for understanding future skills needs. This type of collaboration is common among Lithuanian HEIs. External stakeholders are often involved both in formal credit-based courses and extracurricular learning activities and support services.

Different ways of validating entrepreneurial learning outcomes (for example, internally as well as external accreditation) is an important consideration that drives the design and execution of the entrepreneurial curriculum. An HEI that values entrepreneurial learning commits to regular review, validation and the updating of course content and learning outcomes in all its study programmes. However, only limited evaluation activities of this sort emerged in our review of Lithuanian entrepreneurship education and learning. This is a key area for improvement, possibly linked to the relatively few credit-based specific entrepreneurship courses and the lack of formal recognition of entrepreneurship as a subject. Improving the validation of entrepreneurial learning outcomes could include, for example; 1) collecting and organising the expected entrepreneurial learning outcomes in relation to knowledge, skills and competences in all its education programmes, 2) ensuring that the students understand the entrepreneurial learning outcomes expected and achieved; 3) validating entrepreneurial learning outcomes at the institutional level; as well as 4) acknowledging entrepreneurial learning outcomes in the students' records of accomplishments.

The HEI provides diverse extracurricular and informal learning opportunities

All HEIs interviewed in Lithuania are actively engaged in informal and extracurricular activities aiming to increase entrepreneurial learning. Most of the extracurricular activities focus on start-up activities, often in collaboration with external stakeholders, such as science parks and accelerators. Informal learning also occurs, however, in other aspects of entrepreneurial learning. New Venture competitions are a popular extracurricular activity among Lithuanian HEIs. Especially favoured are different kinds of international venture and/or innovation competitions that involve learning from and visits to other countries. There are also examples of national competitions for Lithuanian HEIs.

One of the biggest challenges for students at Vilnius University is in not seeing or understanding the linkages between their studies and entrepreneurship. While entrepreneurship education is not always fully accepted as an academic subject at the university, several extracurricular activities encourage student start-up activities and learning outside the classroom. Examples include the Vilnius Hackathon, the international competition in Social Entrepreneurship, the Vilnius University Tech Hub and Futurepreneurs.

Entrepreneurial teaching at Klaipėda University involves practice and practical training. It is expected that lecturers will bring their own practical experience into the classroom (e.g. from starting their own business). Management and business education in Klaipėda are linked to entrepreneurship learning, both in practice and in theory. As in many Lithuanian HEIs, start-up programmes and competitions are encouraged. Extracurricular support at Klaipėda Universities includes, for example:

- Start-Up KU, a “100-day incubation programme” created by the business school in collaboration with the student union. The initiative focuses on ideas for new businesses and links student entrepreneurs to mentors for business. Matching students from different faculties to work on one team is also typical.
- The local Science Park offers support, a business simulation game and assists in a competition to pitch business ideas that might obtain funding. It also offers practical seminars.
- Hackathons where students from different faculties are matched into teams of 20 to 30 students are becoming increasingly popular.

Another HEI where student entrepreneurship competitions are popular and have been successful is KTK. Teachers at KTK are interested in entrepreneurship education and learning and consider participating in external competitions a key part of how they deliver entrepreneurial learning. They identified participation in the youth entrepreneurship competition PROFAS as being especially important for informal start-up training for students. Launched in 2007, PROFAS is organised annually by the public institutions PROFAT and Letus. The main financial sponsor of the project is Lithuania's Ministry of Education and Science, and its aim is to develop entrepreneurship learning among Lithuanian college students. PROFAS' program of

events is based on practical training: simulations, complex solutions of business situations and their analysis with the managers of successful companies. The focus of the competition is the development of practical knowledge and skills required for work in business. The aim is to increase students' ability to work in a team, and to communicate more effectively in decision making and exchanging information on business topics. Negotiation and presentation skills are also developed separately.

Students at Lithuanian colleges and their lecturers participate in the competition. The initial selection stage takes place in colleges with the representatives of the public institution PROFAT, selecting the best ideas. PROFAS is attractive in that the project evaluates not only the economic and managerial knowledge of the participants, but also their ability to work in a team, and stimulates young people's enthusiasm and involvement in business. It also helps participants better assess their potential and provides opportunities to enjoy the results of their work. It is very important that representatives of companies also participate in the project.

In September 2016, the follow-up project to PROFAS, Profadienis, was set up, with the aim of showing young people how easy it is to solve business problems and to find creative solutions with the help of an experienced specialist. This project is interesting in that it offers experiential knowledge of the profession or specialisation by introducing situations experienced by the employees of the companies represented, solving the tasks assigned to them, delving into the issues relevant to the people working in such work, and looking for answers. Project partners include SEB Bank; Western Union; the public institution Versli Lietuva; LIMA (the Lithuanian marketing association); the European Institute for Gender Equality; TMD Partners; Emplonet; MB Videography; the business publication Verslo žinios; the radio station Žinių radijas and the European Parliament Liaison Office in Lithuania.

The research institute FTMC offers support for individual PhD students and staff on entrepreneurship (business), innovation and intellectual property rights (IPR) issues. A doctoral education at FTMC includes three ETCS that can be used free of charge for courses such as entrepreneurship, innovation and IPR. There is a big focus on spin-offs, IPR and collaborations with experts from other universities when needed. The support initiatives are organised by the innovation and technology department, sometimes using experts from the surrounding ecosystem. Technology transfer activities are encouraged, and revenue from commercialisation is considered important to the institution. Students have considerable freedom to act and utilise research, and attitudes towards commercialisation and entrepreneurship have become increasingly positive.

Transfer of good practices in HEI entrepreneurial teaching and learning

Many case study institutions described the numerous productive collaborations that universities have with both national partners and foreign organisations. These collaborations have not only inspired the actors to become involved in entrepreneurial teaching but also generated valuable, lasting transfers of knowledge between the actors. The most advanced example among the HEIs interviewed in Lithuania was the transfer of good practices to and from Kaunas University of Technology. Kaunas Technical University is recognised as a leader in Lithuania in this area. LSMU, for example, invited KTU to develop a biomedical programme for its students.

The approach of the KTU Technology-based Entrepreneurship (TE) program is described above. The development of an entrepreneurship education programme for a technology-intensive university is not an easy task. It calls for the sharing and transferring of knowledge from leading competence centres and for the localisation of that knowledge and its appropriate application. The four international "best practices" used by KTU in developing the curriculum demonstrate that TE education requires pedagogical variety, diversified student teams and experiential learning. The KTU TE method is an effort to draw upon best practices developed internationally, and adapt and modify them to accommodate the cultural context of the region.

The curriculum development benefited from the transfer of best practices from leading universities in the field. In the search for best practices, four centres of entrepreneurship education for engineers stood out in the search and selection process.

- Stanford Technology Ventures Programme in the United States
- ETECH Projects at the University of Cambridge in the United Kingdom
- The University of California, Berkeley Method of Entrepreneurship
- The Aalto Ventures Programme at Aalto University in Finland.

Comparison of these four cases supported the KTU teachers in their belief that a new approach to teaching entrepreneurship should contain multiple pedagogical methods, team-based learning and experiential learning. This provided the basis for developing the TE programme at KTU.

The KTU TE method is thus based on research in entrepreneurship education and results from the application and adaptation of internationally acknowledged approaches to entrepreneurship education and innovative teaching methods. It has also laid the groundwork for further TE-oriented programme development both within KTU and for other universities in the region. Examples of this are found in developments both at Vilnius University and at LSMU. Kaunas Technical University is now a recognised leader in Lithuania in this area, and this is used for further transfer of knowledge and best practice.

Policy makers have long been interested in good-practice benchmarking exercises and studies, but it is not always obvious how to make use of these studies, especially when only third-party actors are involved in transferring programmes between actors and regions. Studies on the success factors behind the transfer to industry of various initiatives in entrepreneurship training and teaching have shown that complementarities between the sending and receiving systems are important and should be encouraged through mutual trust, the careful selection of partners and in continual investment in an ongoing relationship (Klofsten, Heydebreck and Jones-Evans, 2010^[43]).

One example of transferring good practices is the doctoral-level initiative in the Nordic context. NORSI, the Norwegian research school, was internationalised and became the Nordic Research School in Innovation and Entrepreneurship in 2021.

Box 2.3. NORSI: Creation of the Nordic Research School in Innovation and Entrepreneurship

The Norwegian research school NORSI was established in 2012, after being granted funding from the Research Council of Norway (NFR). Norwegian higher education in innovation and entrepreneurship at the time consisted of several small research environments.

Initially, NORSI built on experience and competence based on doctoral education in innovation in a number of Norwegian HEIs (as well as the Copenhagen Business School, or CBS, and CIRCLE at Lund University in Sweden). In time, more Norwegian HEIs applied and were accepted as members of NORSI. By 2021, NORSI had 133 doctoral students and had granted 71 PhDs.

NORSI is now a successful interdisciplinary graduate school that combines different sub-areas of innovation and entrepreneurship and offers a more holistic, interdisciplinary education than the previously fragmented education. NORSI uses leading international researchers to complement and expand local expertise. NORSI strives to build bridges between research areas that have not previously had much interaction, which is desirable both from a theoretical and a societal perspective.

The idea of creating a Nordic graduate school in Innovation and Entrepreneurship was presented to NORSI's board. Its only Swedish partner at the time (CIRCLE, Lund University) confirmed how important participation in NORSI was for its research environment. In the Nordic context, the doctoral

program in innovation and entrepreneurship is still non-integrated, with potential for more synergy and increased knowledge exchange. The NFR also actively supported internationalising NORSI and the creation of a Nordic Research School.

In June 2019, 25 current and potential new NORSI member institutions met to discuss the continuation of NORSI as an international partnership, with doctoral courses and activities. To judge by the interest in the proposal, knowledge partnerships at the doctoral level met an important need. In 2020, the NFR granted an application for the internationalisation of NORSI, and in January 2021, NORSI became the Nordic Research School of Innovation and Entrepreneurship.

Today, NORSI has 24 member institutions (each paying an annual fee for its membership of the school and the network) in five Nordic countries, the majority from Norway and Sweden. NORSI has managed to obtain additional funding from the Kamprad Family Foundation for Entrepreneurship, Research and Charity, and the success of the Norwegian initiative is now starting to be copied by the other Nordic countries.

Source: NORSI (n.d.^[44]), *Home Page*, <http://norsi.no/>. Access 11 October 2021

Recommendations

In Lithuania, a focus on entrepreneurship in higher education teaching has emerged over the past 15 years. The students interviewed demonstrated clear entrepreneurial spirit, but showed less interest in learning about the theory of entrepreneurship. Entrepreneurial teaching and learning in Lithuania is still focused on start-up activities. Policy makers and HEIs should work on a shared objective to move to a wider understanding of the potential of entrepreneurship education.

Entrepreneurial teaching and learning involve innovative teaching methods and finding ways to stimulate an entrepreneurial mindset. So that they can be mutually reinforced, it is crucial that national policy making, HEI policy making, entrepreneurial research, teaching and learning be linked, to meet today's societal and economic challenges.

Considerations for policy makers

Entrepreneurial teaching and learning need to be acknowledged and supported by policy makers at every level.

To create the framework conditions for strengthening the teaching of entrepreneurship, policy makers should take steps to support entrepreneurship as an academic subject, and not only with the aim of establishing new firms. This activity should bring together key stakeholders, including the Lithuanian Academy of Sciences, the Lithuanian University Rectors' Conference, the Lithuanian College Directors' Conference and the Centre for Quality Assessment in Higher Education (SKVC).

There is also a role for policy makers in facilitating knowledge transfer and the sharing of best practices. Policy makers should build on the informal knowledge sharing that is already occurring between a number of institutions. Options for policy makers include:

- establishing a network of HEIs to share their experiences of different approaches to entrepreneurial teaching
- developing a "Train the trainer" approach to facilitate the spread of good practice.

Considerations for HEIs

The HEIs interviewed reported wide differences in the way they approach entrepreneurial teaching and learning. All offer extracurricular activities. The colleges that do offer entrepreneurship education offer it at the undergraduate level; only universities have formal entrepreneurship education at all levels. Naturally, research institutes only offer training at the doctoral level. Lithuanian HEIs should make efforts to link their entrepreneurial teaching and learning to research activities in the field.

Possible options for achieving this include inviting PhDs with experience of entrepreneurship education and entrepreneurial skills as change agents, both within and outside the academic context. NORSI graduates, for example, are now employed in academia, business and in different policy organisations.

As for developing teaching capacity, international influences were identified as paramount in inculcating an entrepreneurial mindset in Lithuania. In several HEIs, academics who had spent time abroad acted as important change agents after returning home. This practice should be encouraged by HEIs, including helping to enlist teachers who have participated in international exchanges to share what they have learned about entrepreneurial teaching practices.

