SILESIAN UNIVERSITY OF TECHNOLOGY PUBLISHING HOUSE

SCIENTIFIC PAPERS OF SILESIAN UNIVERSITY OF TECHNOLOGY 2025
ORGANIZATION AND MANAGEMENT SERIES NO. 223

KNOWLEDGE-SHARING NETWORKS OF HIGHER EDUCATION INSTITUTIONS FOR INNOVATION AND ENTREPRENEURSHIP: EVIDENCE FROM THE "DISCO" PROJECT CASE STUDY

Lidia GRYSZKIEWICZ[1], Stephanie KAUDELA-BAUM[2], Piotr KOPYCIŃSKI[3], Marek ORAMUS[4]

[1] LIMITLESS sarl, Luxembourg; lidia.gryszkiewicz@limitless.lu, ORCID: 0000-0003-3122-0228
[2] Lucerne University of Applied Sciences and Arts, Switzerland; stephanie.kaudela@hslu.ch, ORCID: 0000-0002-2480-5108
[3] Krakow University of Economics, Public Economy Department; kopycinp@uek.krakow.pl, ORCID: 0000-0001-8895-9432
[4] Krakow University of Economics, Public Economy Department; oramusm@uek.krakow.pl, ORCID: 0000-0002-3828-8041
*Correspondence author

Purpose: The aim of this article is to assess the impact of the inter-organisational collaboration and knowledge-sharing networks among the higher education ecosystems on higher education institutions' (HEIs') innovation potential, based on the DISCO project case study.
Design/methodology/approach: The study is based on the self-assessment tool named HEInnovate which was used by higher education institutions (HEIs) engaged in the project to compare the 'before' and 'after' results. Its eight dimensions were integrated with theoretical dimension from the heuristic framework providing a structured way to measure the impact of inter-organisational collaboration on the innovation potential of HEIs.
Findings: This study affirms that higher education innovation is best understood as a networked, collaborative, and evolving process. The presented case study of the DISCO project shows the benefits of cooperation among HEIs from different countries, with different levels of development, innovation and entrepreneurship support.
Research limitations/implications: The model offers a valuable structure for further comparative analysis across HEI collaboration projects in different regional or disciplinary settings. It also provides a foundation for developing longitudinal impact tracking tools that combine self-assessment data with network analytics and case-based learning.
Practical implications: Based on the DISCO project's positive impact on the participating HEIs' innovation potential, the authors provide practical recommendations regarding e.g. focus on digital development, joining the leading entrepreneurial ecosystems, investing in further entrepreneurial support successes and continuing the innovation labs.
Social implications: The heuristic framework helps to interpret institutional change more holistically and serves as a guide for both practitioners and policymakers aiming to foster sustainable and scalable innovation in higher education across Europe.
Originality/value: Within this heuristic framework, we draw upon a selection of complementary theories and concepts—such as stakeholder theory, co-production and co-creation, knowledge transfer and management, innovation ecosystems, platform theory and

living labs - to understand the mechanisms and impact of HEI collaboration in the field of innovation and entrepreneurship education based on the specific case study.
Keywords: Higher Education Institutions, international cooperation, management in higher education, innovation, innovation ecosystems.
Category of the paper: case study.

1. Introduction

In a time of rapid societal transformation, digital disruption, and urgent sustainability challenges, collaboration among European higher education institutions (HEIs) has become essential for advancing innovative and entrepreneurial education that prepares students to navigate and shape an uncertain future (Guererro et al., 2024; Syed et al., 2023). This paper attempts to answer the research question of how international collaboration in networks of higher education institutions (HEIs) and the development of joint activities along clearly defined entrepreneurial HEI development and reflection categoriesfields can influence can influence the innovativeness and entrepreneurship support capabilities of these organisations. Specifically, the article examines the impact that international collaboration within the framework of a European project can have on the entrepreneurial and innovative potential of on the innovation potential of HEIs,higher education institutions (HEIs). ISpecifically, it summarises by analysing the results of the HEInnovate self-assessments conducted by the HEIs participating in the DISCO (Developing Innovative Sustainable Cooperation Opportunities) project, which was co-financed by the EIT-HEI Initiative.

The EIT HEI Initiative – *Innovation Capacity Building for Higher Education* (EIT HEI Initiative, 2025; Volkert, Bunescu, 2024) – is designed to enhance innovation and entrepreneurial capacity in higher education by fostering integration across HEIs, industry, and societal actors in pan-European innovation ecosystems. A central guiding model is the EIT Knowledge Triangle (EIT Knowledge Triangle, 2025), which stresses the integration of education, research, and innovation to create systemic institutional transformation. Participating HEIs are expected to leverage this model alongside Smart Specialisation Strategies (S3), the Regional Innovation Impact Assessment (RIIA) Framework (Jonkers et al., 2018), and the goals of the EIT Regional Innovation Scheme (EIT RIS). Through this integrated and place-based innovation logic, projects are designed to embed higher education institutions more deeply into their regional and transnational innovation ecosystems, to leverage synergies, and to mobilise resources beyond the funding period.

Accordingly, the DISCO project aimed to strengthen the innovation capacity of European HEIs by fostering structured knowledge sharing, joint coaching formats, and entrepreneurial capacity-building through collaboration between HEIs, SMEs, and civil society actors. Through DISCO, participating HEIs not only shared best practices in entrepreneurship education and

startup coaching but also acted as knowledge hubs within a broader European co-innovation network. Each partner institution contributed unique approaches to teaching innovation and coaching student startups, and these were exchanged and adapted across borders through the DISCO platform. In doing so, the project exemplified the role of inter-HEI collaboration as an innovation ecosystem in its own right—where participating institutions co-evolved, co-created, and scaled new methods for entrepreneurship education.

This paper frames DISCO as a *higher education innovation ecosystem* (Smorodinskaya et al., 2017) - a form of co-innovation platform in which multiple HEIs, and their respective HEI-industry networks, collectively amplify their impact. As such, we understand HEI networks not just as cooperative arrangements, but as meta-structures that multiply innovation potential by interlinking university-industry ties across national boundaries, creating shared value and fostering systemic change. This framing builds on recent literature emphasising value co-creation (Cai et al., 2019), knowledge platform models (Doering et al., 2022), and the transition of universities toward entrepreneurially oriented multi-actor, open innovation institutions.

HEInnovate provided the framework to assess each HEI's institutional readiness and development in eight key areas related to innovation. As an open self-reflection tool, HEInnovate (HEInnovate, 2025) enabled HEIs to identify strengths, define priorities, and develop action plans. Completion of the HEInnovate self-assessment was a prerequisite for proposal submission, and the same tool was used post-project to assess institutional change.

