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V. NEW PERSPECTIVES ON MANAGEMENT AND RESILIENCE OF BUSINESS ORGANISATIONS *https://vilniustech.lt/bm*

THE CONTRIBUTION OF ENTREPRENEURIAL COMPONENT OF EDUCATION TO RESILIENCE OF HIGHER EDUCATION INSTITUTIONS

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Abstract. Entrepreneurship education ensures the application of risk assessment, opportunity identification, and strategic decision-making in uncertain periods. The object of the research is higher education institutions in different fields. The subject of the research is the improvement of the entrepreneurial component of education in HEIs. The study aims to identify how improving entrepreneurship education in HEIs can contribute to enhancing their competitiveness. The study is focused on Ukrainian HEIS, applying the HEInnovate framework for research to assess faculty members' perceptions through a structured survey. Using such methods as statistical interpretation of the survey and literature review, the study identifies which formal learning mechanisms and informal activities strengthen HEI resilience. The results of the research showed no significant variation by the institutional location, academic field, or faculty age, indicating the equal relevance of entrepreneurial education. The study concludes that the incorporation of entrepreneurial components in HEI curricula and governance management fosters adaptability, sustainability, and long-term institutional capacity, offering valuable insights for enabling HEIs to navigate in dynamic and uncertain environment.

Keywords: higher education, entrepreneurship, HEInnovate, HEI, competencies, entrepreneurial education.

JEL Classification: I23, M13, O31, L21.

1. Introduction

Introducing an entrepreneurial component into the curricula of the study programs should be an essential element helping to ensure graduates' adaptability to the changing market requirements. Still, the enhancement of the curricula might be not enough to ensure the resilience of the Higher Education Institutions (HEIs) and their competitiveness. The HEI governance process itself should be enriched with innovative and entrepreneurial approaches, to ensure entrepreneurial development of the institution. The HEI should have a clear vision and long-term strategy to secure the transition to sustainable entrepreneurship, which encompasses not only economic but also social and environmental values. To achieve that, the HEI should ensure effective collaboration with the industry. Diversified entrepreneurial activities of HEI contribute to the maximization of social and economic value and help to solve different issues, such as financial uncertainties and others. HEIs should be able to provide an evaluation of their entrepreneurial capabilities across multiple dimensions, such as leadership and governance, organizational capacity, entrepreneurial teaching and learning, and others, achieving the ability to identify their strengths, weaknesses, and areas for improvement. HEInnovate framework (HEInnovate, n.d.) is a tool aimed to help HEIs assess their potential and has been solved as a basis for the structured survey of the present research. The perceptions of resilience and the impact of entrepreneurial education are gathered from HEIs faculty members in order to provide a comprehensive understanding of how HEIs can strategically integrate entrepreneurial components into their governance models. Accordingly, the purpose of the study is to assess the importance of entrepreneurship and innovation in Higher Education Institutions (HEIs) by exploring how entrepreneurial components contribute to institutional resilience.

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2. Literature review

Sustainable development of nations for their long-term survival is among priorities in the 21st century (Vargas-Merino et al., 2025). Acting as socioeconomic agents of development, HEIs play a crucial role in ensuring their own and national sustainability in the long-term perspective. Yet, gaps remain in implementing sustainability principles within HEIs operations (Munaro & John, 2025) possibly due to pitfalls in the applied governance principles. The framework that combines both sustainability and governance is the Environmental, Social, and Governance (ESG) principles framework. According to Marques (2025), in case of HEIs, governance refers to the systems and processes through which institutions make decisions, set policies, and ensure accountability of their operations. Considering a growing number of various threats to HEI operations, boosting institutional resilience, which can be viewed as a component of governance, is critical (Palkova et al., 2024). Institutional resilience is the capacity of an institution to endure, adjust to, and recover from disruptions or crises by adopting a comprehensive approach that promotes strength, flexibility, and long-term sustainability (Palkovaet al., 2024). Institutional resilience in HEIs can be of different types, for example, personnel (Orioque et al., 2024; Palkova et al., 2024), disaster (Hayat et al., 2018), environment-related (Munaro & John, 2025), security-related resilience, inclusive of cybersecurity and infrastructure factors (Palkova et al., 2024). Yet, among the various dimensions of resilience, operational resilience aimed at business continuity stands out as particularly vital, as it directly influences the continuity and adaptability of institutional functions in the face of disruptions (Palkova et al., 2024).