As for developing entrepreneurial competencies (e.g. attitudes, soft skills/social/methodological), HEIs should take steps to ensure that entrepreneurial teaching is addressed and tailored to all HE students, from the undergraduate to the doctoral level. A diversity of approaches should be encouraged and applied as far as possible. This will be important in addressing the concerns raised by students that the teaching they receive is not sufficiently linked to entrepreneurship. Options include:

- requiring that entrepreneurship education become an intra-faculty responsibility
- offering interdisciplinary courses. Creative platforms and the development of an entrepreneurial mindset and sustainable business concepts are often stimulated by diverse teams of students from different departments, at different levels.

Finally, HEIs and RIs have an important role to play in persuading policy makers of the importance and potential impact of entrepreneurship. Without a general conviction awareness, it is difficult to create a substantial change among HEIs in entrepreneurial teaching and learning. HEIs and RI should be advocates for entrepreneurship teaching at the national level.

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3

Knowledge Exchange and Collaboration

Innovation is becoming a more important component of the Lithuanian economy, and the HEIs interviewed undertook engagement activities. The focus of many HEI and private sector activities is on technology transfer and commercialisation as well as aligning teaching and learning to sector needs. Next HEIs should look to building capacity to undertake co-creation of knowledge.

Defining and understanding knowledge exchange

In their capacity to co-operate with business and communities, Lithuania's higher education institutions (HEIs) face challenges that are common to most actors in OECD countries. Since the 1980s, HEIs have been expected to actively demonstrate their contributions to the public good and the economy by effectively leveraging collaboration in ways that address complex social and economic challenges (Callon, 1994^[1]; Martin, 2003^[2]; Wilsdon, Wynne and Stilgoe, 2005^[3]). Rather than focusing on cutting-edge research knowledge in its own right, flows of knowledge and knowledge-based activity between academic, state and private sector actors became the locus of policy and stakeholder attention (Papatsiba and Cohen, 2020^[4]). New expectations around HEIs' contributions to economic competitiveness and to addressing societal challenges were articulated, providing a steadily mounting push for HEIs to pursue a more systematic and sustained involvement outside teaching and research (Slaughter and Rhoades, 2005^[5]).

Simultaneously, new demands for participation of governments, private sector organisations and communities in shaping knowledge production were championed worldwide. HEIs were no longer considered the sole sites of knowledge formation. What ensued was a more explicit focus on knowledge dissemination, transmission, translation, utilisation and co-production (Fazey et al., 2013^[6]), moving the discourse from knowledge as an "invisible matter" to spatial imageries of movement and pathways, or from what "it" is to what "it" does, with whom, to whom, and how it does it.

The focus was brought to bear on metaphorical concepts such as knowledge "flows", "exchange", "impact" and "networks" (Brennan et al., 2016^[7]). Beneath these notional shifts lay a more fundamental contestation of models of knowledge production based on unidirectional, hierarchical relationships in which power rested with discrete knowledge producers, in this case HEIs, as an exclusive site of knowledge production (Nowotny, Scott and Gibbons, 2003^[8]). This meant, especially for HEIs, that their economic and societal purposes became part of broader governance arrangements and policy priorities that sought to incentivise their constructive impact on the real world but also to hold them to account in return for public resources (Nelles and Vorley, 2010^[9]).

With this context in mind, knowledge exchange and collaboration (KEC) was discussed with the Lithuanian case study institutions as a diverse, multifaceted dimension that encompasses different activities and roles HEIs can play in their own ecosystems and networks. What was once called the "third mission" of HEIs has become a broader concept that requires HEIs to connect proactively with their ecosystems and networks. Knowledge exchange takes different forms: academic engagement such as collaborative research, contract research, consultancy and academic entrepreneurship, including income generation derived from intellectual property (IP), the formation of spin-off firms and start-ups. Other types of knowledge exchange include public engagement, community engagement, and cultural and social forms of exchanges. These different channels involve individual academics and groups of academics, as well as the departments, faculties and the university as a whole.

As experience of policy on and the practice of KEC grows, a number of key challenges for policy makers and institutional leaders have emerged, which are important in considering the potential for the growth of knowledge exchange in Lithuania.

The first is to find a balance between supporting KEC activities without weakening the research and teaching missions of HEIs that make them distinctive knowledge-forming institutions. There are widespread calls for HEIs to demonstrate the ways in which they are open and engaged in society, while also retaining the autonomy and academic freedom that underpins their specialities and institutional cultures. Challenge-oriented research has to be balanced with curiosity-oriented research and inquiry.

Box 3.1. Knowledge Exchange and Collaboration in the HEInnovate

The HEInnovate Frameworks sets out that 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. The motivation for increased collaboration and knowledge exchange is to create value for the HEI and society.

The dimension includes the following characteristics:

1. The HEI is committed to collaboration and knowledge exchange with industry, the public sector and society.
2. The HEI demonstrates active involvement in partnerships and relationships with a wide range of stakeholders.
3. The HEI has strong links with incubators, science parks and other external initiatives.
4. The HEI provides opportunities for staff and students to take part in innovative activities with business / the external environment.
5. The HEI integrates research, education and industry (wider community) activities to exploit new knowledge.

Source: HEInnovate (2021^[10]), *Home Page*, <https://heinnovate.eu>. Accessed 7 October 2021

Unhelpful tensions can emerge between the highly competitive; exclusively internally focused institutional requirements for teaching and research and the requirements for “effective collaboration”, often with no explicit encouragement for, or recognition for, external engagement (Cuthill et al., 2014^[11]). This can lead to a situation where there is little opportunity or incentive for researchers to engage in knowledge exchange processes and which results in a lack of the associated “project management and collaboration skills” to engage in knowledge exchange in the future. Furthermore, in the process of collaboration, the priorities and constraints under which the partners work are different. If their competing agendas are not recognised and negotiated, this often results in a firm barrier to effective partnerships. Effective partnerships may also call for some support of the capability of the partners in the private sector and other collaborators. Training and greater opportunities for collaboration with HEIs improve collaborative potential where a deficit in specific experience has been identified (Rossi et al., 2020^[12]).

A related tension is that traditional research-intensive universities are often able to develop more intense KEC activity, thanks to their extensive, resource-rich networks and collaborations with government, large firms and established non-governmental organisations (Brennan et al., 2016^[7]; Spigel, Kitagawa and Mason, 2020^[13]). Greater focus on the achievement of excellence in global research rankings can send implicit messages about the lower value or “rate of return” of locally orientated activities. In addition, KEC-specific trends may shift. Models of funding allocation can inadvertently reinforce the status quo, providing awards based on past performance, and large bonuses to top-performing institutions, rewarding larger and better-established universities (Rosli and Rossi, 2016^[14]; Götze, Carvalho and Aarrevaara, 2021^[15]; Pickernell et al., 2019^[16]).

Given the multifaceted and highly contextual nature of KEC (Spigel, Kitagawa and Mason, 2020^[13]), evaluating it presents additional challenges that highlight the limits of standardisation across contexts and time. Rosli and Rossi (2016^[14]) recommend broadening the range of indicators used to assess engagement, including more involved qualitative evaluations. Spigel, Kitagawa and Mason (2020^[13]) point

out that this calls for a granulated understanding of ecosystem thinking, with greater consideration of the diversity of actors and contexts, and more attention paid to the heterogeneous nature of places and complex interactions between actors and networks.

Lastly, KEC will also need to adjust to the challenge of COVID-19. The coming decade will be characterised by efforts to recover from the pandemic and “build back”. Universities’ role in the multifaceted recovery from the pandemic has intensified and been made more topical. Calls for increasing societal engagement by universities (The British Academy, 2021^[17]) are being articulated in different quarters. While there are strong signs that academic communities are embracing this renewed focus on their broader contributions, the societal engagement dimension of KE does not inherently lead to income generation in the way that commercial technology and knowledge transfer does (Perkmann et al., 2013^[18]).

The innovation and entrepreneurship ecosystem in Lithuania

The Lithuanian economy may be increasingly hi-tech and development-based, but HEIs are still striving for more home-grown hi-tech companies, because much of Lithuania’s core business is still focused on exporting goods and services and on collaborating with companies based overseas. HEIs do have their own start-up companies and innovative products, but the collaborative mode of practice is different from that associated with larger international collaborations. National ambitions for Lithuania as a leader in the Baltic region are acknowledged, but there is a sense that the pace of growth needs to quicken.

Lithuania is judged to be a Moderate Innovator (on a rising scale from Modest Innovator, Moderate Innovator, Strong Innovator, to Innovation Leader). In comparison, Sweden and Finland are judged to be Innovation Leaders, Estonia a Strong Innovator, and Poland and Latvia, like Lithuania, are Moderate Innovators. For Lithuania, Innovators, Innovation-friendly environment and Linkages are the strongest innovation dimensions on the European Innovation Scorecard. Lithuania scores high on population with tertiary education, innovative SMEs collaborating with others, non-R&D innovation expenditures, and broadband penetration. Attractive research systems, sales impacts and intellectual assets are the weakest innovation dimensions. Low-scoring indicators include: exports of knowledge-intensive services, R&D expenditures in the business sector, public-private co-publications, and foreign doctoral students.

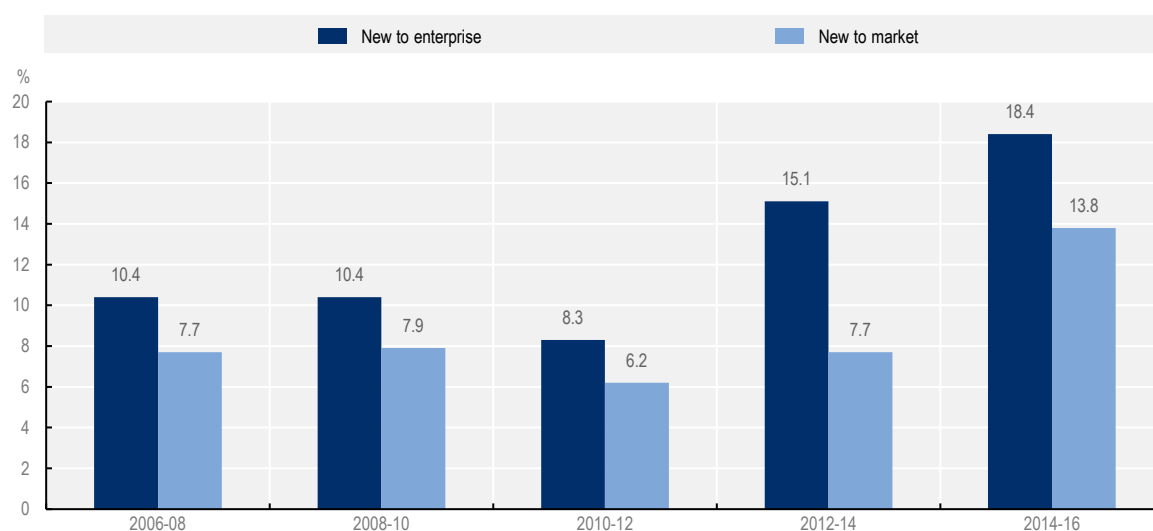
There are signs that innovation is becoming a growing part of the Lithuanian economy. Over the last decade, the share of innovation-active firms grew from one-third to almost a half (47%) of all the firms (Juozapaitienė et al., 2021^[19]). This is consistent with other trends that find that Lithuanian companies are significantly more likely to adopt product and technological innovations. The share of firms with product innovations differs depending on the product’s novelty level (Figure 3.1).

At the end of 2020, more than 900 start-ups are headquartered in Lithuania, and 2019 also saw the first Lithuanian “unicorn”, the website Vinted. Since 2016, 387 million EUR has been invested in Lithuanian start-ups, less than neighbouring Estonia’s 589 million EUR, but more than Latvia’s 88 million EUR (Juozapaitienė et al., 2021^[19]).

Attitudes towards knowledge exchange in Lithuania

All HEIs interviewed are motivated and willing to play an active role in the entrepreneurial ecosystem. A strong consensus emerged around the potential of KEC for all partners and for society. There was a clear understanding of the role of the HEI for the stimulation and direct application and exploitation of knowledge for the benefit of the social, cultural and economic development of society. However, those who volunteered to be interviewed for the report may represent a “coalition of the willing”, and this attitude may not permeate every level of the institution.

Figure 3.1. Product innovators by product novelty level, compared to all companies



Source: Juozapaitienė, R. et al. (2021^[19]), *Review of the Lithuanian Innovation Ecosystem*, STRATA.

One example of the type of KEC activities undertaken in Lithuania is the collaboration between the Centre for Physical Sciences and Technology (FTMC) and Integrali Skaidulinė Optika (ISO). The collaborator is a successful laser technology start-up established in 2015, with a patent and general licence from FTMC. ISO's key technology is based on its patented laser-pulse generator, and it has more than ten ongoing projects with the research institute. Located on FTMC's Science & Technology Park, ISO has affordable access to the institutes' laboratories, equipment and expertise, and leverages further government support for its projects involving FTMC R&D. FTMC is at the centre of Lithuania's photonic hub; of the 200 new photonic companies founded in Europe each year, 30 are Lithuanian.