This paper presents a comparative analysis of HEInnovate self-assessments conducted at the beginning and end of the DISCO project. Through this 'before-and-after' approach (Leiber et al., 2015), we aim to understand how participation in the DISCO collaboration affected each institution's perceived innovation potential. The paper also outlines the theoretical framework underpinning the project design and assumptions—including organizational network theories like stakeholder theory, co-production, co-creation, knowledge transfer, innovation ecosystems, platforms and the living lab approach. The paper concludes with an analysis of the survey results, followed by implications for future transnational collaboration among HEIs seeking to build long-term innovation capacity.

2. Methods

The central methodological idea of this research was to compare the 'before' and 'after' HEInnovate self-assessment scores of the HEIs participating in the DISCO project. While the 'before' self-assessment was predominantly completed at the proposal or project initiation stage, the 'after' self-assessment took place in May 2024, during the final phase of the project.

The HEInnovate platform offers the possibility to form groups for comparative analysis among peers. However, a key limitation in the platform's functionality is that it does not allow for multiple entries per HEI over time. This constraint limited the possibility of using the group function for longitudinal within-HEI comparisons. Additionally, the late entry of a partner institution, Sumy State University, further complicated direct comparisons.

To address these challenges, each HEI partner submitted individual self-assessments, which were then manually transferred into a shared Excel database. This facilitated data visualisation, enabled direct comparison across time points, and allowed for a more nuanced post-hoc analysis of category-level changes.

It is important to note that the HEInnovate tool has evolved over time, and changes in sub-question formulations across its eight categories prevent a reliable question-level comparison between the initial and final assessments. As such, the 'before-after' design used in this study must be interpreted at the aggregated category level for time-series analysis, with a more detailed item-level analysis only possible for the final assessment round.

Integration of a QA Impact Evaluation Perspective

To further strengthen the methodological rigour and align with broader European discussions on quality in higher education, the study also draws on the conceptual and methodological framework of impact evaluation of quality assurance (QA) as articulated by Leiber et al. (2015). This framework introduces a more comprehensive view of causality, complexity, and longitudinal change in institutional quality development.

From a QA impact evaluation perspective, the DISCO project's design aligns with a before–after comparison model, a common and pragmatic approach in higher education settings where experimental or control-group designs are typically unfeasible due to institutional and ethical constraints. According to Leiber et al., such longitudinal designs allow researchers to observe change over time, provided that a baseline (pre-intervention) and end-line (post-intervention) are clearly defined, which was achieved here using HEInnovate at two distinct project phases.

In addition, this methodology can be further understood through the lens of causal social mechanisms, as discussed in the QA impact literature. These mechanisms can be divided into:

- Situational mechanisms, such as the influence of the project's external funding and collaboration context on institutional priorities.
- Action-formation mechanisms, including internal decision-making processes triggered by the project (e.g. changes in entrepreneurial support structures, changes in HEI leadership practices).
- Transformational mechanisms, which reflect how individual or departmental-level changes scaled into broader institutional shifts, as reflected in higher HEInnovate scores.

This layered perspective acknowledges that improvements in HEInnovate scores are not simply 'outputs' but may also be indicators of mid-term outcomes and *emerging institutional impacts*, contributing to the transformation of entrepreneurial culture and practices (Wright et al., 2017).

Furthermore, embedding this QA lens enriches the interpretation of self-assessment results by stressing that impact is not linear and must consider the multi-level nature of change in higher education (from individual staff to institutional policy), as well as the contextual factors (e.g. national policies, resource availability, stakeholder engagement) which condition how QA-related interventions play out.

The use of HEInnovate itself, as a self-reflection tool, can be interpreted as part of a broader quality enhancement process. When assessed through the QA impact evaluation framework, such tools serve both a diagnostic function (revealing institutional capacities) and a developmental function (stimulating strategic reflection and change). The process of repeated engagement with HEInnovate over time can thus be seen as an example of participatory evaluation, a key feature of embedded QA cultures.

It should be noted that HEInnovate, as an institutional self-assessment platform, is designed primarily for structured reflection and strategic dialogue rather than for statistical analysis; consequently, inferential statistics (e.g., significance testing) could not be applied to the 'before and after' comparisons due to the nature of the available data.

3. Inter-Organisational Collaboration and Networked Innovation in Higher Education – Theoretical Considerations

This study frames the DISCO project and its outcomes through the lens of inter-organisational collaboration between HEIs, interpreted as a dynamic form of organisational networking. Within this heuristic framework, we draw upon a selection of complementary theories and concepts—such as stakeholder theory, co-production and co-creation, knowledge transfer and management, innovation ecosystems, platform theory and living labs - to understand the mechanisms and impact of HEI collaboration in the field of innovation and entrepreneurship education (Wright et al., 2017). HEI faculties with entrepreneurial experience play a significant role in supporting other HEI faculties who are new to the student start-up support or spin-off processes (Mosey, Wright, 2007).

Collaboration among HEIs has evolved into more than bilateral cooperation or project-based partnerships. It increasingly represents purpose-driven, networked ecosystems where universities act as co-creators of shared value within a broader innovation infrastructure (Cai et al., 2020; Doering et al., 2022). These ecosystems are essential to support both

institutional transformation and student-centred innovation formats, including startup coaching, spin-off development, and the integration of entrepreneurship into curricula.

Stakeholder Orientation as a Foundation for HEI Collaboration

Considerations regarding the types of entities with which HEIs cooperate, and the motivations for such cooperation, are widely discussed in the literature and serve as an important entry point for understanding inter-organisational collaboration. Stakeholder theory provides a foundational perspective by framing organisations as systems embedded in networks of relationships (Freeman, 1984). Freeman defines stakeholders as "any group or individual who can affect or is affected by the achievement of the organisation's objectives" (Freeman, 1984, p. 46). HEIs, in this view, must respond to the expectations and needs of diverse stakeholders—including students, academic staff, local communities, industry partners, public agencies, and policymakers (Crane, 2004; Gamble, 2001; Gianiodis, Meek, 2020).

Stakeholder-theory related research emphasizes the importance of collaboration within the broader entrepreneurial ecosystem in which the university is embedded (Bischoff et al., 2018; Gianiodis, Meek, 2020; Kuratko, 2005). Stakeholder theory in the HEI context intersects with the broader discussion on corporate social responsibility (CSR) and Environmental, Social and Governance (ESG) frameworks, which are increasingly being adopted in higher education as guiding paradigms (Guerro, Lira, 2023; Rasche, Moon, 2017). These perspectives underpin the strategic imperative for HEIs to engage in inclusive, responsive, and impact-oriented forms of innovation, particularly considering pressing societal challenges and sustainability agendas.