One of the most effective ways to embed principles of operational resilience into HEI practices is by fostering business creativity and an entrepreneurial mindset, both of which drive institutional innovation and adaptability under the umbrella of sustainable development. In HEIs, entrepreneurship has largely been associated with academic entrepreneurship due to the importance of graduates' employment (Adeel et al., 2023; Khelifi, 2023). Significantly less attention has been given to the application of entrepreneurial principles in HEI governance, underscoring the relevance of this study. By integrating governance entrepreneurship, HEIs might be able to reduce reliance on traditional funding sources, streamline administrative processes, and implement market-driven solutions, thus, boosting institutional resilience and long-term sustainability. In what follows, entrepreneurship's contribution to HEI sustainability.

2.1. Entrepreneurship's contribution to HEI resilience

Entrepreneurship involves identifying, assessing, and capitalizing on opportunities to create future products and services, which generates social and economic impacts (Scahill & Pirouzi, 2025). Upon embedding entrepreneurship into their structures, HEIs enhance their reputation and contribute to national and regional development (Klingler-Vidra et al., 2025; Patrício & Ferreira, 2023), which strengthens HEI resilience to disruptive changes. To ensure the long-term effects of entrepreneurial governance inclusive of resilience, HEIs should secure the transition to sustainable entrepreneurship promoting the institutional vision and strategy for long-term socioeconomic development. By including both economic and social aspects in governance and strategy, sustainable entrepreneurship promotes the transition from the shareholders' to stakeholders' management in HEIs (Vargas-Merino et al., 2025). As a result, HEIs might be able to obtain access to alternative funding sources, reducing dependence on traditional public and tuition-based revenues (Schaeffer et al., 2021), ultimately boosting institutional resilience. Sustainable entrepreneurship can be viewed as a bridge in transition to the Triple Helix model, where universities collaborate with industries and government (Etzkowitz et al., 2019) for strengthening their resilience. The attractiveness of involvement in the Triple Helix model pertains to acquiring the sustainability foundation for business continuity in business management. The resulting transformation leads to the emergence of an entrepreneurial university, characterized by its ability to maximize social and economic value through diversified entrepreneurial activities (Klingler-Vidra et al., 2025).

Previous studies discuss that capital and regional universities face different challenges and opportunities, that lead to their variations in their resilience. For instance, capital universities are often larger, with worldwide connections, operating with more resources (Nyakotyo & Goronga, 2024), while regional universities might be smaller, and rely more on local engagement and community ties (Goddard, 2021). Capital universities are often located in vibrant regions, that provide them more opportunities to industries and funding, and their resilience is fostered by ability to generate innovations on a large scale (Huggins & Johnston, 2009). Opposite regional universities often act as key anchors for regional development by providing education and supporting regional SMEs (Howard et al., 2024). COVID-19 period demonstrated, that capital universities were able to leverage their global networks and resources to maintain their processes and continue teaching and research activities. That allowed them to adapt to economic shock, caused by pandemia, in relatively fast time (Goddard, 2021). Regional universities often focus on niche areas of expertise, engaging community partners, thus adapting effectively to regional challenges (Howard et al., 2024). Based on this discussion authors proposed the Hypothesis:

H1: *The contribution of the entrepreneurial component to HEI resilience is higher in universities located in capitals than in regional universities.*

The essence of entrepreneurship in Higher Education Institutions (HEIs) lies in exploration, evaluation