Created with the assistance of significant seed funding five years ago, this enterprise in laser technology is now not only fully embedded within the case study institution on a day-to-day basis, but also looks outwards and welcomes contributions from international, university and business actors. The relationship between the company and its host institution is predicated upon the experience of working on technology transfer together and remains essential as they share infrastructure and continue to collaborate on creating patents and publications, and on representing each other at exhibitions and trade shows.

This willingness to contribute and collaborate was also exemplified in the way Lithuanian HEIs responded to the COVID-19 pandemic. Many of the case study institutions cited examples of working with government, industry and with public organisations in a shared effort to respond to COVID-19. For example, Klaipėda University has been working closely with seven municipalities on the way the pandemic has affected small and medium enterprises in their areas. Science is "here to help," and Vilnius University, for example, has engaged all its faculties and the Senate in discussions about their contributions to the understanding of, and response to, the COVID-19 pandemic. This represents a clear effort to mobilise all its disciplinary areas of knowledge and expertise. HEIs are also nodes of transnational interconnectivity around the world, able to bring together "knowledge alliances" for policy options that encompass medical, social and economic responses to the pandemic.

Private sector attitudes

Lithuania offers a number of examples of well-established alliances between collaborators and their HEI partners, in which the collaboration involves the highest strategic level and includes teaching, public engagement, and research and licensing. Vilnius University has a close, longstanding collaboration with

Thermo Fisher Scientific Inc., a global company specialising in science and science instruments. A number of Thermo Fisher scientists began their careers at Vilnius University and still lecture there, helping to maintain connections between the two entities at various levels. Vilnius University sits on Thermo Fisher's board in Lithuania, and their partnership reflects the sense of social responsibility shared by all concerned. A government requirement for companies in free enterprise zones to take part in HEI collaboration is potentially a useful tool.

Another example is the collaboration between the Lithuanian Biotechnology Association and the Lithuanian University of Health Sciences. The depth of the collaborative experience extends beyond the life of distinct projects, and includes reflection about and action on policies, resources and the broader ecosystem. The case for a more joined-up approach in knowledge exchange and innovation at a policy level in Lithuania has been put forward. In January 2021, representatives of the sector addressed a proposal to Lithuania's Prime Minister and its Ministers of Economy and Innovation and Education and Science, under the title, "On the recognition of the biotechnology sector as a strategic economic sector and the reforms and measures necessary for its development". It proposed a series of reforms for developing the sector and its innovations in Lithuania, including changes in university and research institute funding, and developing infrastructure and a legal framework that supports and facilitates technology transfer and licensing. While recognising the success of collaborative efforts to date, it noted as a serious problem Lithuania's lack of acceleration programmes and incubation facilities close to universities, and of a "filter" for developing promising ideas.

However, despite these examples, institutions also reported that there were cultural challenges in the Lithuanian business sector to be overcome before they could fully benefit from knowledge exchange. In many agreements with the private sector, HEIs effectively act as subcontractors rather than full partners or collaborators. Some attributed this to the fact that most of the existing government support schemes focus on businesses that generate R&D. They expressed a sense that they do not collaborate on an equal footing, and that businesses and HEIs need to maintain and strengthen their networks, and learn from each other.

Several HEI interviewees identified international firms as playing a key role in setting a more ambitious tone for knowledge exchange. International firms were considered to have a culture of knowledge exchange and come with the expectation that they would collaborate and work with local HEIs. HEIs considered that Lithuanian firms that were in direct competition with international firms were more likely to adopt intersectoral collaboration in order to compete. However, other HEIs noted that the impact of foreign firms was narrowly focused on sectors where they are present in Lithuania, namely manufacturing.

Public sector attitudes

HEIs are active in the lives of their communities, with student internships in municipal departments, grants for city-related problems and awards for innovation. Relations with the municipalities were highly valued and considered important channels for developing and delivering mutually beneficial KEC. A particularly strong example is Klaipėda University's role in the Lithuanian Maritime Cluster's Blue Growth initiative. The university contributed to development of the city's regional strategy for Blue Growth, and then adapted its own institutional strategy based on the Blue Growth objectives.

In particular, the university took the responsibility for establishing the Blue Growth Leaders Academy. Each cohort includes representatives from businesses and the marine cluster (e.g. shipping and cargo company managers), representatives from the municipalities across the coastal region, as well as academics from the university. Each participant represents a possible partner for further collaboration with Klaipėda University. The university brings its specific expertise to the table to help increase leadership capacity in the region.

Another example of a “brain exchange” and “circulation of competence” occurs when a university’s senior leadership assumes major policy roles with government or national agencies. Leadership positions with the Education and Science committee, the Research Council or the Academy of Sciences, and the Ministry of Education and Science have been filled by experienced leaders of the HE sector, contributing to increasing expertise within public policy and to assist in rational policy formation.

However, the HEIs also noted that different public priorities and systemic fragmentation can create tensions in the environment for collaboration, not only for HEIs, but for businesses. They described a fragmented system in which HEIs must deal with multiple funding agencies with overlapping and conflicting rules that reflect these tensions. HEIs are looking to the new Lithuanian government for a more collaborative and less competitive mode of funding, particularly regarding R&D.

Knowledge exchange and collaboration activities

While the HEIs initially appeared to frame KEC as technology transfer focused on straight commercialisation, the interviews revealed a variety of activity, including outreach to schools, open days, public engagement, volunteering and consultancy.

Current focus on technology transfer and commercialisation

Lithuania’s drive to “capitalise science” is evident in governmental and international incentives that strongly encourage technology transfer and commercialisation. The formation of HEI policies on the co-ordination and management of IP and licensing, for example, have been prioritised in recent years. Examples include:

- On the tenth anniversary of the Centre for Physical Sciences & Technology (FTMC) in 2019, its director wrote, “We have reconsidered our mission, giving special emphasis on generation and capitalisation of scientific knowledge in applied physics, chemistry and technological sciences”.
- The current mission of the LEI includes the transfer of “applied scientific research results and findings to industry and business”, as well as consultation with state, governmental, public and private institutions and enterprises on Lithuanian sustainable energy development.
- KTU declares that it aims to create “appropriate conditions for provision of research services to business companies, based on the one-stop-shop principle and promotion of science-business co-operation”.

A similar focus on IP can also be seen in a very different type of institution, the Design Innovation Centre, established by the VAA in 2007. It became responsible for the academy’s IP management in 2016, and currently provides commercialisation, incubation and project management support for collaboration. The Centre is also a Lithuanian Patent Library Centre. HEIs generally aim to encourage enterprising approaches in their departments and faculties, as well as among individual members. VAA’s strategic goals, for example, include encouraging creativity, responsibility and entrepreneurship that enables “the growth of a talented individual”, especially young researchers.

It is worth noting that the “co-production” of knowledge between HEIs and their partners was not mentioned in any of the conversations. Co-production knowledge is an important form of advanced knowledge exchange, defined as a process in which knowledge can be produced through interaction with others, possibly with people with different perspectives and backgrounds, through co-operative endeavours and mutual learning. On example of co-production between an HEI and a start-up is expanded on below. That this sort of KEC practice was not flagged by Lithuanian HEIs reflects their feedback that HEIs are not often seen as equal partners with their private sector counterparts.

Box 3.2. Co-production of knowledge in Jönköping (Sweden)

The Högskolan i Jönköping, and in particular at the Department of Education, offers one example of an innovative collaboration with Sound Lily, a digital platform for teaching music in schools. In recent years, Sweden has made a consistent effort to introduce digital tools in school and has set up a test bed for educational technology. However, technology companies have had difficulties interpreting the feedback from a pedagogical perspective.

In its joint project with Högskolan i Jönköping, Sound Lily is hoping to gain greater understanding, to develop tools that can have an impact on learning. The two partners have carefully designed the project to support their twin objectives of commercialisation and research. Their research is considered a best-practice example in which researchers are treated as equal partners and where their academic interests are built into the project.

Source: (OECD/EU, 2021^[20]) *Supporting Entrepreneurship and Innovation in Higher Education in Sweden (Forthcoming)*.

Strong collaborator interest in teaching and learning

One notable trend in Lithuania is the close relationship that has developed between teaching and knowledge exchange for many institutions, in particular those that offered professional degrees. In general, students, as future graduates, appeared to be a key component in knowledge exchange initiatives and activities. Companies are eager to attract talented graduates in a context where the numbers of students are declining (see Chapter 1), and HEIs, for their part, are competing for students, given that their funding is contingent on student admissions. Knowledge exchange activities help businesses increase their reputation as a workplace where well-qualified graduates will want to work, and in turn, graduate employability becomes a valuable marketing tool for HEIs within a constrained and competitive student market.

The depth of such relationships is illustrated by KTU's collaboration with TransUnion, a global information and insights company offering specialist services in fraud, identity and risk management, automated decision making, and pre-screening and demographics. Its local offices in Kaunas, Žalgiris Arena, employ 220 people.

Working closely with Kaunas University of Technology to devise an accredited undergraduate and postgraduate curriculum allows TransUnion to nurture talent, both in the institution and in its own organisation. It is helpful that the business partner appreciates the timeline involved in devising and approving a higher education study programme. The company's employees contribute to the study programme, providing "additional value into the learning process", or, as the interviews indicated, "They have a need to share their knowledge, they need to feel their knowledge is valued".

VIKO offers one student-focused example of knowledge exchange with Skulas, a family firm that has 72 employees, a network of gas stations and a head office in Vilnius. The aim of the project was to develop a range of fresh food to sell at the stations, including salads and sandwiches. Rather than engage a prestigious private sector service provider, the collaborator chose to work with the college on the project, with the aim of benefiting both the students and the company. The students' enthusiasm and their innovative ideas inspired Skulas' decision. VIKO staff assisted Skulas with the required regulatory paperwork and its students were engaged at all stages of the project, creating and testing new recipes. VIKO lecturers also trained Skulas employees in food preparation. VIKO is being commissioned by Skulas to extend the project evaluation.

In this respect, Lithuania demonstrated the important links between KEC activities and enhancing the entrepreneurship and innovation potential of all the activities of the HEIs. A key motivator for many Lithuanian businesses to collaborate with HEIs is this focus on developing links with graduates, to help ensure that they have the skills that are needed, and also, perhaps more importantly, to make their company a preferred choice of employment for talented graduates.

A growing emphasis on tackling societal challenges

Strategic recognition of KEC is clearly growing, as HEIs refine their plans and publish new strategies. Institutions demonstrated that they are increasingly looking beyond their own economic drivers to KEC activities that may benefit communities and society as a whole.

The Lithuanian Energy Institute is building important bridges with wider society in collaborating with the Smart Health Digital Innovation Hub (DIH), a non-profit hub in Vilnius with 4,000 member organisations established in 2017. DIH works on innovative solutions to promote health, prevent disease and provide resilient, accessible and effective patient-centred care that meets European citizens' needs. Effective communication with its members, scientists, businesspeople and public sector representatives alike is critical to building bridges. Taking the time to raise awareness, and to listen and hear all perspectives, creates trust and enables the hub to develop new models that work at a deeper level.

Vilnius University reports that it has a new five-year strategy (2021-2025) that includes societal impact, to be measured by key performance indicators. In February 2021, in announcing that this plan would include the goal of becoming a more sustainable institution, reducing its greenhouse gas emissions, its Rector declared: "The newly developed strategic plan of Vilnius University activities highlights the value of sustainability as a responsibility to the state, society, culture as well as the environment. The university is duty-bound and obliged to set an example for the state and society" (Vilnius University, 2021_[21]).

VIKO is working towards a new interdisciplinary strategy, with recommendations for partnerships with industry and public organisations at all levels. As a practice-based institution, it intends to focus on small and medium enterprises and public organisations for under-represented groups, although it is acknowledged that collaboration with public entities is not valued as highly by governmental agencies as collaboration with businesses. For example, the educational benefits of student volunteering are more challenging to measure than the income generated through contracts with industry, although they are considered equally important by the university.

Within these examples, there is room for Lithuanian HEIs to integrate these practices more systematically into their activities, as well as over the long term. The example (Box 3.3) of the Public Engagement Framework of Memorial University illustrates where Lithuanian HEIs can embed their collaboration strengths.

Box 3.3. Memorial University's Public Engagement Framework (Newfoundland, Canada)

Memorial University is a comprehensive research university located in St. John's, Newfoundland and Labrador, Canada. As the region's only university, Memorial fulfils a special obligation to the people of the province, supporting the needs and opportunities of the region, in the context of national and international research, partnerships and relevance.