Co-Production and Co-Creation in the HEI Environment

In line with stakeholder-oriented thinking, the concepts of co-production and co-creation offer additional theoretical scaffolding for understanding collaborative innovation processes. Co-production, as defined by (Chathoth, 2013), refers to the firm-centric involvement of customers in the production of services, emphasizing simultaneity in production and consumption. In contrast, co-creation highlights reciprocity, interdependence, and blurred boundaries between producers, users, and stakeholders (Galvagno, 2014). This conceptual shift is especially relevant in education, where students, faculty, entrepreneurs, and external actors engage in collaborative design and delivery of innovative learning experiences.

In the context of the DISCO project, co-creation was a core operational logic: HEIs shared responsibility for designing and delivering entrepreneurial education and startup support activities, co-developing tools, coaching frameworks, and best practices. These interactions created mutually reinforcing knowledge flows and supported institutional transformation through peer learning and iterative experimentation.

Organisational Network Theory and Knowledge Transfer

The framing of HEIs as nodes in knowledge-intensive, inter-organisational networks is central to our interpretation of the DISCO collaboration. Organisational network theory (Popp et al., 2014; Provan et al., 2007) views innovation as a product of networked interdependence, where actors exchange resources, generate trust, and co-produce novel solutions. Knowledge, in this view, is not only transferred but co-developed through embedded relationships, structured interactions, and shared learning.

Recent research emphasises the multi-level nature of knowledge transfer between HEIs (Cerver Romero et al., 2021; Sjöö, Hellström, 2019) —occurring at micro (intra-institutional), meso (peer institution), and macro (societal/industry) levels (Doering et al., 2022). The DISCO project activated all three levels by enabling internal self-reflection (*via* HEInnovate), peer-to-peer exchange, and the creation of transnational coaching formats. Furthermore, the use of digital tools and shared platforms helped to institutionalise this knowledge, increasing visibility, reusability, and scalability of innovations.

HEI Innovation Ecosystems and Co-Innovation Platforms

The concept of innovation ecosystems, adapted to higher education by Cai et al. (2020) and Cai et al. (2019) provides a powerful meta-theoretical framework for understanding the structural and dynamic features of the DISCO network. Innovation ecosystems differ from traditional innovation systems in that they are based on ecological interdependence and co-evolution, rather than hierarchical coordination. HEIs, in this context, are no longer passive knowledge providers but active orchestrators of value co-creation within complex, transdisciplinary constellations of actors.

A transnational innovation ecosystem refers to the integration of two or more innovation ecosystems across national borders, each with varying degrees of transnational cooperation and coordination. To grasp the nature of such systems, it is first essential to understand the concept of an innovation ecosystem. As commonly defined, innovation ecosystems consist of "complex relationships that are formed between actors or entities whose functional goal is to enable technology development and innovation" (Jackson, 2011, p. 2).

Sotarauta et al. (2016) identify several defining characteristics of innovation ecosystems, including their interconnectedness—the idea that all elements within the system are linked; their organic nature, referring to the system's capacity to evolve through continuous adaptation of its components to changing conditions; and their multi-locational structure, whereby knowledge flows and innovation processes occur across multiple geographical contexts.

DISCO can be seen as a *HEI innovation ecosystem* (Figure 1) that brought together universities, student entrepreneurs, SMEs, and non-profits to generate shared innovation outcomes. Each HEI acted as a local node with unique regional and institutional assets, but through the DISCO collaboration, these assets were mutually amplified, resulting in a

richer, more diverse and scalable innovation landscape. The project thus exemplifies how co-innovation networks can emerge from HEI collaboration, where knowledge, methods, and tools are continuously exchanged and adapted across institutional and national boundaries (Cai et al., 2019).

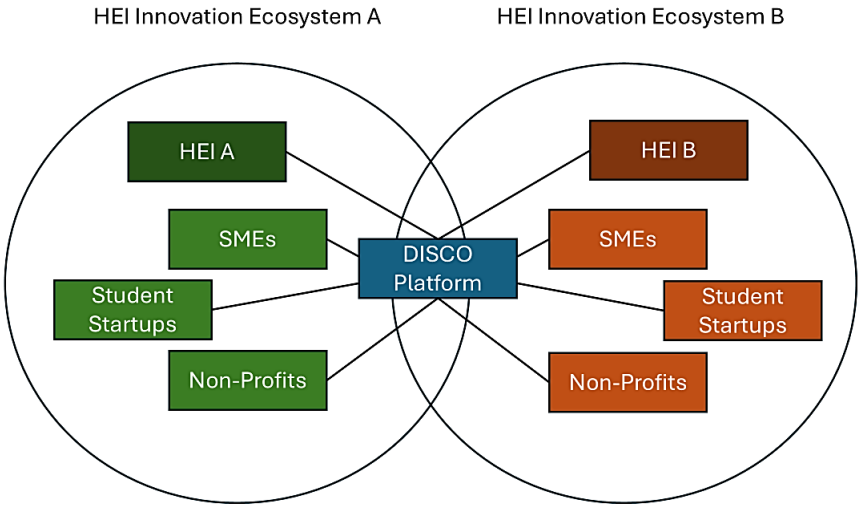

Figure 1. DISCO as a transnational HEI co-innovation ecosystem amplifying institutional assets through shared platforms and knowledge exchange.

Source: own study, based on the HEInnovate surveys conducted by analysed HEIs.

The (living) lab concept as basis for HEI cooperation

Before discussing the concept of a living lab, it is worth emphasizing that it belongs to a larger family of 'labs', which includes, among others, innovation labs, social innovation labs, community labs, gov labs or enterprise labs, to name a few. A living lab is understood as a way of actively involving the city dwellers in planning the development of the city (Mitchell, 2005) is widely discussed in the literature on the subject (Almirall, 2009; Ballon, 2005; Nyström, 2014; Paskaleva, 2015). Westerlund is indicating that living labs "... are physical regions or virtual realities where stakeholders form public-private-people partnerships (4Ps) of firms, public agencies, universities, institutes, and users all collaborating for creation, prototyping, validating, and testing of new technologies, services, products and systems in real-life contexts" (Westerlund, 2011, p. 20).