(Anubhav et al., 2024), and creativity. Although traditionally these factors have been associated with innovation, they also significantly contribute to the development of institutional resilience. These factors are triggered by people, which is why for HEIs, strengthening institutional resilience requires investing in personnel resilience, where individual adaptability, creativity, and continuous skill development form a pillar of the institution's capacity to respond to disruption. By emerging through the ongoing acquisition and application of knowledge across diverse contexts (Uzule, 2020) in corporate settings, creativity transforms into a strategic cumulative asset of institutional resilience. Yet, such transformation is possible under human-centric management, which, according to Dehtjare and Uzule (2023), foster staff motivation, engagement, and a sense of purpose, and they, in turn, create an institutional environment driving institutional resilience. On the basis of this discussion, Hypothesis 2 (H2) was formulated:

H2: *The introduction of entrepreneurial components in education fosters institutional resilience.*

However, the degree of fostering of institutional resilience through entrepreneurship components might vary depending on various factors, including the conceptual proximity to entrepreneurship. In their study of 12 universities in Chile, Castillo-Vergara and Álvarez-Marín (2016) addressed how universities could facilitate entrepreneurial attitudes. Their respondents were from various academic programs, including engineering, business administration, social sciences, and health sciences. Although the study does not report differences in perception across these disciplines, the stratified sampling approach suggests that such differences could be explored. Given that academic fields emphasize different competencies and professional outcomes, it is quite plausible that differences in perceptions in value of entrepreneurship components in education might surface. In another study of Hämäläinen et al. (2022), more than 1000 lecturers in Finland were surveyed for their perception of entrepreneurship education. The outcomes pointed to that academic staff from business-related fields valued entrepreneurship education significantly higher than their counterparts from other areas of science. Therefore, the following Hypothesis was proposed:

H3: *The perceived importance of entrepreneurial components in education varies by field of science.*

Among other factors affecting the implementation of the entrepreneurship component might be age. According to Syed et al. (2024), perceptions of the value, motivation, and barriers to entrepreneurship vary significantly across age groups. In this study, younger individuals were found to associate entrepreneurship with opportunity, personal growth, and innovation, and tend to express higher entrepreneurial intentions. In contrast, older individuals approached entrepreneurship with greater caution, often motivated by necessity or a desire for autonomy. These differences might also be relevant to education. Even though this study did not directly investigate age differences in educational settings, it sets the overall background for exploring how age may influence the perceived importance of entrepreneurial components in higher education. This formed the foundation for Hypothesis 4:

H4: *Younger faculty members perceive the entrepreneurial component in education as more important than older faculty members.*

Overall, implementing the entrepreneurship component into HEI might boost institutional resilience. This integration, however, depends on many factors, some of which will be addressed in this paper. In the following Section, the framework within which this research was conducted will be reviewed.

2.2. HEInnovate as a framework for implementing governance entrepreneurship at HEIs

To successfully implement entrepreneurship within HEIs, it is critical to use a structured framework that guides strategic decision-making and institutional transformation. One such framework specifically designed to promote entrepreneurship is HEInnovate, a self-assessment tool (Henry & Lahikainen, 2024) developed by the Organisation for Economic Co-operation and Development [OECD] in collaboration with the European Commission [EC]. This tool allows HEIs to critically evaluate their entrepreneurial capabilities across multiple dimensions, helping them identify their strengths, weaknesses, and areas for improvement (Patrício & Ferreira, 2023). Through this process, HEIs can evaluate whether they align with the concept of an entrepreneurial university (Garus & Odlanicka-Poczobutt, 2023). HEInnovate not only provides a means of evaluating the entrepreneurial status of HEIs but also serves as a tool for predicting potential future trends in entrepreneurship, enabling institutions to adjust their long-term strategies accordingly (Garus & Odlanicka-Poczobutt, 2023). It also facilitates the transformation of HEIs into dynamic, opportunity-driven institutions that engage in strategic partnerships, leverage innovative funding models, and enhance institutional adaptability (Jongbloed & Kottmann, 2022).