In 2011, Memorial undertook a major consultation to develop a framework for the university's collaborations with its many public partners. Hundreds of individuals and organisations, both inside and outside the university (including, but not limited to, municipal, provincial, federal and Indigenous governments, not-for-profit organisations, and firms and industry associations), participated in thematic sessions related to all aspects of Memorial's relationship with its public partners. Each session was

co-chaired by an internal and an external representative, who gave final approval on the session reporting. All these contributions were considered and incorporated into the draft Framework. The resulting Public Engagement Framework was endorsed by Memorial's Senate and Board of Regents in 2013.

The Framework defines "public engagement" as collaborations between Memorial and its partners outside the university, as they relate to the university's academic mandate. It offers a long-term vision, values and goals, along with tangible, measurable objectives to work towards, both in terms of individual projects and relationships, and administrative and strategic decision making.

Mutual respect, mutual contributions and mutual benefits are cornerstones of the Framework, with an emphasis on making a positive difference, mobilising Memorial for public engagement, cultivating the conditions for the public to collaborate, and building, strengthening and sustaining the relationships that connect Memorial and the public.

Key to the success of the Framework is the stewardship of Memorial's Office of Public Engagement (OPE). While individual students, faculty and staff at Memorial participate in and contribute to this public engagement, OPE's mandate is to promote, advance and evaluate the Framework, working with internal and external groups to support programmes and initiatives that advance its objectives. OPE conducts regular monitoring and evaluation activities to assess the success of programmes, needs and opportunities related to public engagement, and the levels and quality of participation in public engagement across the university.

So far, the Framework has had a number of positive impacts on Memorial's ability to play a crucial, supportive role in the social, cultural, environmental and economic development of Newfoundland and Labrador. It has institutionalised Memorial's commitment to public engagement, and it has become a shared focus rather than a project of specific faculty or staff champions. The language of public engagement is now integrated into other university planning and strategy documents. A public engagement perspective is now part of project and program development, many hiring processes, and university decision making.

Ultimately, the increased collaborative activity as a result of the Framework has made Memorial a more relevant, responsive institution, especially in challenging times. It has supported a culture of collaboration, both inside and outside the university. External organisations know that they can reach out to Memorial for support and partnership, and faculty, staff and students understand the value of public input and expertise. This has encouraged an understanding that by working together, both the province and the university are stronger.

Source: Memorial University (n.d.^[22]), *The Public Engagement Framework*, <https://www.mun.ca/publicengagement/memorial/framework/>.

KEC activities are increasingly valued and recognised in Lithuania

The shape of KEC in practice is not only determined at a strategic level, but also by institutional culture, through structural and informal mechanisms that reflect the complex, multifaceted nature of knowledge exchange itself. Collaboration is becoming more formalised and embedded as a valued and recognised activity in Lithuanian HEIs.

The infrastructure, too, is now more sophisticated. In the past five years, Lithuanian technology transfer departments and centres that co-ordinate collaboration in research and teaching have become standard practice, or as interviewees put it, "We started with nothing, and now we enjoy lots of projects". Development services, including one-stop-shops for enquiries and exploratory conversations, are increasingly considered important for successful collaboration.

Individuals and faculties also play a role in championing KEC in their own academic communities, with noticeable effect as the number of collaborative projects multiply. HEI fields and faculties are led by innovators who choose to make an impact through strong relationships with companies and public organisations.

Managing the expectations of a potential collaborator can be challenging, especially for HEI staff responsible for enabling KEC within their institution. Many also balance this work in addition to other academic or administrative tasks. Mediating between a company and a faculty can be tricky. Faculty members may not see how they can collaborate, and sometimes, companies can be disappointed, not because of the faculty but simply because their respective expectations are incompatible.

KEC is increasingly being recorded, measured and evaluated within HEIs, although the emphasis still appears to be on STEM disciplines and income generation. Accounting for licensing and contract research, for example, is better integrated administratively, with key performance indicators and systems for distributing generated income within the institution.

Research and societal impact is monitored more comprehensively at the national level. Collaboration that benefits society tends to be more decentralised as an activity within HEIs, and is not monitored as closely at a strategic level, despite institutional declarations about the importance of the HEIs' contribution to society.

Improvements in measuring the impact of technology transfer and knowledge exchange at an institutional level are acknowledged, but monitoring of KEC overall is inconsistent and underdeveloped, and has prompted calls for flexible methods in addition to the quantitative assessments that cover collaboration with industry. As interviewees put it, "Not only researchers but the community understand that it is important to be open".

HEIs are appealing for approaches to evaluation that reflect and track the broad nature and complexity of knowledge exchange, including individual interactions, and for a wider perspective that embraces a researcher and teacher's career and impact. "With the external organisations, we have personal feedback. The personal interaction is also very important", was one comment. One example of how the evaluation of KEC activities can be conducted at the national level is explored in the box below.

Box 3.4. The Knowledge Exchange Framework (UK)

The United Kingdom is reportedly the first country to have introduced performance-based funding, through the Higher Education Innovation Fund (HEIF), to reward universities' success in knowledge exchange (Rosli and Rossi, 2016^[14]; Kitagawa and Lightowler, 2013^[23]). Research England recently published the outcomes of the Knowledge Exchange Framework (KEF) exercise, as an interactive dashboard that aims to provide more accessible information and data for institutions and their partners to understand and improve their own performance.

According to Research England (2021^[24]), "The aim of the KEF is to increase efficiency and effectiveness in the use of public funding for knowledge exchange (KE) and to further a culture of continuous improvement in universities. It will allow universities to better understand and improve their own performance, as well as provide businesses and other users with more information to help them access the world-class knowledge and expertise embedded in English HEPs [higher education projects]" (<https://re.ukri.org/knowledge-exchange/knowledge-exchange-framework/>).

After the consultation and pilot exercise, the first knowledge exchange framework iteration took place in the academic year of 2019-2020. All HEIs eligible for the knowledge exchange funding participated in this exercise. To enable comparability between HEIs, the institutions were grouped in clusters by capability (research institutions versus more 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.

For this iteration and the subsequent ones, the KEF is evaluating HEIs based on quantitative metrics and on narrative statements. The quantitative metrics are grouped into seven categories:

- research partnerships with non-academic stakeholders
- “working with business”: incomes from contracts for research and consultancy with business, as well as grants
- “working with the public and third sector”: research, consultancy, facilities and equipment income with the third sector
- “skills, enterprise and entrepreneurship”: Higher Education Business and Community Interaction, income from professional development course and graduate start-up rates
- “IP and commercialisation”: licensing, IP as a proportion of research income
- “public and community engagement”: score based on a self-assessment and additional information, including a narrative statement
- “local growth and regeneration”, including a narrative statement.

Each metric will be calculated based on data averaged over the most recent three years.

The narrative statement was added to support the metrics under the “public and community engagement” and “local growth and regeneration” categories.

Source: Rosli, A. and F. Rossi (2016^[14]), “Third-mission policy goals and incentives from performance-based funding: Are they aligned?”, <http://dx.doi.org/10.1093/reseval/rvw012>; Kitagawa, F. and C. Lightowler (2013^[23]), “Knowledge exchange: A comparison of policies, strategies, and funding incentives in English and Scottish higher education”, <http://dx.doi.org/10.1093/reseval/rvs035>; Research England (2021^[24]), *Knowledge Exchange Framework (KEF)*, <https://re.ukri.org/knowledge-exchange/knowledge-exchange-framework/> (accessed on 2 June 2021).

Individually, HEI staff and their partners are beginning to reflect and learn from their collaboration, but they have yet to find ways of further developing their methods and sharing their lessons through continuous dialogue, within their own institutions and with communities. The value of openness, and of learning by failure as well as by success is acknowledged.

Recommendations

KEC in all its diversity is beginning to gain a higher public profile in Lithuania. It is also becoming more recognised and integrated into day-to-day academic practice. The following recommendations examine how policy makers and institutions can collectively develop a culture of knowledge exchange and collaboration, building on the strengths discussed above.

Considerations for policy makers

Overall, collaboration with the public sector was strong, with many impressive examples. However, the fragmentation of science support schemes creates difficulties for HEIs and both their existing and potential collaborators, as they struggle to meet the various eligibility, legislative and monitoring requirements. Differences in the policy priorities of government departments can create tensions.

Embedding knowledge exchange in HEIs and RIs will require capacity building. Policy makers can encourage this both through structural and informal mechanisms and through meaningful discourse with HEIs and with their collaborators. Options include:

- *Targeted funding aimed at supporting knowledge exchange capacity building within HEIs and RIs.* This funding should look at supporting HEIs to develop approaches regarding KEC that can be shared with their HE partnerships.
- *A sector-wide survey of perceptions of KEC amongst HEI staff, collaborators and policy makers.* This would raise awareness, facilitate further discourse and provide a more granular picture of the critical factors that affect involvement in KEC, as well as a baseline for changing culture and building capacity across higher education.

The evaluation of knowledge exchange should be developed at the system and institutional level. Policy makers should take a leadership role to support a culture of evaluation, where HEIs actively and consistently reflect on what they want their KEC activities to achieve and how to assess their outcomes. This is critical for enabling continuous improvement but also for avoiding mission drift and potentially wasting time and resources for all concerned. Options include:

- collaborating with stakeholders to broaden the range of indicators used to assess KEC, including more involved qualitative evaluations and reflective exercises.
- considering the diversity of institutional size and mission, disciplinary mix, geographic location and the balance between “curiosity” and “challenges” research in different institutions and departments.

Considerations for institutions

While institutions show some promising signs of reflecting on how HEIs can meet broad societal challenges in Lithuania, they should consider how to strategically widen KEC activity (as opposed to technology transfer). To promote a rewarding exchange of ideas, research, expertise and resources in the context of principled negotiation and reciprocity, knowledge engagement and collaboration between researchers, businesses, public actors and civic communities will require an articulation of HEIs’ roles in society. It will also require visionary leadership at every level, both within and outside HEIs.

Options include:

- *More dedicated operational professionals who can take on the role of ‘knowledge brokers’ or ‘linkage agents’.* These brokers must have the skills and the time to facilitate a shared understanding of successful KEC, and to provide advice and practical support for HEI practitioners and their collaborators.
- *Training and capacity building for all staff, to give them the skills to more successfully manage and meet the expectations of all parties.* This does not imply that they have identical goals or that they think alike, but instead commit to working collaboratively, including resolving tensions and navigating contradictions.

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4 Digital Capacity and Transformation

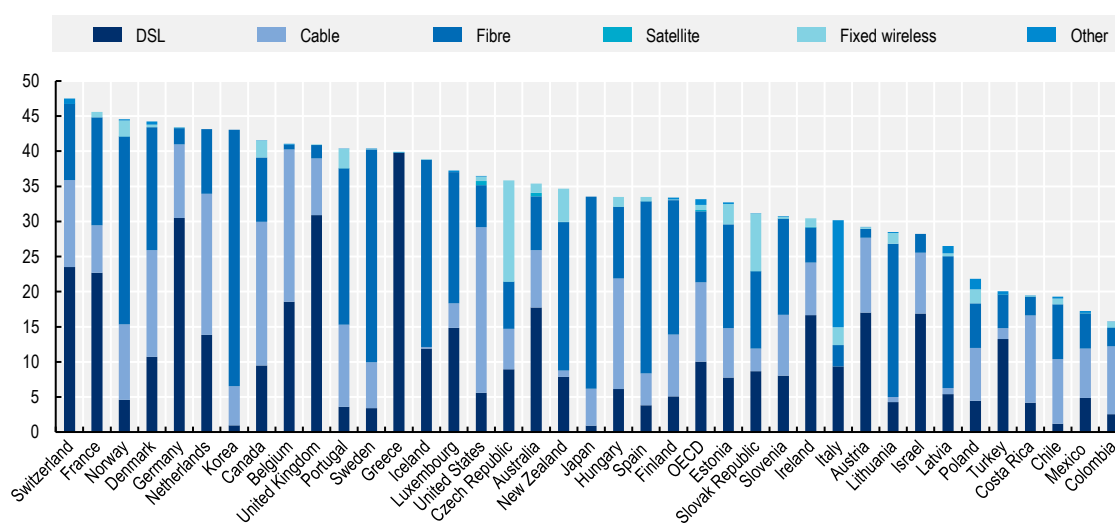
Prior to the Covid-19 pandemic, HEIs had only limited online learning. The progress of digital activities the past year have been impressive, with significant teaching and learning moving online and innovative digital collaboration with their communities. The challenge for HEIs will be to move from the digitalisation of services to digital transformation of organisations and activity.

Digital transformation in Lithuania

The digital transformation and capacity of higher education in Lithuania will be shaped and fundamentally linked with the country's wider digital transformation of the country. Lithuania performs well on several core digital indicators. It is one of only five OECD member countries where fibre provides the majority of broadband connections, and its use of digital tools by business is above the OECD average. Its broadband prices are also among the lowest in the European Union.