The living lab concept can be understood more broadly, not only in terms of city management but also with regards to innovative processes within organisations. Living labs can be understood as a platform for implementing the open innovation concept (Paskaleva, 2015), p. 119). In this sense (Nyström, 2014, p. 483) claim that living lab is a network of open innovation characterized by openness and user involvement. In this way, ideas for the development and implementation of innovative enterprise solutions are derived from the external environment. These processes occur in real-life environments, not in closed research laboratories (Almirall, 2009). Nyström justifies the network nature of a living lab by the

voluntary cooperation of entities having similar roles (Nyström, 2014, p. 484). The users are particularly important, being both the subject and the object in innovative processes, acting as co-creators, testers and co-producers (Ballon, 2005).

Considering the above, we can say that living lab is a voluntary network of cooperation among various entities - higher education institutions, enterprises, public entities and users (such as students, in the HEI context), with particular importance of the latter. They participate in the design, development and implementation of innovative solutions based on the experiences of everyday life. Such activities can be classified as open innovation (Chesbrough, 2003).

Platform Theory and Digital Transformation of HEI Collaboration

An important enabler of such inter-organisational collaboration is the emergence of platform-based collaboration models (Doering et al., 2022). Platforms—whether digital or hybrid—serve as intermediary spaces where knowledge, practices, and resources are exchanged among previously disconnected actors. In the context of the DISCO project, the creation of shared knowledge repositories, coaching frameworks, and joint events functioned as platform elements that facilitated cross-institutional knowledge flows. Simultaneously, the digital transformation of HEIs is reshaping how knowledge is produced, shared, and transferred. Digital platforms lower the threshold for collaboration and increase the visibility of institutional practices. They also allow HEIs to extend their third mission activities—entrepreneurship education, startup incubation, and social innovation—beyond their physical and national boundaries (Doering et al., 2021; Klofsten et al., 2019). DISCO exemplifies how digitally enabled HEI networks can drive systemic change in innovation teaching and entrepreneurial capacity-building.

Framing HEI Collaboration and Innovation: A Heuristic Model for HEInnovate Impact Analysis

Taken together, these perspectives form a heuristic framework for interpreting the results of the HEInnovate self-assessments and the transformation dynamics of the participating HEIs in the DISCO project. The theories and concepts—stakeholder orientation, co-creation, network theory, knowledge transfer, innovation ecosystems, platform collaboration and living labs—provide complementary lenses through which the institutional, educational, and strategic impact of the DISCO project can be understood.

This layered framework allows us to interpret the observed changes not only as isolated outcomes but as emergent properties of a collaborative HEI innovation network. In doing so, we aim to contribute to a deeper understanding of how European HEIs can collectively mobilize their innovation capacity through structured, networked cooperation.

4. Dimensions of the HEInnovate Framework as a Reflection Tool for HEI collaboration effectivity

To operationalize the heuristic framework developed in this chapter, we integrate the eight dimensions of the HEInnovate self-reflection tool (https://www.heinnovate.eu/en), which served as the baseline and post-assessment methodology for all DISCO project participants. These dimensions provide a structured way to measure the impact of inter-organisational collaboration on the innovation potential of HEIs. Each HEInnovate dimension can be aligned with specific components of our heuristic framework in Table 1.

Table 1.
HEInnovate dimensions

HEInnovate Dimension	Theoretical Dimension from the Heuristic Framework
1. Leadership and Governance	Stakeholder theory; innovation ecosystems require adaptive leadership to manage interdependence and external alignment.
2. Organizational Capacity	Organizational network theory; capacity is distributed across institutions and enhanced through collaboration and shared resources.
3. Entrepreneurship in Teaching and Learning	Co-creation and co-production; active student and staff participation in creating new pedagogies.
4. Preparing and Supporting Entrepreneurs	Knowledge transfer and co-innovation networks; collaborative coaching and incubation practices as transfer mechanisms.
5. Digital Transformation and Capability	Platform theory and digital transformation literature; digitally mediated collaboration enables scale, visibility, and innovation.
6. Entrepreneurial Ecosystems and Networks	Central pillar of the network perspective; peer-learning, mutual trust, and shared learning objects.
7. The Internationalized Institution	Globalised innovation ecosystems and transnational collaboration; leveraging cross-border complementarities.
8. Impact of the Entrepreneurial HEI	Governance and accountability in ecosystems; platform analytics and stakeholder-centric metrics (e.g., entrepreneurial outcomes, startup formation).

Source: own study.

Through this alignment, the HEInnovate dimensions not only serve as assessment categories but also act as analytical filters through which we can observe how theoretical principles manifest in practice. This integration allows us to use the HEInnovate results not just descriptively (as 'before and after' scores), but as evidence of how inter-organisational collaboration contributes to systemic institutional change.

In the following empirical section, we revisit the results of the HEInnovate self-assessments of the DISCO HEIs through this lens, offering a theoretically grounded interpretation of the observed shifts.

5. HEInnovate Results Summary

In this part of the article, we want to focus on a less common perspective on the effects of living lab, but not from the perspective of enterprises, but HEIs. Specifically, it is about evaluating the impact of the cooperation on the consortium members, identifying the crucial areas of improvement and the ones that need more focus in the future.

At the outset of the DISCO project, participating HEIs engaged in a structured self-assessment of their institutional innovation capacity using the HEInnovate tool. Anchored in a stakeholder- and network-oriented understanding of institutional development, this process served not only as a diagnostic instrument but also as a platform for strategic reflection and capacity mapping. By identifying both institutional strengths - seen as potential assets for knowledge sharing and peer learning - and areas requiring development, the self-assessment laid the groundwork for targeted interventions, collaborative experimentation, and the co-creation of improvement strategies across the network. In this way, the HEInnovate tool functioned as an *activation point* within a broader co-innovation ecosystem, aligning with the project's aim of fostering institutional transformation through inter-organisational learning and distributed knowledge flows.

The DISCO project baseline began with a self-assessment in which HEIs evaluated their innovative potential, using the HEInnovate tool. The process has identified both the strong points (to share and leverage) and the weak ones (to target for training and development). The initial HEInnovate self-assessments of participating HEIs are presented in Table 2.

Table 2.
HEInnovate self-assessments at a glance, before project implementation

Score	Krakow University of Economics (KUE)	Lviv Polytechnic National University (LPNU)	Lucerne University of Applied Sciences and Arts (HSLU)
Highest	Knowledge Exchange and Collaboration 4.8 Preparing and Supporting 4.7	Organisational capacity: funding, people and incentives 4.2 Preparing and Supporting entrepreneurs 4.2	Organisational capacity: funding, people and incentives 5.0 Preparing and Supporting entrepreneurs 5.0
Lowest	Organisational Capacity: Funding, People and Incentives 3.2 The Internationalised Institution 3.4	Measuring Impact 3.3 Leadership and Governance 3.4	Digital transformation and capability 4.4 The Internationalised Institution 4.0

Source: own study, based on the HEInnovate surveys conducted by analysed HEIs.