HEInnovate evaluates HEIs across eight key dimensions through a structured self-assessment framework consisting of 40 guiding questions (HEInnovate, n.d.):

- Leadership and governance
- Organisational capacity: Incentives, people, resources, rewards
- Entrepreneurial teaching and learning
- Preparing and supporting entrepreneurs
- Digital transformation / capability
- Entrepreneurial ecosystem / networks
- The internationalised institution
- Impact of the entrepreneurial HEI.

HEInnovate's effectiveness in promoting sustainability within HEIs can be categorized into three primary

domains: strategic governance, resource mobilisation and external engagement.

Entrepreneurial teaching and learning, which is in the focus of this study, is included in the second category – resource mobilization. This category also includes organisational capacity and digital transformation/capability. These aspects focus on optimising financial, human, and technological resources to support sustainable initiatives. By effectively managing and developing available resources, HEIs can increase staff competencies, invest in green technology, create virtual entrepreneurial hubs, and implement digital innovation systems that facilitate entrepreneurship education and business incubation (Schaeffer et al., 2021).

Overall, the integration of governance entrepreneurship within HEIs is essential for ensuring institutional resilience, financial sustainability, and long-term societal impact. HEInnovate provides a structured framework that enables HEIs to systematically assess and enhance their entrepreneurial capabilities, aligning governance with innovation-driven and sustainability-oriented strategies. By embedding entrepreneurial principles at the governance level, universities can foster adaptability, strengthen external partnerships, and position themselves as key drivers of economic and social development in an increasingly dynamic global landscape.

3. Methodology

This study explores the contribution of entrepreneurial education components to the resilience of HEIs through a structured survey assessing faculty perceptions. The study is based on HEIinnovate framework (HEInnovate, 2025).

This study aimed to gather standardized information from a large number of participants, allowing for the statistical testing of hypotheses across different demographic and institutional categories (Creswell, 2014). In the context of higher education research, surveys are widely recognized for their efficiency in capturing perceptions, attitudes, and behaviors systematically, especially when assessing constructs like entrepreneurial orientation and institutional resilience (e.g., Nabi et al., 2017). The chosen structured survey-based approach meets the research aim and is widely approbated in social and business research.

The questionnaire was distributed electronically via Google Forms in February 2025 to Faculty members from Ukrainian HEIs were invited through institutional email lists and academic networks. Participation was voluntary and anonymous.

Data analysis included descriptive statistics, Shapiro-Wilk test and non-parametric tests: Mann-Whitney U for two-group comparisons, Kruskal-Wallis for multigroup comparisons, as well as regression model building and interpretation. Reliability of the scales was assessed using Cronbach's Alpha.

The study adhered to ethical research standards. Participation was fully voluntary, data collection was anonymous, and no identifiable personal data were recorded. The purpose of the research was disclosed to all participants prior to survey participation, ensuring informed consent in accordance with principles of ethical academic research.

3.1. Survey design

A structured questionnaire was developed based on the HEInnovate framework, which provides a validated tool for evaluating entrepreneurial practices and governance within HEIs (Garus & Odlanicka-Poczobutt, 2023; Henry & Lahikainen, 2024). HEInnovate's use in European higher education settings underlines its methodological appropriateness for examining entrepreneurial dimensions systematically. The questionnaire was based specifically on the "Entrepreneurial Teaching and Learning" dimension of the HEInnovate framework (HEInnovate, n.d.), alongside custom-developed items on institutional resilience.

The questionnaire consists of multiple sections:

(1) Demographic and Institutional Information – gender, age, education level, major field of science, teaching experience, HEI type: public/private, and HEI location: capital/region (A1–A8);

(2) Resilience of HEIs – three items assessing (A9) HEI adaptability, (A10) recovery capacity, and (A11) ability to maintain core functions;

(3) Entrepreneurial components in education – multiple subscales evaluating various aspects of entrepreneurial education and its contribution to HEI resilience: (B1) curriculum-based components, (B2) Experiential Learning, (B3) mentorship & networking, (B4) entrepreneurial mindset development, (B5) digital & technological entrepreneurship, (B6) research & policy support; (C) formal and (D) informal learning opportunities.