However, despite this solid foundation, a significant urban-rural divide in the digitalisation of Lithuania. Fixed broadband coverage of households remains below the European average, and digital skills are below the EU average.

Figure 4.1. Fixed broadband subscriptions per 100 inhabitants, by technology, December 2020



Source: OECD (n.d.^[1]), *Broadband Portal*, www.oecd.org/sti/broadband/oecdbroadbandportal.htm.

Lithuania is investing in improving its broadband coverage, and the Ministry of Transport and Communications is currently implementing the Next Generation Access Infrastructure for high-speed access. Lithuania has also leveraged EU-funded programmes (the Rural Area Information Technology Broadband Network) to improve digital access in remote and sparsely populated areas.

In this context, institutions should consider their impact in building digital skills and supporting Lithuanian society on a path towards maximising the benefit of digital transformation.

Box 4.1. Digital Capability and Transformation in the HEInnovate Framework

The OECD and the European Commission added Digital Transformation to the HEInnovate Framework in 2018, reflecting the growing role of digital technologies in underpinning the objectives of the framework. This dimension illustrates the intertwined nature of the HEInnovate framework, where an entrepreneurial mind-set is necessary to achieving digital transformation and equally digital transformation is critical to delivering entrepreneurial outcomes.

The dimension was updated in March 2021 and it was that new framework that was used to inform this analysis.

The dimensions was updated to have the following characteristics:

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

Source: HEInnovate (n.d.^[2]), *Home Page*, <https://heinnovate.eu>. Accessed 7 October 2021

Digital teaching and learning

Before the outbreak of the coronavirus pandemic, digital teaching undertaken by the case study HEIs in Lithuania. Most institutions reported that they had no, or virtually no, online students. However, they were able to quickly to shift to online learning to complete the academic year 2020, and have continued blended learning in the 2020/21 academic term. At the time of writing, much of the activity of HEIs and RIs is conducted online.

The magnitude of the shift is exemplified by Vilnius University. Before the pandemic, it provided no courses online, and less than one-third of its students used online teaching tools like Moodle as part of their face-to-face learning. The use of digital tools was based on the preferences of individual lecturers, and the university had no standardised policies or practices governing digital teaching. The faculty overall was considered to be relatively unfamiliar with the use of digital tools.

When lock-down restrictions were implemented, Vilnius University had quickly to shift both staff and students to an online learning environment, which included buying core equipment such as laptops and providing basic training for videoconferencing programmes. The faculty's lack of digital skills meant that the university also had to handle situations where lecturers attempted to disengage completely from teaching.

In matter of weeks, they were delivering their full programme of teaching, and all the faculty had been trained on the software. While Vilnius University is content with the level of teaching and assessment that was provided during the pandemic, it acknowledges that significant challenges remain. Anecdotal evidence suggests that student engagement in the autumn 2020 term is lower than in previous years and that the sense of being part of a university community has diminished.

Vilnius University considers that one of the benefits of this accelerated digitalisation is levelling the playing field in terms of access to leading global experts. Teachers could now bring in guest lecturers from all over the world. This was described as a “significant reduction in the costs of collaboration” and offered as an important example of how digitalisation could support other HEInnovate dimensions.

The LSMU also had to rapidly move teaching and assessment online. This was particularly complex, because medical instruction often relies on practical, hands-on learning. LSMU was able to move the theoretical training to Microsoft Teams, and procured specific teaching tools to provide virtual training for specific medical skills. These tools included:

- InSimu, a virtual patient
- HybridLab simulation of situation modelling, and also for procedure training
- Specific simulation-centre equipment used by the Faculty of Medicine and the Faculty of Veterinary Medicine.

On the positive side, the institutions did not experience significant issues with staff or students lacking the infrastructure to participate in digital learning. In the first wave of the pandemic, VIKO purchased a number of laptops for staff, but had no instances of students reporting difficulties. As a contingency measure, computers were made available to students on campus, while respecting sanitary measures.

The overall feedback from Lithuanian HEIs was that while the transition to online learning had been difficult at times, it was not traumatic, and teaching and learning had continued. Reservations were expressed, however, about relying on digital teaching in the long term. It was felt to be a stopgap measure to survive the crisis. At LSMU, the experience of digital learning was due to be included in the institution's strategic planning exercise, but it was not clear whether the leadership had committed to continue online learning. HEIs were uncertain whether the quality of teaching and learning been successfully maintained, in particular for practical courses.

This scepticism of digital teaching reflects that while teaching and learning has been digitalised in Lithuania, deeper digital transformation has yet to take place. The case study institutions frequently raised the issue that transition to online learning required training teaching staff, both in the skills of using specific digital tools and in new pedagogy for taking advantage of digital tools.

The effectiveness and value of an online or blended in-person/digital course is based on the approach to the design and the quality of teaching, rather than its mode of delivery. Analysis of online courses, or courses that combine digital and face-to-face teaching, support this conclusion, finding that they can provide equal or even superior learning outcomes compared with purely in-person courses (Vo, Zhu and Diep, 2017^[3]). An example of how digital tools can enhance teaching is found in Box 4.2, which allows real-time adaptation of teaching targeted to the gaps in a student's knowledge.

Box 4.2. Nanyang Technological University Lee Kong Chian School of Medicine (Singapore)

Nanyang Technological University has used learning analytics to enhance its delivery of “Teams-Based Learning”, which it describes as a “group-based active learning method”. To support Teams-Based Learning, the university has built a circular learning studio that can accommodate over 250 people and has multiple round tables to facilitate group work. Each table has a microphone at the centre that can be used to communicate with teaching staff and with other teams. Students can also wirelessly project relevant information onto large projection screens hung around the room.

Teaching staff can access real-time learning analytics data that allow them to see both individual student and team performance, identify knowledge gaps that apply across the whole class, and then tailor their teaching to address these knowledge gaps during the class.

Source: Barber, M. (2021^[4]), *Gravity Assist: Propelling Higher Education Towards a Brighter Future*, Digital Teaching and Learning Review, Office for Students.

One way to fully benefit from digital tools is a “pedagogy-first” approach, defined by the UK’s Quality Assurance Agency as “the development of digital learning in which the pedagogical approaches to be taken in the delivery of the programme are placed at the forefront and regarded as a key driver in the programme development and design process” (QAA, 2020^[5]). This requires experimentation with different digital tools, and using digital tools not as a replacement for in-person learning but because they are the best tools to support the learning required. VIKO found this was the case when it considered how to adapt its assessment methods for the pandemic. The new assessments selected were more individualised. Rather than exams, the assessments included case studies and reflections, which gave the students the possibility to do self-directed learning and demonstrate critical thinking.

An example of how the University of Gävle in Sweden is experimenting with innovative digital tools to support digitally enabled learning can be found in Box 4.3.

Box 4.3. The University of Gävle’s Digital Learning Lab

Digital Learning Lab is an important node for research on IT and learning at the University of Gävle in Sweden. The group’s ambitions include developing IT and media competence in teacher training, both for teacher educators and students. Collaboration takes place with IT educators from several municipalities in the Gävleborg region and with other higher education institutions.

The lab also undertakes academic research digital learning. Technology available in the Digital Learning Lab includes:

- robots and programming
- augmented and virtual reality
- recording and e-meetings
- digital media production
- game-based learning (“gamification”).

The lab also has the equipment to support the creation of digital educational productions. It is open to partners outside the university to create productions for courses.

Source: (OECD/EC, 2021^[6]) *Supporting Entrepreneurship and Innovation in Higher Education in Sweden (Forthcoming)*.

Open access

Open educational resources, open science and open data practices are reshaping knowledge production and use in HEIs. Educators and students can capitalise on the open approach to create bespoke education programmes, benefiting from the latest relevant information, making quality education more accessible and equitable, as well as affordable. Researchers can share the results, obtain access to the latest findings and data, and can reuse and reproduce content, accelerating their own research agendas. An HEI that embraces open education, open science and open data commits to open outputs, open infrastructure and culture change.

In Lithuania, the library of Vilnius University has a unique role in the national innovation and entrepreneurial ecosystem, because it manages two important open access repositories. eLABa is a repository for research publications (articles, books, conference proceedings, etc.) and electronic theses and dissertations. It is a national repository owned by the Lithuanian Ministry of Education, Science and Sport, and managed by a consortium of 48 academic institutions. However, according to the law documenting

the governance of the repository, Vilnius University is the main managing institution, with overall responsibility for the data security and the operations of the repository. Beside its legal liability, Vilnius University, like any other institution in the consortium, is responsible for managing records created by authors affiliated with it. Four members of Vilnius University Library staff are responsible for looking after the metadata and full-text documents contained in the records created by members of the university. Other units in the university also have active roles in the consortium, but they are from units other than the library (mainly from the Information Technology Service Center).

The National Open Access Research Data Archive (MIDAS) is a repository for research datasets. It has the legal status of a “national information system” and is open to research data from all Lithuanian research and education institutions. MIDAS is also managed by Vilnius University, and the library is mainly responsible for user training/consulting, promotion and metadata curation. However, library staff also take part in projects concerned with the technical development of the repository, where they collaborate with specialists from the university’s Information Technology Service Center.

Vilnius University has identified a number of challenges presented by open access and these repositories. One of the major challenges is persuading the research community of the benefits of open access to information and open science. Often, the library finds that researchers do not come into contact with open-access concepts until required to do so by a funder or external pressure, and scepticism of the value of open access persists. The library has to devote significant energy to persuade the researchers that open access will be beneficial to their career and that it contributes to the common good.

A related challenge is that Lithuania has no national Open Science Policy/Roadmap. A unified position on open science would strengthen the voice of the academic libraries in advocating for openness. Although agreements have been negotiated by the Electronic Information for Libraries on discounts on article-processing charges, the price of open access publishing is still too high, since it can cost twice or three times the monthly salary of an average Lithuanian researcher.

The last challenge pertains to the funding of MIDAS. Vilnius University is supportive of open access to data and the data repository (MIDAS), but offers only funding for basic upkeep. Unlike eLABa, the data repository does not receive any funding directly from the state. MIDAS depends on project funding for improvement of the repository’s software and hardware. Stable funding would allow the managing team to plan for the development of the repository earlier than is currently possible.

Support for the wider digital ecosystem

HEIs can play an important role as an innovator of digital transformation and as a hub to improve capacity of their wider entrepreneurial ecosystem. This was an area of particular strength for Lithuania, and the institutions interviewed shared number of significant examples of how HEIs can support digital capacity in their networks and ecosystems.

In Klaipėda University, COVID-19 created new opportunities to support the surrounding region. For the past 10 years, Klaipėda University has participated in a project funded by the Ministry of Education, Science and Sport to support internet connectivity in schools. While this project had focused on physical infrastructure, in the summer of 2020, Klaipėda University noticed that their local schools were struggling to respond to the new demands of supporting online learning. Klaipėda University drew on its strong relationships with the municipality to develop a pilot which allowed the university to provide IT administrative support to all 36 schools in the region. This would include conducting IT audits to determine needs, provide cybersecurity, as well as open up its digital training to school teachers. Klaipėda University would also be responsible for the procurement of licences, to reduce the costs for all.

The goal was to improve the digital capacity of schools and improve the learning experience for students, but the project also had secondary benefits for Klaipėda University. Schools provide a test bed for different technologies, and expand its reach with local schools.

Other institutions also contributed to the efforts in their regions to improve digitalisation. Vilnius City Council has established a Digital Innovation Hub, to encourage use of big open data, to support both its residents and start-ups. Vilnius University, among other HEIs, supports this initiative through a partnership with science parks, which help clients structure their business plans, find a team and submit applications for funding.

Kaunas Technical University is establishing a centre of expertise in artificial intelligence. The decision to specialise in AI was the result of linking the institution's existing expertise in mathematics to the skills gaps it had identified in the region, in particular around video game designers and graduates with computer engineering qualifications.

In all these examples, Lithuanian institutions are collaborating with stakeholders to build not only their own digital capacity and that of their region as a whole. This is accomplished by collaborating with stakeholders, sharing infrastructure and supporting graduates with the necessary skills.

Lithuanian institutions may be particularly well placed to support digital capacity building, because they already have a relatively strong infrastructure and skill set relative to other organisations. They should be encouraged to build on their leadership role, and carry through this mind-set when they look to digital transformation in other parts of their organisation.

Impact of digitalisation on innovation, administrative and central services

Like any other organisation, innovation in administrative services in higher education can result in important increases in organisational capacity, freeing up resources that can be used to invest in development and increases in productivity.

In discussions, a positive view of the digitisation of administrative support emerged. Online document-processing systems were seen as very positive developments, reducing the amount of paperwork and enabling remote work. Academics cited the value of good document-management systems, smooth processes such as the use of e-signatures, and the ability and ease of undertaking work remotely and from any location. Remote meetings were seen as making decision making faster. In fact, IT supported a wide range of day-to-day administration, including financial management, publication of academic information, timetabling and project planning. Digital support for online staff meetings was increasingly being used for online conferences, which attracted international participants. Students reported that they had noticed improvements in the administration at their HEIs. They said they felt supported and that things were improving each year. Timetabling had improved, paperwork was easier, and HEIs were responsive to students' requests and suggestions.