This summary underlines the differences among the engaged HEIs from Poland, Ukraine and Switzerland. Lucerne University of Applied Sciences and Arts (HSLU), as the most developed university, played a key role in sharing the good practices. However, thanks to the different experiences and national specificity of other HEIs, also HSLU was also able to improve its results.

In the following section, we present the 'before' and 'after' results of the whole HEI-part of the DISCO consortium, across eight HEInnovate categories. These are presented in Figure 2.

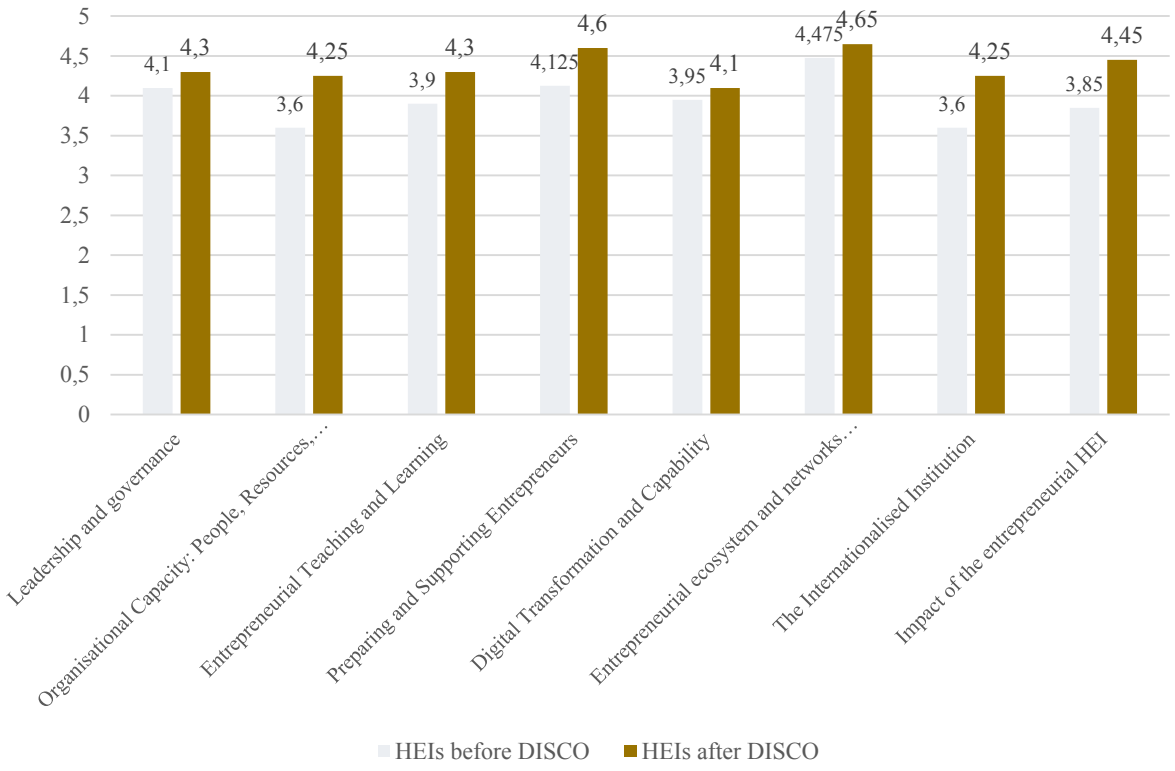

Figure 2. HEInnovate scores progress of all HEIs in the DISCO consortium: before and after the project. Source: own study, based on the HEInnovate surveys conducted by analysed HEIs.

The highest overall score both 'before' and 'after' the project was **'Entrepreneurial Ecosystem and Networks'**. This category is defined by HEInnovate as follows:

An entrepreneurial and innovative HEI proactively connects with its ecosystem (intended as an array of interlinked actors pooling skills and resources to pursue a common goal) to deliver social, cultural and economic benefits. The capacity to connect with entrepreneurial ecosystems and networks represents an important catalyst for organisational innovation in the HEI. It also helps the advancement of teaching and research, and transforms the HEI into an important actor in regional development and issues related to territorial cohesion (HEInnovate, 2025).

The 'before' result is understandable. The HEIs participating in DISCO were inherently interested in developing entrepreneurial ecosystems and networks, or else they would not have joined the consortium. What is interesting is that DISCO seems to have allowed the partners to push this capability even higher, as a result making it the most developed consortium capability, on average.

Indeed, DISCO in itself has organised various activities that have allowed for this to happen - predominantly thanks to the international exchange meetings and labs allowing for broadening of their entrepreneurial networks. As mentioned in a separate deliverable, several innovation labs have been implemented.

They brought together representatives from business, academia, and government. Each of the three-day conferences co-organised by all HEIs generated new relationships and improved the nature, content, and forms of collaborations with external partners such as corporations, research organisations, governmental agencies, non-governmental organisations (NGOs), and other societal partners. During these events, problems such as start-up support and the organisation of training in the fields of innovation and entrepreneurship for a diverse group of participants have also been addressed.

When it comes to the increase in scores on **'Internationalised Institution'**, the different project meetings, labs, workshops, and trainings have all offered the partners the opportunity to engage in discussions sharing their own HEIs' experiences, differences and similarities.

Second highest increase can be noted for the 'Impact of Entrepreneurial HEI' category. Here, too, part of the credit can be attributed to the Limitless Innovation Bootcamp and 'Developing Service Innovation Capabilities at HEIs' trainings that presented different international trends and practices in terms of the role HEIs play in social innovation and in terms of the environmental and social impact of HEI activities. After the former training, partners were asked to work on their good practices to be shared with the consortium - majority of these have indeed concerned the impact aspects.

Finally, the lowest final score, and also the lowest increase in absolute terms (3.95 to 4.1), has been recorded for the **'Digital Transformation and Capability' category**, which is defined by HEInnovate as follows:

HEIs are already deploying digital technologies, however the uptake and integration varies among and within institutions. HEIs should make the most out of the opportunities presented by digital transformation and consider digital technologies as a key enabler of innovation and entrepreneurship. An HEI's digital capability is defined as the ability to integrate, optimise and transform digital technologies to support innovation and entrepreneurship (HEInnovate, 2025).