Table 1. Reliability test and normality check

Scale	Items included	Items	Cronbach's Alpha	Reliability level	Mean	Sum	Shapiro-Wilk	
							W	p
Resilience of HEIs	A9–A11	3	0.889	High	4,26	772	0.857	<.001
Entrepreneurial components	B1–B6	6	0.923	Excellent	3,95	715	0.914	<.001
Formal learning opportunities	C1–C6	6	0.929	Excellent	3,91	707	0.917	<.001
Informal learning opportunities	D1–D4	4	0.927	Excellent	3,94	713	0.903	<.001

All items were measured on a 5-point Likert scale, where 1 – "strongly disagree", 2 – "Disagree", 3 – "Neither agree, nor disagree", 4 – "Agree", 5 – "Strongly agree".

To ensure the internal consistency of survey measures, Cronbach's α was calculated for different scales, and the results indicated reliability from high (0.889) to excellent (0.929). The Cronbach's alpha results are presented in the Table 1.

To determine the appropriate statistical tests, a normality check was conducted using the Shapiro-Wilk test (Table 1). Normality check shows, that all variables significantly deviated from normal distribution ($p < 0.001$). Based on this calculation, non-parametric methods were chosen for hypothesis testing: Mann-Whitney U test will be used for group comparisons, the Kruskal-Wallis test for multiple-group comparisons, and Spearman's correlation for relationships.

3.2. Respondents

The final sample size consisted of 181 respondents from Ukrainian higher education institutions (HEIs). Although this number is lower than the 370 respondents typically recommended for generalizable survey research with a 5% margin of error (Krejcie & Morgan, 1970), it is still considered sufficient for exploratory research purposes (Saunders et al., 2019). Additionally, faculty surveys typically experience lower response rates due to academic workloads and survey fatigue (Dillman et al., 2014), particularly under challenging conditions such as the geopolitical situation in Ukraine. The presented sample is realistic and provides meaningful dataset for capturing trends and patterns among Ukrainian faculty members. It is acknowledged that the sample may not fully represent the entire population of Ukrainian HEI faculty members.

The majority of respondents have more than 10 years of teaching experience (85%) and work in public institutions (98%), with most institutions located in regional areas (81%). The most represented fields of science were Humanities & Arts (22%), Social Sciences (22%), and Engineering & Technology (21%). Table 2 summarizes the respondent characteristics.

The survey was conducted on Google Survey platform anonymously.

In order to make an accurate choice of statistical tests for hypothesis testing, a normality test was performed. Descriptive statistics and normality test results are summarized and presented in Table 1.

4. Results

The importance of entrepreneurship and innovation in Higher Education Institutions (HEIs) was assessed by exploring how entrepreneurial components contribute to institutional resilience. The study explores, how the perceived impact of entrepreneurship on HEI resilience varies based on institutional type, location, field of science, and faculty characteristics.

These hypotheses are tested through statistical analysis, considering faculty members' perceptions of HEI resilience (adaptability, recovery capacity, and ability to maintain core functions) and the integration of entrepreneurial components in education. Given the results of the normality check ($p < 0.001$ for all variables), non-parametric statistical tests (Mann-Whitney U, Kruskal-Wallis) are applied to test these relationships. The summary of statistical tests for hypothesis testing is summarized in Table 3.

To verify **H1:** *The contribution of the entrepreneurial component to HEI resilience is higher in universities located in capitals than in regional universities* there was conducted the comparative analysis by U Mann-Whitney Test. "Location of HEI" (A8) was set as independent variable, "Perceived resilience scores" (A9, A10, A11) were used as dependent variables. The results are presented in Table 4.