The Lithuanian Research and Education Network (LITNET) connects computer networks of research, study and education institutions. For all the institutions connected to this network, digital data transmission services are provided, as well as other innovative solutions in computer network technology and its services. LITNET activities aim to enhance the competitiveness of the Lithuanian economy by intensifying scientific research, to enable researchers and other academic and study staff and students to use services of the European academic network GEANT. This will give them access to a computer network environment comparable to any academic environment in Europe, obtaining high-quality data transmission services at a lower cost. LITNET is part of the European academic network and allows for participation in different projects on the platforms of other international computer network organisations (TERENA, CERT, etc.).

It was noted that some staff were reluctant to take full advantage of new technologies in administrative services. Although the digital support was good, the motivation to use it was not always high. Some teachers were slow to adopt innovation and felt that the pace of change could destabilise the working environment. This raised the question whether this reflected the shift in the organisational culture from academic to management values, e.g. in the increasing use of key performance indicators.

In discussion, academics reported that they had full access online, and that the fast, robust internet access in Lithuania had meant that working online was gaining acceptance. Despite the acknowledged need to invest in the digitisation of administrative services, the current structures were judged as supporting core activities. The smooth shift from physical to online tuition and the use of virtual learning environments were seen not simply as reactive but as part of a concerted strategy.

Opportunities for digital transformation

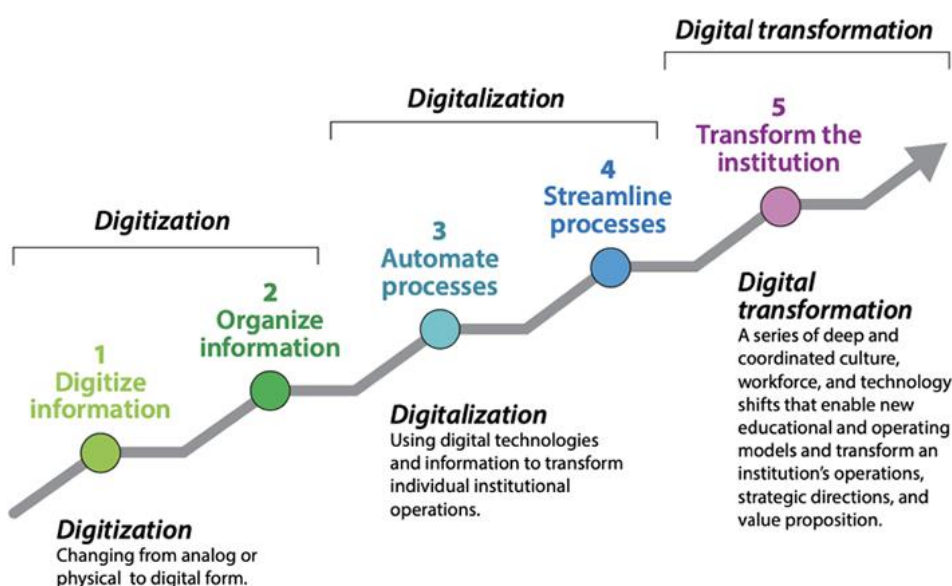
Lithuanian HEIs and RIs have accomplished much during their response to the COVID-19 pandemic, as they moved rapidly to teaching and offering administrative services online. This has begun to shift the mindset of students and staff towards accepting digital technologies.

This change in mindset is a crucial foundation for achieving wider digital transformation in Lithuanian HEIs and RIs. Digital transformation in the next five to seven years will need to be closely tied to the strategic planning and aims of the institution. Digital technology needs must be considered both in terms of how it can facilitate delivery of a strategy, as well as how to create opportunities and the risks to be managed.

Digital transformation is much broader than the adoption of technology. It requires a cultural, organisational and operational change in an organisation, through the smart integration of digital technologies, processes and competencies across all levels and functions in a phased process (Iosad, 2020^[7]).

Figure 4.2 below illustrates the digital transformation curve, moving from changing the form of delivery (e.g. moving lectures from in person to online) to transforming processes (e.g. online registration for courses) to a fuller digital transformation (e.g. courses designed with digital tools in mind and designing online modules to meet local skills needs, which can be complemented with in-person sessions).

Figure 4.2. Transition to digital transformation



Source: Reinitz, B. (2020^[8]), "Consider the Three Ds when talking about digital transformation".

Digital transformation at its best not only allows institutions to work more efficiently but influences their vision and strategy.

The challenging element of the transformation involves less the digital technology itself, but changing perceptions in the HEI about how it serves its students and community. This change in perspective requires both innovation and entrepreneurial thinking, and in turn, allows the HEI to become more entrepreneurial and innovative.

Clarity on the leadership of this digital transformation will be vital. As Lithuanian HEIs consider how to adopt a mind-set that support digital transformation, they should consider the changes in leadership culture this requires. Where is the source of digital expertise within the institution? Do those with expertise have sufficient authority and seniority in the institution's governance structures? Do governance bodies need up-skilling to be able to make decisions on the digital transformation of the organisation? Digital technology needs to be considered both in terms of how it enables the delivery of a strategy, as well as how it creates opportunities and risks to be managed.

Recommendations

To achieve the full potential of digital transformation in higher education will require considering digital tools as an integral part of the way in which institutions work. Lithuania has significant successes to build on, and institutions and policy makers should build on the momentum created by COVID-19.

Considerations for policy makers

Policy makers should ensure that institutions have the framework conditions in place to support digital transformation. In particular, in teaching, policy makers should consider targeted funding to support the development of teacher skills in digital pedagogy. This could build on the recommendations for capacity building in the chapter on Entrepreneurial Teaching and Learning.

Policy makers can help to create the conditions to maximise the benefit of open access and open science in Lithuania. Options include:

- Policy makers and sectoral bodies collectively develop an Open Access Strategy and Roadmap. A goal of this process should be creating owners for open access within the academic community.
- Tools such as MIDAS offer considerable potential, and the higher education sector and policy makers should develop a sustainable funding model.

Considerations for institutions

Institutions should work on adopting the shifts in culture and mindset to enable digital transformation. Options for doing so include:

- leveraging the HEInnovate Self-Assessment tool to understand the current state of their digital transformation
- ensuring that their governance structures have sufficient digital expertise to create a vision around digital transformation
- allowing HEIs and RIs to continue investing in innovative and digitally transforming their administrative services to improve the quality of their work, increase organisational capacity and improve productivity through greater efficiency and effectiveness.

In the area of teaching, HEIs should consider moving on from a pedagogy-first approach, and consider digitally enabled teaching a part of course design, rather than a replacement for face-to-face teaching. Options for doing so include:

- Undertaking student satisfaction surveys to evaluate the students' experience with online learning during the COVID-19 pandemic. Input from students should be used to influence how courses can integrate digital tools in teaching.
- additional training for teachers on the pedagogical potential of digital tools.

As for supporting the wider ecosystems, the HEIs and RIs should continue to increase their activities supporting Lithuania's wider entrepreneurial and innovation agenda. Institutions should continue to collaborate with their regional and local governments to assess their communities' digital transformation needs and collectively identify opportunities where HEIs and RIs can play a role.

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5 Organisational Capacity: Funding, People and Incentives

Entrepreneurial organisations encourage individuals, units and departments to reach across internal boundaries, to seek multidisciplinary collaborations and to connect to external organisations at the local, regional and national level. The majority of HEIs and RIs see themselves as playing a role in the so-called “triple helix” of government, education and industry as they work to create economic, social and cultural value in Lithuanian society. To build on these strengths will require more key performance indicators.

Introduction

Organisational capacity is the ability of a higher education institution (HEI) or research institute (RI) to deliver on its strategy. If an organisation is committed to greater innovation, and to taking a more entrepreneurial approach to its core activities, key resources, such as funding and investments, people, expertise and knowledge, and also incentive systems, must be in place to increase its capacity for entrepreneurship.

This chapter explores four key behaviours of entrepreneurial organisations:

1. Making a strategic commitment to become more entrepreneurial and using key performance indicators to monitor and improve performance.
2. Using the key resources of funding and people to support the achievement of strategic objectives.
3. Designing and using incentives and rewards to sustain and increase organisational capacity.
4. Providing ongoing staff development to support the transformation of an organisation.

These behaviours of entrepreneurial organisations are incorporated into the HEInnovate Framework for Organisational Capacity: Funding, People and Incentives (see Box 5.1).

Box 5.1. Organisational Capacity: Funding, People and Incentives in the HEInnovate Framework

The HEInnovate Framework defines the 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, then key resources such as funding and investments, people, expertise and knowledge, and incentive systems need to be in place to sustain and grow its capacity for entrepreneurship.

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.

Source: HEInnovate (n.d.^[1]), *Home Page*, <https://heinnovate.eu>. Accessed 05 October 2021

Strategy and key performance indicators

Strategy

Entrepreneurial organisations encourage individuals, units and departments to reach across internal boundaries, to seek multidisciplinary collaborations and to connect to external organisations at the local, regional and national level. HEIs and RIs in Lithuania expressed a strong commitment to an entrepreneurial role, which they consider to be aligning themselves with the practical needs of society. They see

themselves as playing a role in the so-called “triple helix” of government, education and industry, as they work to create economic, social and cultural value in Lithuanian society.

In discussion, HEIs and RIs reported that their own strategies are closely aligned with national government policies. This is facilitated by a number of formal mechanisms to encourage dialogue between the Ministry of Education, Science and Sports, the HEIs and RIs, including such groups as the Lithuanian University Rectors’ Conference, which co-ordinates relationships between rectors (directors) of HEIs and state government, administrative and municipal institutions. The Conference aims to promote Lithuanian scientific, educational, cultural and economic development, co-operation between HEIs and international networking, as well as co-operation with government authorities and local government. A comparable role is played by the Rectors’ Conference of Lithuanian University Colleges, an association grouping the Rectors of 12 Lithuanian state and 7 private Universities of Applied Sciences.

HEIs and RIs are also able to enhance the alignment of national and organisational priorities by providing input for a variety of working groups that advise the Ministry. In discussion, HEIs confirmed that they have provided expert advice to the Ministry and its working groups on a wide range of topics, including HE policy, the missions of individual HEIs, the remuneration of staff, health technologies, smart specialisation, ICT, agriculture, food technology, photonics and energy. The LSMU, for example, noted how its research on alcohol and tobacco could be used to inform national policy discussions on taxation.

Representatives of HEIs also provide expert advice to many organisations, professional associations and expert groups at both the national and municipal level, including the Research Council of Lithuania and the Lithuanian Academy of Sciences and the Lithuanian Scientific Society. The wide range of subjects and disciplines offered for study and research were seen as enabling HEIs to take a multidisciplinary approach in responding to priorities in both the private and public sectors. In discussion, all HEIs mentioned the success of the recent work by expert groups at the local and national level in response to the COVID-19 pandemic.

HEIs and RIs reported that they value strategic collaborations with each other, with Lithuanian business and society, and with organisations in the Baltic, Europe and internationally. This can increase organisational and national capacity by providing access to additional physical and intellectual resources.

One example of a strategic collaboration focusing on innovation, creativity and societal impact is the European Consortium of Innovative Universities (ECIU), a network of 12 European universities of which Kaunas University of Technology is a member. The ECIU, founded in 1997, is a select group of entrepreneurial universities funded by the EU that aims to create a new educational model on a European scale. It brings together students, teachers and researchers to co-operate with cities and businesses on solving real-life challenges, and to work on grand challenges such as the UN Sustainable Development Goal 11, “Sustainable cities and communities”. The Rector of Kaunas University of Technology and a representative of the university’s student union sit on the ECIU Board.

Another example of a strategic collaboration, this time for the purpose of improving technology transfer, is TTO Lithuania, which is a partnership between five Lithuanian universities: Vilnius University, Kaunas University of Technology, Vilnius Gediminas Technical University, the Lithuanian University of Health Sciences and Klaipėda University. Its long-term perspective is to establish a regional network of the Baltic states with institutions in neighbouring countries, with the aim of uniting knowledge and technology transfer professionals working in science and study institutions, and to create opportunities for them to exchange professional practical knowledge and raise competence in the field of intellectual property management.

Key performance indicators

Discussions with HEIs and RIs explored how they evaluate the success of their strategies and entrepreneurial objectives. HEIs were able to cite examples of indicators that could be used to make these judgements, such as the overall level of government funding, successful competitive bids for additional funding, the level of money they attracted from industry, the number and quality of research papers, the number of patents registered and the number of start-ups created by doctoral students and academic researchers. It should be noted that some of these indicators are more relevant to the universities than the colleges, since colleges receive less research funding than universities.