This category is in general a complex issue that cannot be resolved by the activities of a European project alone, as it typically requires larger organisational decisions and significant infrastructure investments that were not part of the DISCO scope. Possibly, barriers to digital innovation in HEIs could include gaps in digital strategy and governance, competencies of the academic and support staff, limitations in terms of digital infrastructure, resistance to change and institutional inertia, or cybersecurity constraints, to name a few, all of which could have been easily exacerbated by the speed of recent technological developments, such as progress in artificial intelligence solutions. We theorise that most of these barriers, as predominantly internal issues, would not have been significantly overcome by increased collaboration in a European project, at least not in the short-term.

However, during the collaborative design and implementation of a MOOC for students at the participating universities, significant differences emerged with regard to the use of digital teaching tools and the respective national infrastructure for implementing MOOCs. On the Polish platform Navoica, the MOOC was implemented quickly and professionally,

while Ukrainian universities can easily integrate MOOCs into their curricula and test them. In contrast, the Swiss HEI lacks both the appropriate infrastructure and the openness of lecturers to integrate MOOCs into innovation and entrepreneurship modules on a test basis. At the Swiss HEI, the development of a MOOC is estimated to take 1.5 years, while in the project, the combination of digital skills and infrastructure in Poland required 3 months.

These different implementation speeds and digital learning cultures have clearly led the Swiss project partner to question the digital maturity in that area.

At the same time, the enormous opportunities for increase in digital innovation, driven by the recent progress in generative artificial intelligence technologies, immersive learning technologies, or virtual mobility solutions, to name a few, have not been fully explored in scope of the DISCO project. This is partially due to the fact that these trends were still emerging at the time the project took place, and the participating HEIs were still struggling to fully make sense of them internally. Our understanding is that the time was not 'ripe' enough yet for the knowledge sharing stage to bear significant fruit in this respect.

The most significant improvement—rising from 3.6 to 4.25—was observed in the categories of '**Organisational Capacity**' and **'Internationalised Institution**', reflecting the tangible impact of DISCO's targeted interventions in enhancing structural capabilities and fostering cross-border collaboration among HEIs.

In terms of **'Organisational Capacity'**, several activities took place explicitly dedicated to the topic of capacity development. One of them was the Limitless Innovation Bootcamp™ organised 14-15 July 2022 at the start of the project, with the following objectives:

- to increase the innovation and entrepreneurship capacities of the professional and support staff of the European higher education institutions and other project partners,
- to exchange good practices in innovation and entrepreneurship support among project partners,
- to exchange first ideas for further collaboration in the project within the proposed Innovation Vision Action Plan (IVAP).

On day one, in an informal setting inspired by the examples from and beyond Luxembourg, participants learned about collaborative innovation as a framework for innovating with and for public administration and society. Specifically, the methodologies of innovation labs as well as social impact measurement were discussed as effective approaches to mobilize public administrations, citizens and other stakeholders in collaborative innovation processes. On day two, focused on the specific ambitions of the DISCO project as reflected in its IVAP, participants learned about the ways in which HEIs innovate themselves as well as act as innovation and entrepreneurship enablers for other actors, from students, through public, private and third sectors, to community and society at large.

In 2024, a two-session training was organised again (this time jointly by HSLU and Limitless), on the topic of 'Developing Service Innovation Capabilities at HEIs – Trends, opportunities, challenges and requirements for an innovation-encouraging leadership culture at

HEI'. The learning objectives were that after completed training, the participants would be able to:

- understand what an organisational capability is,
- understand what a service innovation capability is and provide examples for knowledge intensive organisations such as HEIs,
- name megatrends in various service areas of HEIs,
- provide inspirational examples to promote the entrepreneurial and innovative skills in HEIs, both internally and of their students,
- present their service innovations and related organisational capabilities,
- understand the importance of service innovation institutions (such as labs, hubs, start-up centres etc.) at HEI and their importance for the development of organisational innovation capabilities and the development of service leaders,
- exchange ideas about possible future collaboration potential (leadership communities, mentoring, further research projects) to consolidate the exchange of knowledge.

6. Discussion

The DISCO project affirms that higher education innovation is a networked, collaborative, and evolving process. The findings show that international HEI collaboration can bridge capability gaps, particularly benefitting emerging institutions. In theoretical terms, this reflects knowledge transfer dynamics: multilateral exchanges allowed all HEIs to enhance their innovation capacities, consistent with the view that cross-border partnerships strengthen entrepreneurial ecosystems (Cerver Romero et al., 2021; Sjöö, Hellström, 2019).

Viewed through stakeholder theory, the project highlighted the strategic role of engaging diverse actors—students, staff, industry, and civil society - in co-creating innovation. DISCO's participatory model aligned institutional goals with broader societal expectations, confirming that stakeholder-driven collaboration can advance both entrepreneurship education and societal impact. This further illustrates the growing intersection of higher education with Corporate Social Responsibility (CSR) and Sustainability Development Goals (SDG)ESG frameworks (Guerrero, Lira, 2023; Gianiodis, Meek, 2020).

The project's strong emphasis on co-creation and co-production allowed participating HEIs not just to exchange knowledge, but to jointly develop new entrepreneurial education models, mentoring frameworks, and innovation labs. This resonates with recent research showing that co-creation accelerates organizational learning and deepens stakeholder engagement. Even the most advanced HEI partner in selected categories benefited from exposure to new cultural and operational contexts, highlighting the reciprocal nature of international learning (Doering et al., 2023).

From an innovation ecosystems perspective, DISCO functioned as a transnational network linking local startup and innovation hubs (like e.g. Smart-up from HSLU) into a broader system. Each HEI contributed and amplified unique strengths, resulting in richer ecosystem dynamics. The findings validate the idea that HEIs are not isolated knowledge producers but active orchestrators in multi-actor systems. The improvements in "Internationalized Institution" and "Entrepreneurial Ecosystems and Networks" dimensions of HEInnovate further underscore the transformative power of cross-border collaboration (Cai et al., 2020).

The living lab approach embedded in DISCO activities - —such as innovation labs and hackathons—involved students and external stakeholders directly in real-world experimentation. This reflects the theoretical model of living labs as spaces for open, user-centered innovation. By co-creating solutions with end-users, HEIs accelerated feedback loops and enhanced their entrepreneurial teaching capabilities. The project also demonstrates that universities can serve as living labs for their own institutional innovation processes (Nnyström, 2014).

A crucial enabler of DISCO's success was the use of digital platforms. Shared digital spaces allowed for frequent knowledge exchanges, document sharing, and co-development across borders. In line with platform theory, the digital infrastructure reduced transaction costs and increased collaboration efficiency. However, the relatively weaker progress in the "Digital Transformation and Capability" HEInnovate category shows that many HEIs still need to invest in digital skills and infrastructure to fully leverage these platforms (Doering et al., 2023).