The authors proposed, that the contribution of entrepreneurial component to resilience of HEI can be affected by such factors as access to business and innovation ecosystems, greater industry collaboration, higher access to funding and resources, that are more available to capital universities in comparison to regional ones. And as observed capital universities demonstrate overall higher scores of perceived resilience of HEI. But the comparative analysis tested by U Mann-Whitney indicated no

Table 2. Respondent's profile

Category	Groups	Count (%)
Gender	Female / Male	101 (56%) / 80 (44%)
Age	18–30 / 31–45 / 46–60 / 61+	10 (6%) / 27 (15%) / 75 (41%) / 69 (38%)
Level of education	Bachelor / Master / PhD Candidate / Dr	1 (1%) / 31 (17%) / 112 (62%) / 37 (20%)
Teaching experience	1–5 years / 6–10 years / more than 10	17 (9%) / 11 (6%) / 153 (85%)
HEI type	Public / Private	177 (98%) / 4 (2%)
HEI location	Capital / Regional	35 (19%) / 146 (81%)
Field of science	Humanities & Arts Social Sciences Engineering & Technology Natural Sciences Medical & Health Sciences Agricultural & Veterinary Sciences	41 (22%) 40 (22%) 39 (21%) 30 (17%) 24 (14%) 7 (4%)

Table 3. Summary of statistical tests for hypothesis testing

Hypothesis	Independent Variables (IV)	Dependent Variables (DV)	Statistical test
H1: The contribution of the entrepreneurial component to HEI resilience is higher in **universities located in capitals** than in regional universities.	Location of HEI: capital/ regional (A8)	Resilience scores (A9, A10, A11)	Mann-Whitney U Test
H2: The introduction of **entrepreneurial components in education** fosters institutional resilience.	Entrepreneurial component scores (B1–B6, C1–C6, D1–D4)	Resilience scores (A9, A10, A11)	Multiple linear regression
H3: The **perceived importance** of entrepreneurial components in education varies by **field of science**.	Major field of science: Categorical (A5)	Entrepreneurial component scores (B1–B6, C1–C6, D1–D4)	Kruskal-Wallis test
H4: Younger faculty members perceive the entrepreneurial component in education as more important than older faculty members.	Age: Categorical: 18–30 / 31–45 / 46–60 / 61+ (A3)	Entrepreneurial component scores (B1–B6, C1–C6, D1–D4)	Kruskal-Wallis test

Table 4. Comparison of universities located in capital and regional area

	Mean (Capital) n = 35	Mean (Reginal) n = 146	Mann-Whitney U	p
My HEI has a strong ability to adapt to the changes (A9)	4.37	4.21	2290	0.301
My HEI has a strong ability to recover from challenges (A10)	4.26	4.14	2365	0.463
My HEI has a strong ability to maintain the core functions of education (A11)	4.40	4.38	2471	0.738
Aggregated resilience score	4.34	4.24	2253	0.262

Note: H_a μCapital ≠ μRegion.

statistically significant differences between these groups, that rejects H1. This suggests that regional universities in Ukraine have developed strong institutional mechanisms that provide resilience comparable to capital-based universities (Etzkowitz et al., 2000; Guerrero et al., 2015).

To verity the **H2:** *The introduction of entrepreneurial components in education fosters institutional* resilience, a multiple linear regression analysis was conducted. The dependent variable in this model is aggregated resilience score (mean value of A9, A10 and A11). Initially, all predictor variables – entrepreneurial component scores (B1–B6), formal (C1–C6) and informal (D1–D4) learning opportunities were included in the model. And a multicollinearity check was performed using Variance Inflation Factors (VIF). Three variables (C5, D2, D3) showed high collinearity (VIF > 4.7) and were excluded to improve model stability and interpretability. The final model provided a better fit ($R^2 = 0.509$) and allowed clearer interpretation of significant predictors. The final regression models were estimated using the remaining predictors, separately analyzing curriculum-based (B), formal learning (C), and informal learning (D) components.