HEIs noted, however, that they do not common practice for HEIs to benchmark their performance against each other or against other HEIs in Europe. They noted that there is some limited but useful information can be found on the websites of Lithuanian HEIs but that there is no common data set that is either supplied or analysed by all HEIs. It was noted that HEIs can be reluctant to make such comparative judgements, since this could be perceived as being “impolite” in a system that values collegiality.

Comparisons between Lithuanian and European HEIs in terms of innovation and entrepreneurship performance, for example, are typically made on an informal basis, using a tacit understanding developed as a result of participation in strategic partnerships, connections to industry, memberships of professional bodies, delivery of joint projects and by attendance at conference and other events. No agreement has been concluded between organisations about the indicators that could be used for benchmarking their performance, and no evaluations are currently undertaken.

One example of a methodology that HEIs and RIs might use for a more robust approach to benchmarking is the European Innovation Scoreboard 2020 (see Box 5.2) which provides a comparative assessment of research and innovation performance of EU countries against other European countries and their regional neighbours. As noted above, Lithuania is judged to be a Moderate Innovator (on a rising scale starting from Modest Innovator, Moderate Innovator, Strong Innovator to Innovation Leader).

Box 5.2. European Innovation Scoreboard

The European Innovation Scoreboard provides a comparative analysis of innovation performance in EU countries, other European countries and regional neighbours. It assesses relative strengths and weaknesses of national innovation systems and helps countries identify areas they need to address. The European Innovation Scoreboard 2020 was released on 23 June 2020.

The 2020 edition of the Innovation Scoreboard highlights that the EU's innovation performance continues to increase at a steady pace, with growing convergence between EU countries. On average, the innovation performance of the EU has increased by 8.9% since 2012. Performance increased in 24 EU countries since 2012, with the largest increases in Lithuania, Malta, Latvia, Portugal and Greece.

At the global level, the EU's performance has overtaken the United States for the second time, and it continues to perform better than the United States, China, Brazil, Russia, South Africa and India. Since 2012, the gap between the EU's performance and that of South Korea, Australia and Japan has increased, while the EU's performance lead over the United States, China, Brazil, Russia and South Africa has decreased.

Source: EC (2020^[2]), *European Innovation Scoreboard 2020*, European Commission.

HEIs and RIs in Lithuania expressed confidence in their ability to contribute to regional and national development in the Baltic region. Indeed, the Analysis of 2011-2015 external review of HEIs in Lithuania concluded that the scale of impact by HEIs on regional and national development is beyond any doubt and marks a win-win situation. The positive regional and national impact is felt both by institutions of research and academic studies and their social partners. Among many advantages they noted, co-operation with business and academic partners merits special attention for stimulating knowledge development, facilitating qualitative improvement of the curriculum, and contributing to employment and other national priorities. Effective regional and national development activities and publicity contribute to the status and prestige of HEIs, including among potential new students.

In conclusion, the majority of HEIs and RIs described a strategic commitment to becoming more entrepreneurial. Strong evidence emerged of an entrepreneurial approach in the alignment between HEIs and national and organisational priorities and in their many strategic collaborations. However, it was noted that key performance indicators are not used to benchmark the entrepreneurial performance of HEIs and RIs. There are many existing achievements by HEIs and RIs and these would benefit from being located within the national and European contexts. Benchmarking would help to promote current entrepreneurial strengths, to identify institutional comparators, to ensure that any weaknesses are identified, to create effective targets for improvement, strengthen institutional identity and ultimately to enhance the international reputation of Lithuanian higher education and research.

Funding and people

If an HEI or RI is committed to carrying out entrepreneurial activities to achieve its strategic objectives, key resources, both funding and people must be in place to sustain and increase its capacity.

Funding

An entrepreneurial organisation is one that is determined to both maximise and diversify its funding base. For example, HEIs seek to maximise the state funding that they receive, first for teaching, and secondly, for research. However, such funding often only covers fixed costs. This leaves little discretionary monies for accelerating innovative or entrepreneurial development. Organisations thus seek to diversify their funding through third-stream activities, such as working with the public and the private sectors, with industry and philanthropists, and by raising income from intellectual property and campus services. In addition, strategic collaborations can offer access to additional funding, physical and human resources.

HEIs reported a strong motivation and a strategic commitment to raising money from nongovernmental sources, although they noted that this is a highly competitive area and that raising third-stream income from business and industry is not easy. Competition for external funding is considered “tough”, requiring high quality, competitively priced products. Barriers to income generation include an unwillingness on the part of companies to pay for services and a perceived lack of entrepreneurial culture in academia and the wider society.

In discussion, it was noted that targets were crucial if third-stream income was to be increased, by setting up targets that were described as ranging from “comfortable” to “stretching”. Financial targets could be set at the organisational, departmental and individual levels. Ambitious targets are sometimes used to stimulate competition within an organisation. In HEIs, the financial targets could be varied between academic disciplines on the basis of their inherent income potential. One business school, funding is composed of 40% government funding and 60% external funding.

HEIs reported a wide range of activities they use to raise money, including the sale of products and services, providing consulting and training, and supplying access to specialised equipment and facilities. Vilnius Gediminas Technical University offers services for business that combine creativity and expertise

to solve relevant problems. They might, for example, evaluate a product or technology from a business point of view; create prototypes using the latest technological solutions; create advertising for products; or analyse the possibilities for commercialisation.

Strategic partnerships with prestigious companies can ensure continuity and sustainability of funding. The National Innovation and Entrepreneurship Centre (NIEC) at KTU is a link between science and business, ensuring smooth mutual co-operation, commercialisation of the latest innovations developed at the university, protection of intellectual property and developing newly established enterprises. The Design Innovation Centre of Vilnius Academy of Arts is a centre of excellence that was established in 2007 to promote design in society, which generates income by providing commercialisation, development and renewal of new products and incubation activities.

Companies are sometimes willing to invest in infrastructure, for example, new laboratories. As an example, the Lithuanian AI Laboratory opened its doors in 2020 at the Institute of Data Science and Digital Technologies of the Faculty of Mathematics and Informatics of Vilnius University. It is a result of co-operation between Vilnius University and a Lithuanian biometrics company, Neurotechnology. The AI Laboratory aims at fostering the practical application of knowledge by solving scientific and technological problems related to artificial intelligence, machine learning, automatised and robotics. In Lithuania, few companies can afford a R&D department. The creation of this laboratory is seen as a win both for business and for academia.

Philanthropy is not yet well established in Lithuania as a source of additional income for HEIs. The Vilnius University Foundation is the first university endowment in Lithuania. In 2016, three investors established an endowment capital fund, and the return from investment is used to ensure university's financial stability, finance studies, internships, establish scholarships and mobility grants for the most talented students and scholars at home and abroad.

People

An entrepreneurial organisation seeks to create maximum value by involving and empowering each employee to use their expertise and knowledge. The level of innovation in an organisation is influenced by the diversity of people and the degree of their inclusion in creative activities and decision-making processes. Issues of diversity (age, gender, race, etc.) and equal opportunity are important factors in increasing organisational capacity. HEIs discussed the diversity of their staff in terms of gender, age and nationality, and in relation to academic subject disciplines, research and management positions.

The percentage of women academics in Lithuanian HEIs is one of the highest in OECD countries, but this is not true of all academic disciplines. Students noted, for example, the absence of women professors in physics. This lack of diversity can have an impact in many ways, for example on student support, supervision of study trips and in a lack of career role models. The percentage of female university professors of the total number of professors was 35% in 2015 and 40% in 2019.

Efforts to establish diversity depend on demographic trends. In 2019, more than one-fifth of the EU-27 population was aged 65 and over. The percentage of people of 80 years or older in the EU-27's population is projected to increase by a factor of 2.5 between 2019 and 2100, from 5.8% to 14.6%. The increase in the percentage of the population of age 65 years or over between 2009 and 2019 in Lithuania was 2.6%, compared to the EU average of 2.9%.

Interviews suggest that it was seen as important for the long-term sustainability of HE and research to be able to recruit younger, international staff and people from industry. The percentage of persons awarded master's degrees in Lithuania is almost half the OECD average, and the share of researchers in the total number of employed persons is by 27% lower than the EU average. The number of doctoral graduates in Lithuania is half the OECD average.

Equal opportunities are relevant to every aspect of the operation of HEIs, including the recruitment and progress of students and staff. Student admissions in 2019 included 1.4 times fewer men than women among university entrants. Those with a basic disability enter HEIs less frequently than those who do not have special needs. In discussion, students noted that in their opinion, students were treated fairly by their HEIs. In terms of career progression for staff, as in other OECD countries, fewer women occupy senior positions in Lithuania. In discussion, it was noted that staff who concentrate on teaching are at a disadvantage, since promotion is based on research rather than teaching. Wage analysis by groups of positions and by gender shows that in many positions, women receive lower wages than men.

Discussions revealed how well-versed the organisations were in the debate around these issues of diversity and equal opportunity, including whether strategies or policies existed or were under development, the monitoring of key performance indicators, and the drivers for developments in these issues, including demographic trends. One HEI reported that this was a relatively new discussion which tended to occur more at the level of top management. Another HEI shared the view that although these issues were fully embedded in some disciplines, e.g. in health and nursing education, it is hard to connect these issues to all academic disciplines and that they are rarely discussed.

HEIs and RIs acknowledged the need to develop strategies, policies and plans, not least because European funding streams has recognised the importance of improving gender equality in research and innovation, and to overcome persistent gender gaps. As a result, gender equity plans will gradually become part of the eligibility criteria for public bodies, research organisations and HEIs applying to the programme. Discussions of gender equality policies and plans in Lithuanian HE and research revealed that some organisations are only in the early stages of incorporating equal opportunities into their organisational strategy and devising key performance indicators, while others are much further along. Important questions to investigate include how diversity data is gathered, how equal opportunities are monitored, who is conducting the monitoring, what actions are taken as a result and whether these actions lead to improvements. It is preferable if organisational procedures can detect and correct problems. It is unsatisfactory if a lack of equitable opportunity goes unnoticed and if those who are subject to discrimination are unable or prevented from getting the support they need.

KTK supplied an example of an annual report where a variety of statistics are analysed, including the gender balance. This included analysis of all workers, the distribution of college lecturers' positions by study programs, the qualifications of lecturers, the number of lecturers from universities and other research institutions and business enterprises invited to the college, the number of lecturers from foreign countries, the distribution of teachers by age, the number of staff participating in professional development, the number of staff participating in Erasmus+ projects, and the strengths and aspects to be improved.

Vilnius University is one of eleven partners from nine European countries in the Supporting and Implementing Plans for gender Equality in Academia and Research (SPEAR) consortium, funded by the European Union's Horizon 2020 Science with and for Society programme. SPEAR focuses on supporting the implementation of Gender Equality Plans in European universities in accordance with the European Institute for Gender Equality's GEAR tool which provides universities and research organisations with practical advice and tools through all stages of institutional change, from setting up a gender equality plan to evaluating its real impact.

At Kaunas Technical University approved an Equality and Diversity Policy to ensure the implementation of the fundamental human rights set out in the Constitution of the Republic of Lithuania and the Charter of Fundamental Rights of the European Union. The university has also set up an Equality Committee. The Council of Marine Research Institute at Klaipėda University has confirmed a Gender Equality Action Plan for the period 2018-2023. The Lithuanian Research Centre for Agriculture and Forestry has discussed diversity and equality in relation to six long-term research programmes, and these issues were also raised with the Ministry.

In summary, HEIs and RIs reported that they are committed to using the key resources, such as funding and people, that are needed to sustain and grow capacity. Many examples were cited of efforts to diversify income through third-stream activities. Diversity and equal opportunities are also important in increasing organisational capacity, and some organisations are developing equal opportunity strategies and using key performance indicators to evaluate and improve performance. Diversity and equal opportunity are a useful means of increasing organisational capacity and the long-term sustainability of HE and research.

Incentives, efficiency, productivity and value for money

Incentives

If an HEI or RI is committed to carrying out entrepreneurial activities to support its strategic objectives, incentive systems need to be in place to sustain and increase its capacity for entrepreneurship. In discussion, all HEIs and RIs confirmed that they use incentives to motivate and reward their workforces.

Staff can receive additional supplements to their salaries if they meet or exceed agreed performance targets. Klaipėda University has introduced a new salary system, approved by its council, with a base salary and the chance to earn extra for contributions to innovation and start-ups. RIs reported that staff who worked harder and generated more research output were rewarded with additional salary.

HEIs and RIs reported that they have procedures in place for the allocation of duties and responsibilities to staff members. Kaunas Technical University publishes Guidelines for Organisation of Performance Evaluation and Competitions for the Positions of Lecturers and Researchers. All HEIs confirmed that they share a common approach in which the teaching staff's work responsibilities are allocated to teaching and research, and the balance of those activities for each year is agreed upon in advance with their academic manager. Minimum targets for research output are commonly used when agreeing on work outputs and workloads. Where appropriate, allocating hours to other duties, e.g. professional practice, creative activities and external liaison, is also accounted for.