For HEI managers, these findings underline the value of participating in international networks not just for benchmarking, but for co-creating new capacities. Embedding collaborative digital platforms, encouraging stakeholder-centered innovation, and maintaining living-lab formats can enhance institutional agility.

From a policy perspective, supporting cross-border HEI collaboration is a critical tool for reducing regional innovation divides. Funding bodies like the EIT and Erasmus+ should continue incentivizing projects that combine structured knowledge transfer with open innovation approaches (Volkert, Bunescu, 2024). Additionally, policymakers should promote the integration of platform technologies and encourage the use of longitudinal tools like HEInnovate to measure and sustain institutional transformation.

Overall, the DISCO project provides empirical support for theories of stakeholder-driven, ecosystem-based innovation in higher education. It shows that structured international collaboration can trigger sustainable change in entrepreneurial capacity, and highlights strategies for amplifying these effects in the European Higher Education Area.

7. Conclusions

The following practical recommendations for European HEIs can be concluded from our research:

1. Focus on digital development

'Digital Transformation and Capability' remains the least developed aspect of innovation at participating HEIs. Five action cards have been developed by HEInnovate to help further the development of this capability, namely: 5/01 General E-Learning Capabilities, 5/02 Educator E-Learning Capabilities, 5/03 Advanced E-Learning Capabilities, 5/04 IT Infrastructure and 5/05 Community Platform (cards can be found: https://www.heinnovate.eu/sites/default/files/2023-06/HEInnovate-Action-Cards_0.pdf). It is recommended that all DISCO HEIs use these in their own development.

2. Join leading entrepreneurial ecosystems

'Entrepreneurial Ecosystem and Networks' seem to be very well developed by the DISCO partners and it is recommended that the HEIs and consortium as a team builds upon this strength and learn from even more advanced startup ecosystems in Europe. These, in Europe, are according to the Global Startup Ecosystem Index 2023: London, Paris, Berlin, Stockholm, Amsterdam, Moscow, Munich, Barcelona, Helsinki, Madrid, Dublin, Istanbul, Copenhagen, Tallin, Zurich, Lisbon, Cambridge, Oslo, Milan and Vienna. Only HSLU is based in the country covered by the index, and none of the partners are located in any of these top 20 hubs in Europe. A recommendation would be to link to these ecosystems through new European or other international projects.

3. Invest in further entrepreneurial support successes

Besides collaboration with the established ecosystems, it is recommended to further invest in entrepreneurship support activities: entrepreneurship tracks and courses, startup coaching systems, incubation and acceleration methodologies, prototyping facilities and equipment, embedding entrepreneurship education across disciplines, early-stage investment opportunities. In addition, it is recommended to consider more advanced forms of support such as HEI-owned investment instruments to foster spin-offs.

4. Launch or continue the innovation labs

The innovation labs have proven effective in experience sharing. It would be recommended that these types of activities continue after the DISCO project, albeit in a limited (hybrid/virtual) form if needed. Participation in such initiatives is important not only for enterprises, but also for making changes in the functioning of HEIs - adapting the research carried out there and educating students to the needs and realities of enterprises.

5. Keep the good practice sharing

Continued investigation of more international good practices could prove helpful as further inspiration for the DISCO partners. Sharing within the consortium seemed to be even more

effective and could be upheld even in an informal format. In general, good practice sharing with peer HEIs can be recommended to any European higher education institution willing to progress more quickly on its innovation potential.

6. Consider dedicated funding options for structural cooperation

Besides the EIT-HEI programme, the main source of financial support for European HEIs is probably offered by Erasmus+. In addition, HEIs can access national or regional funding schemes, including bi-lateral or multilateral competitive research calls.

7. Establish or keep up the HEInnovate self-assessment habit

The self-assessment is an invaluable part of the progress monitoring and thus paying continuous attention to the service innovation capability development. It is recommended that HEIs exercise the good habit developed in DISCO and upkeep the HEInnovate self-assessment as a yearly practice. It would be beneficial if they continue to track their progress against themselves and their peers, for instance in the context of the DISCO project, by using the established 'benchmarking' community. The process could become a great opportunity for organising a shared session to discuss and share. These developments suggest that HEInnovate is not only a useful assessment tool but also a strategic enabler when integrated into regular planning and ecosystem alignment.

Recommendations for future research

The theoretical integration proposed in this article points to some future research avenues. First, the model offers a valuable structure for comparative analysis across HEI collaboration projects in different regional or disciplinary settings. Second, it provides a foundation for developing longitudinal impact tracking tools that combine self-assessment data with network analytics and case-based learning. Third, it encourages the refinement of self-assessment instruments like HEInnovate to better capture relational and systemic dimensions of institutional innovation.

In conclusion, this study affirms that higher education innovation is best understood as a networked, collaborative, and evolving process. The heuristic framework developed here helps to interpret institutional change more holistically and serves as a guide for both practitioners and policymakers aiming to foster sustainable and scalable innovation in higher education across Europe.

References

1. Almirall, E. (2009). *Understanding innovation as a collaborative, co-evolutionary process. Doctoral Thesis.* Esade – Escuela superior de administracion y direccion de Emperas.
2. Ballon, P.P. (2005). Test and experimentation platforms for broadband innovation: Examining European practice. *Brussels Studies on Media, Information and Telecommunication (SMIT)*.
3. Bischoff, K., Volkmann, C.K., Audretsch, D.B. (2018). Stakeholder collaboration in entrepreneurship education: An analysis of the entrepreneurial ecosystems of European higher education institutions. *Journal of Technology Transfer, 43*, pp. 20-46.
4. Cai, Y., Ramis Ferrer, B., & Luis Martinez Lastra, J. (2019). Building university-industry co-innovation networks in transnational innovation ecosystems: Towards a transdisciplinary approach of integrating social sciences and artificial intelligence. *Sustainability*, *11(17)*, 4633.
5. Cai, Y., Ma, J., Chen, Q. (2020). Higher education in innovation ecosystems. *Sustainability*, *12(11)*, 4376.
6. Cerver Romero, E., Ferreira, J.J., Fernandes, C.I. (2021). The multiple faces of the entrepreneurial university: A review of the prevailing theoretical approaches. *The Journal of Technology Transfer, 46(4)*, pp. 1173-1195.
7. Chathoth, P.A. (2013). Co-production versus co-creation: A process based continuum in the hotel service context. *International Journal of Hospitality Management*, *March*, pp. 11-20.
8. Chesbrough, H. (2003). *Open Innovation: The New Imperative for Creating and Profiting, from Technology*. Boston: Harvard Business School Press.
9. Crane, A.M. (2004). Stakeholders as Citizens? Rethinking Rights, Participation, and Democracy. *Journal of Business Ethics, Vol. 53, No. 1/2,* pp. 107-122.
10. Doering, C., Timinger, H., Wolff, C. (2023). Knowledge Sharing Between Higher Educational Institutions: Evaluation of a Transfer Platform. *Proceedings of the 15th International Joint Conference on Knowledge Discovery, Knowledge Engineering and Knowledge Management (IC3K 2023) - Volume 3, KMIS SCITEPRESS – Science and Technology Publications*, pp. 166-173.
11. EIT HEI Initiative (2025). *Boosting innovation and entrepreneurship capacity in higher education*. Retrived from: https://eit-hei.eu/, 22.03.2025.
12. *EIT Knowledge Triangle* (2025). Retrived from: https://www.eitmanufacturing.eu/what-we-do/the-eit-knowledge-triangle/, 22.03.2025.
13. EIT RIS (2025). *The EIT Regional Innovation Scheme (RIS): Closing the Innovation Divide in Europe*. Retrived from: https://eit.europa.eu/activities/eit-regional-innovation-scheme-ris-closing-innovation-divide-europe, 22.03.2025.