To summaries the key insights, focus only on significant predictors and provide quick comparison across models (Field, 2018; APA, 2020) the results are presented in Table 5 (for the full regression models with full set of predictors correspondent author may be contacted).

The full model accounted for 50.9% of the variance ($R^2 = 0.509$), indicating a strong relationship between full

Table 5. Summary of the regression models

Model	Significant predictors	β (Estimate)	p-value	Direction
Full Model 1 – all predictors (B, C, D)	C3: Staff training	0.233	<0.001	Positive
	C6: Inclusive learning	0.278	<0.001	Positive
Model 2 – entrepreneurial component scale predictors (B)	B6: Research & policy support	0.165	0.030	Positive
Model 3 – formal learning scale predictors (C)	C3: Staff training	0.226	<0.001	Positive
	C6: Inclusive learning	0.331	<0.001	Positive
Model 4 – informal learning scale predictors (D)	D1: Supporting entrepreneurship clubs	0.286	<0.001	Positive
	D4: Recognizing extracurricular activities	0.182	0.004	Positive

set of predictors. Formal learning opportunities were the strongest predictors of resilience, with staff training for entrepreneurship curriculum ($\beta = 0.233$, $p < 0.001$) and inclusive learning opportunities ($\beta = 0.278$, $p < 0.001$) having significant positive effects.

Separate regression models revealed additional insights. Within curriculum-based components, research & policy support ($\beta = 0.165$, $p = 0.030$) was the only significant predictor. Among informal learning opportunities, support for student entrepreneurship clubs ($\beta = 0.286$, $p < 0.001$) and recognition of extracurricular entrepreneurial activities ($\beta = 0.182$, $p = 0.004$) positively influenced resilience.

These findings suggest that formal entrepreneurship education and institutional support mechanisms play the most significant role in enhancing resilience, while informal initiatives also contribute positively. H2 is confirmed.

These results are in line with previous research, that describe the importance of formal entrepreneurial education. For example, as mentioned in Henry and Lahikainen (2024) and Nabi et al. (2017) structured approach to the development of educational programs allows universities to adapt to changes more easily and effective. And the institutions who has well-developed entrepreneurial programs can sustain innovations and overcome crises like economic downturn (O'Dwyer & Rogers, 2024). Additionally formal entrepreneurial education fosters problem solving skills, critical thinking and adaptability among students and faculty, strengthening institutional resilience (Pittaway & Cope, 2007).

The importance of institutional support and policy-driven mechanisms in resilience of HEI is presented in Etzkowitz et al. (2000), who states, that universities with strong policy frameworks are more resilient because their ability to integrate innovations. Additionally support structures like commercialization of research, collaboration with industry partners, governmental support to entrepreneurial initiatives helps institutions to stay more resilient (Guerrero et al., 2015). Plus training the faculty members to integrate the entrepreneurial component into study programs, leads to culture of adaptability, that fosters institutional sustainability (Siegel & Wright, 2015).

The informal learning mechanisms also significantly contribute to institutional resilience. As presented in Fayolle and Gailly (2015) extracurricular activities provide the experiential learning, risk-taking and innovation skills. Enterpreneurial clubs, led by students and mentors help to create social capital, networks and peer-learning, that support entrepreneurial decisions and problem solving (Bae et al., 2014).

To verify **H3:** *The perceived importance of entrepreneurial components in education varies by field of science,* there was non-parametric Kruskal-Wallis Test applied. The independent variable here is the category: Major field of science (A5), but the dependent variables: Entrepreneurial component scores (B1–B6), formal (C1–C6) and informal (D1–D4) learning mechanisms. To perform the analysis the mean values of each scale were used. The results of the comparison are presented in Table 6.