In discussion, it was noted that the management of workloads is the responsibility of the individuals and their immediate manager. There is no central oversight of workloads or mechanisms for avoiding extremes of low or high workloads. Some students noted that academics are obliged to work long hours in order to fulfil a broad range of responsibilities and that higher workloads can deprive academic staff of time for reflection, creativity and entrepreneurship. HEIs reported that staff experience high workloads and noted that academics can become demotivated if their workloads remain too high for too long.

HEIs also use awards to incentivise staff. KTK makes awards to staff in both the study and the research departments, and these are announced and celebrated during the graduation ceremonies. The LSMU holds a competition to identify the most innovative lecturer, who receives a financial award.

Incentives are sometimes funded from additional third-stream income. This may be modest compared to government funds, can enable an organisation to provide monetary and non-financial incentives. In discussion, HEIs reported that they used the income raised from nongovernmental sources in a variety of ways, including for overheads for central services (writing contracts, meetings, etc.), to support faculties (both infrastructure and people) and to reward academics (in salary, and in time for study and research).

Efficiency, productivity and value for money

Additional resources gained from third-stream income sources enables additional output. The corollary is that if the additional resources are not available, then it is not possible to produce, or perhaps even attempt to produce, the additional outputs. A more entrepreneurial approach would be to consider questions of efficiency (the ability to accomplish something with the least amount of wasted time, money and effort), productivity (maximising the value created from the available resources) and value for money (cost

minimisation, output maximisation and full achievement of the intended results.) These are important issues, given the limited amount of public funding available, the inevitable rise in costs year-on-year and the increasing expectations that a variety of stakeholders have in the quality and impact of HE and research.

Efficiency, productivity and value for money are complex issues in the context of HE and research. They are difficult to measure, and their meaning and purpose are a matter of debate. In discussion, HEIs and RIs reported that measuring productivity is seen as difficult and hard to evaluate. For example, HEIs reported tensions between demanding teaching workloads and the requirement to generate high-quality research papers. No methodology is currently used, however, to monitor or attempt to increase productivity. Productivity was described as simply “trying to deliver as much as we can.”

The distribution of duties between academics, researchers and administrators is an important issue. According to the Review of the State of Higher Education in Lithuania, administrative staff members are three times more numerous than academic staff. The growing need for monitoring and accountability is driving up the number of staff performing these functions. The use of new technology is also an important consideration. At Klaipėda University, administration of internal and government funded projects has been managed entirely online since 2020, saving time, generating management information and reducing paperwork. Such systems need to be aligned with the procedures and systems used by the HEIs and RIs to report to the Ministry, to avoid duplication of effort and reduced productivity.

In conclusion, in both HE and research, as organisations strive to become more entrepreneurial, it becomes necessary to address issues of efficiency, productivity and value for money. This inevitably requires major changes to traditional and current ways of working and will require concerted effort to achieve the necessary organisational transformation. The approach must be realistic, recognising problems, obstacles and bottlenecks. It must overcome any inability or unwillingness to question the status quo or to embrace change. Organisation-wide action plans will be needed to improve the capacity of entrepreneurship and innovation at every level of an organisation.

Staff development and organisational transformation

If an organisation is committed to greater innovation, and to taking a more entrepreneurial approach to its core activities, it will need a commitment to ongoing staff development and organisational transformation. In discussion, HEIs and RIs reiterated their commitment to encouraging an entrepreneurial attitudes and behaviours of staff and students, to achieve this organisational change.

Staff development

The objectives of staff development include strengthening capacity, enhancing the ability to deliver strategic objectives, establishing and embedding good working practices and ensuring that people have the necessary expertise and knowledge to make the best use of the resources available in an efficient, productive manner.

Staff development can help develop a set of shared understandings of the attributes that all staff should develop and help staff to see how their day-to-day responsibilities influence the organisation’s strategy and entrepreneurial goals. HEIs reported that they “treasure people” and that their culture encourages people to grow personally and professionally. Organisations make a variety of development opportunities available to staff, including specialised seminars, congresses and conferences, workshops and financial support for doctoral study. Responsibility for developing staff competencies is often the responsibility of deans in the faculties rather than of a central human resources department. Typically, a personnel department manages the formal procedures associated with the recruitment and employment of staff.

In discussion, it was noted that RIs place less emphasis on personal development and place greater focus on the quality of the science. At KTK, the professional development of college teachers is encouraged by in-house courses for staff to improve their qualifications, including studying for doctoral and master's degrees. External seminars, conferences and projects at national and international levels provide opportunities for development. Erasmus+ projects allow teachers and staff of the college to go on short-term teaching or study visits. Finally, opportunities to enhance the knowledge and expertise related to business and industry arise in consulting and training activities with practitioners and enterprises.

Staff development needs and opportunities are identified and agreed during an annual meeting to review performance and plan future work responsibilities. One HEI noted that discussion of innovation and entrepreneurship could be “embarrassing” in an annual review, since academics are considered conservative in their outlook. Another HEI noted that although informal discussions of topics such as the entrepreneurial mindset did occur, such considerations have not been made a formal part of annual performance reviews. One RI shared the view that researchers should not be forced to become more entrepreneurial. Doubts were expressed as to whether every discipline, all staff or all organisations had the ability to become more entrepreneurial, or even if this was desirable.

Intrapreneurship is the idea that organisational capacity can be increased by encouraging employees to develop their attitudes and behaviour, so that they think and act more like entrepreneurs. This applies not simply in the pursuit of entrepreneurial activity, such as the commercialisation of research, but by using entrepreneurial behaviour as appropriate, such as risk-taking and creativity, in all their duties and responsibilities.

In discussion, it was clear that little consideration is given to intrapreneurship, or the rigorous identification of the desirable characteristics of entrepreneurial employees or of the value of increasing productivity to release more human resource potential for HE and research. In an example of a more forward-looking approach, the European Institute of Innovation and Technology (EIT) health hub at LSMU organises innovative staff development activities for academics and administrators, including hackathons and pitch competitions.

Organisational transformation

In discussion, HEIs and Research Institute confirmed that they have a strategic commitment to changing their organisations to become more entrepreneurial. However, they also recognise that this change will mean engaging in an “entrepreneurial journey” over the medium to long term. Some organisations are already introducing new entrepreneurial activities, e.g. entrepreneurship qualifications for students, entrepreneurship topics for research or collaborations with industry. The longer-term goal is the establishment of an entrepreneurial culture that builds new relationships and synergies, which infuses every part of an organisation and all its activities. Creating such a culture will require organisational transformation that continuously builds capacity for innovation and entrepreneurship.

The need to improve the innovation capacity for HEIs is a key objective for the EIT as part of its new strategy, the EIT Strategic Innovation Agenda (SIA) 2021-2027. The initiative aims to support HEIs to develop innovation action plans (see Box 5.3) and recognises the need for organisational change. The Pilot Call for Proposals invites European HEIs to design institutional action plans to enhance their entrepreneurial and innovation capacity at all institutional levels.

Box 5.3. Innovation capacity building for higher education

The HEI Initiative: Innovation Capacity Building for Higher Education is a key objective for the EIT as part of its new strategy, the EIT Strategic Innovation Agenda 2021-2027. The initiative aims to support HEIs with expertise and coaching, access to the EIT innovation ecosystem and funding, enabling them to develop innovation action plans complementing the needs of individual HEIs. The initiative will help HEIs across Europe enhance their ability to innovate. More specifically, the initiative aims to encourage these institutions to look at their own practices and develop concrete actions to increase the impact of their innovation and entrepreneurship activities on their local and regional ecosystems.

What type of activities will the Initiative support? Activities to support HEIs can focus on several themes, including:

- encouraging institutional engagement and change
- strengthening partnerships between higher education, business and research organisations
- developing innovation and business support services
- enhancing the quality of entrepreneurial education
- creating and disseminating knowledge.

Source: EIT (n.d.^[3]), *Opportunities*, <https://eit.europa.eu/our-activities/opportunities/pilot-call-hei-initiative-innovation-capacity-building-higher-education>; EIT (2021^[4]), *Pilot Call 2021: Factsheet*, <https://eit-hei.eu/assets/pdf/hei-factsheet.pdf>.

Transformation and cultural change in any organisation are challenging, and HE is no exception. However, a substantial body of literature and case studies offer guidance as to what works and what does not. For example, an entrepreneurial culture can be encouraged (see Box 5.4) if an organisation identifies common entrepreneurial attributes for its staff and makes explicit the connections between its entrepreneurial strategy and their day-to-day roles and responsibilities.

Box 5.4. Supporting institutional transformation for an entrepreneurial culture

In developing an entrepreneurial culture, it could be beneficial for a university to:

1. make a strategic commitment to developing a unified culture with the objective of supporting stakeholder engagement including interactions between the university and industry
2. create, through wide-ranging discussions, a set of shared understandings of the common attributes that all staff might develop and which would provide a foundation to support university interactions with external organisations, including industry
3. connect entrepreneurial strategy to the day-to-day roles of staff and define the corresponding expectations for leadership and management
4. use human resources policies to devise a system of pay, rewards, recognition and incentives that will motivate staff to become more entrepreneurial
5. provide development activities for senior staff so that they can become entrepreneurial leaders capable of building an entrepreneurial culture.

To overcome the obstacles reported in moving a university toward an entrepreneurial mode, leaders must demonstrate the tangible benefits of an entrepreneurial strategy in enhancing an institution's reputation and building a sense of pride in staff, students and business partners. They need to become role models of entrepreneurial leadership and ensure that the entrepreneurial strategy is an embedded priority for all.

Source: Coyle, P. (2014^[6]), "How Entrepreneurial Leadership Can Engage University Staff in the Development of an Entrepreneurial Culture", <http://dx.doi.org/10.5367/ihe.2014.0215>.

In conclusion, HEIs and RIs can be guided in their pursuit of organisational transformation by using research literature, case studies, the output of new initiatives, such as the EIT Innovation Capacity Building and by learning from other exemplary organisations. In discussion, the examples of Aalto University in Finland and Eindhoven University of Technology in the Netherlands were both cited as useful case studies. A note of caution is necessary, however, since translating good practice from one context to another is fraught with difficulty. Each organisation will need to devise its own approach to its "entrepreneurial journey" and define what entrepreneurship means in relation to its own history, location, resources and future strategy. Finding the right terminology in the Lithuanian language is also crucial.

Recommendations

Considerations for policy makers

The majority of HEIs and RIs described a strategic commitment to becoming more entrepreneurial over time. HEIs and RIs see themselves as playing a role in the so-called "triple helix" of government, education and industry as they work to create economic, social and cultural value in Lithuanian society. Strong evidence of an entrepreneurial approach is indicated by the alignment of national and organisational priorities and in the many strategic collaborations involving Lithuanian partners. However, a lack of key performance indicators to benchmark the entrepreneurial performance of HEIs and RIs was noted. Policy makers should work with organisations in Lithuania and Europe to establish a set of key performance indicators that would allow for a robust approach to benchmarking. This could help promote current entrepreneurial strengths, identify institutional comparators, ensure that any weaknesses are identified, create effective targets for improvement, strengthen institutional identity and ultimately enhance the international reputation of Lithuanian higher education and research.

Considerations for institutions

HEIs and RIs should continue to use key resources, both funding and people, to sustain and grow capacity. They should maintain their efforts to diversify income through third-stream activities. At the same time, institutions should increase their efforts to promote the benefits of diversity and equal opportunity as a means of increasing organisational capacity and securing the long-term sustainability of HE and research. All institutions should strengthen their equal opportunities strategies, the associated action plans and the use of key performance indicators to evaluate and improve performance.

If institutions are to achieve their stated aim of becoming more entrepreneurial, they should do more to address issues of efficiency, productivity and value for money. This will inevitably require major changes to traditional and current ways of working. Institutions should ensure that their organisation-wide action plans can deliver improvements in the capacity for entrepreneurship and innovation. Institutions should ensure that their approach is determined and realistic, fully recognising the inevitable problems, obstacles and bottlenecks that will have to be overcome.

HEIs and RIs should strengthen their capacity for organisational transformation by making use of research literature, case studies, the outputs of new initiatives like the EIT Innovation Capacity Building and by learning from other exemplary organisations. However, a note of caution is necessary, since the translation of good practice from one context to another is far from obvious. Each organisation will need to devise its own approach to its “entrepreneurial journey” and define what entrepreneurship means in relation to its own history, location, resources and future strategy. Finding the right terminology in the Lithuanian language is also crucial. It will be necessary to design institution-wide action plans to address the scope of the ambitions for building an entrepreneurial culture and the challenges of transformation.

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