14. Freeman, R.E. (1984). *Strategic Management: A Stakeholder Approach.* Boston: MA: Pitman.
15. Galvagno, M.A. (2014). Theory of value co-creation: a systematic literature review. *Managing Service Quality: An International Journal*, *Vol. 24, No. 6*, pp. 643-683.
16. Gamble, A. K. (2001). Shareholder Value and the Stakeholder Debate in the UK. *Corporate Governance*, *Vol. 9, No. 2*, pp. 110-117.
17. Gianiodis, P.T., Meek, W.R. (2020). Entrepreneurial education for the entrepreneurial university: a stakeholder perspective. *The Journal of Technology Transfer, 45(4)*, pp. 1167-1195.
18. Guerrero, M., Fayolle, A., Di Guardo, M.C., Lamine, W., Mian, S. (2024). Re-viewing the entrepreneurial university: strategic challenges and theory building opportunities. *Small Business Economics*, *63(2)*, pp. 527-548.
19. Guerrero, M., Lira, M. (2023). Entrepreneurial university ecosystem's engagement with SDGs: Looking into a Latin-American University. *Community Development, 54(3)*, pp. 337-352.
20. HEInnovate (2025). *Is your Higher Education Institution prepared for future challenges?*. Retrived from: https://www.heinnovate.eu/en, 22.03.2025.
21. Jackson, D. (2011). *What is an Innovation Ecosystem?* Arlington, VA: National Science Foundation.
22. Jonkers, K., Tijssen, R., Karvounaraki, A., Goenaga, X. (2018). A regional innovation impact assessment framework for universities. *JRC Duscussion Paper.* Brussels: Joint Research Centre.
23. Klofsten, M., Fayolle, A., Guerrero, M., Mian, S., Urbano, D., Wright, M. (2019). The entrepreneurial university as driver for economic growth and social change – Key strategic challenges. *Technological Forecasting and Social Change, 141*, pp. 149-158.
24. Kuratko, D.F. (2005). The emergence of entrepreneurship education: Development, trends, and challenges. *Entrepreneurship theory and practice, 29(5)*, pp. 577-598.
25. Leiber, T., Stensaker, B., Harvey, L. (2015). Impact evaluation of quality assurance in higher education: methodology and causal designs. *Quality in Higher Education*, *21(3)*, pp. 288-311.
26. Mitchell, W. (2005). *Placing Words: Symbols, Space, and the City.* Cambridge: MIT Press.
27. Mosey, S., Wright, M. (2007). From human capital to social capital: A longitudinal study of technology based academic entrepreneurs. *Entrepreneurship Theory and Practice, 31*, pp. 909-936.
28. Nyström, A.G. (2014). Actor roles and role patterns influencing innovation in living labs. *Industrial Marketing Management*, *43*, pp. 483-495.
29. Paskaleva, K. (2015). E-governance as an enabler of the smart city. In: M. Deakin, *Smart cities. Governing, modelling and analising the transition.* Oxfordshire: Routledge.

30. Popp, J.K., Milward, B.H., MacKean, G. et al. (2014): I*nter-Organizational Networks: A Review of the Literature to Inform Practice.* IBM Center for the Business of Government. pp. 93-96.
31. Provan, K.G., Fish, A., Sydow, J. (2007). Interorganizational networks at the network level: Empirical literature on whole networks. *Journal of Management, 33(3)*, pp. 479-516.
32. Rasche, A.M., Moon, J. (2017). *Corporate Social Responsibility: Strategy, Communication, Governance.* Camebridge: Camebridge University Press.
33. Sjöö, K., Hellström, T. (2019). University–industry collaboration: A literature review and synthesis. *Industry and higher education, 33(4)*, pp. 275-285.
34. S*mart Specialisation Strategies (S3)* (2025). Retrived from: https://ec.europa.eu/regional_policy/policy/communities-and-networks/s3-community-of-practice/about_en, 22.03.2025.
35. Smorodinskaya, N., Russell, M., Katukov, D., Still, K. (2017). Innovation Ecosystems vs. Innovation Systems in Terms of Collaboration and Co-creation of Value. *Proceedings of the Hawaii International Conference on System Sciences 2017*, Hilton Waikoloa Vilage, HI, USA, 3-7 January 2017.
36. Sotarauta, M., Heinonen, T., Sorvisto, P., Kolehmainen, J. (2016). *Innovation Ecosystems, Competences and Leadership: Human Spare Parts and Venture Finance Ecosystems Under Scrutiny*. Helsinki: Tekes—The Finnish Funding Agency for Innovation.
37. Syed, R.T., Singh, D., Spicer, D. (2023). Entrepreneurial higher education institutions: Development of the research and future directions. *Higher Education Quarterly*, *77(1)*, pp. 158-183.
38. Volkert, D., Bunescu, L. (2024). Empowering change: the EIT HEI Initiative and its impact on higher education institutions. *Entrepreneurship and Digital Humanities*, pp. 154-166.
39. Westerlund, M.L. (2011). Managing the challenges of becoming an open innovation company: Experiences from Living Labs. *Technology Innovation Management Review*, *October*, pp. 19-25.
40. Wright, M., Siegel, D.S., Mustar, P. (2017). An emerging ecosystem for student start-ups. *The Journal of Technology Transfer*, *42*, pp. 909-922.