Table 6. The comparison of the perception of entrepreneurial component across different study fields

Kruskal-Wallis	χ^2	df	p
Entrepreneurial component (B), Mean	3.64	5	0.603
Formal learning opportunities (C), Mean	3.68	5	0.597
Informal learning opportunities, (D), Mean	2.21	5	0.820

Note: comparison made across fields of Science: Humanities & Arts/ Social Sciences/ Engineering & Technology/ Natural Sciences/ Medical & Health Sciences/ Agricultural & Veterinary Sciences.

The results presented in Table 6 showed no significant differences in overall perceptions across disciplines (Mean B: $\chi^2 = 3.64$, $p = 0.603$; Mean C: $\chi^2 = 3.68$, $p = 0.597$; Mean D: $\chi^2 = 2.21$, $p = 0.820$), suggesting the rejection of H3. These results suggest that entrepreneurial competencies are viewed as universally important regardless of discipline, which supports arguments that entrepreneurship education is relevant across all fields (Fayolle & Gailly, 2015; Nabi et al., 2017).

To verify **H4:** *Younger faculty members perceive the entrepreneurial component in education as more important than older faculty members*, there was Mann-Whitney U test used. The independent variable was a category: Age (A3) (18–30 / 31–45 / 46–60 / 61+) and dependent variables: Entrepreneurial component scores (B1–B6), formal learning opportunities (C1–C6) and informal learning opportunities (D1–D4). The results of the comparison are presented in Table 7.

Table 7. The comparison of the perception of entrepreneurial component across different age groups

Kruskal-Wallis	χ^2	df	p
Entrepreneurial component (B), Mean	2.64	3	0.451
Formal learning opportunities (C), Mean	4.16	3	0.244
Informal learning opportunities, (D), Mean	4.46	3	0.216

Note: comparison made across age groups: 18–30 / 31–45 / 46–60 / 61+.

The results showed no significant differences in overall perceptions across age groups (Mean B: $\chi^2 = 2.64$, $p = 0.451$; Mean C: $\chi^2 = 4.16$, $p = 0.244$; Mean D: $\chi^2 = 4.46$, $p = 0.216$). This contradicts the assumption that younger faculty would value entrepreneurship more, possibly indicating that faculty across all age groups recognize its importance in modern HEIs (Bae et al., 2014; Fayolle & Gailly, 2015). H4 is rejected.

4.1. Summary of hypothesis testing

The study tested four hypotheses to assess the role of entrepreneurial components in HEI resilience. Of these, only H2 was confirmed, indicating that structured entrepreneurial education and institutional support significantly contribute to resilience ($R^2 = 0.509$). The strongest predictors were formal learning mechanisms (staff training, inclusive learning), research and policy support, and informal activities (entrepreneurship clubs, extracurricular engagement).

However, H1, H3, and H4 were rejected, as no significant differences were found between capital vs. regional HEIs, academic disciplines, or faculty age groups. These findings suggest that entrepreneurial education is valued equally across all institutional and demographic categories, reinforcing its universal importance in HEIs. The results align with prior research emphasizing the role of institutional policies and structured programs in fostering adaptability and resilience (Henry & Lahikainen, 2024; O'Dwyer & Rogers, 2024; Siegel & Wright, 2015).

5. Discussion

This study aimed to explore the contribution of entrepreneurial components in education to the resilience of Higher Education Institutions (HEIs) in Ukraine. The results confirmed that entrepreneurial education significantly enhances HEI resilience, while other hypotheses concerning differences by location, field of science, and faculty age were not supported.

Firstly, while it was hypothesized that capital-based universities would exhibit stronger resilience due to greater access to financial resources, innovation ecosystems, and industry networks (Goddard, 2021; Huggins & Johnston, 2009), the analysis showed no statistically significant differences between capital and regional universities. This finding suggests that regional universities have developed effective resilience strategies, possibly through stronger local community engagement, access to regional development programs, and flexibility in governance (Guerrero et al., 2015). Furthermore, accelerated digitalization and the capacity to collaborate remotely during the COVID-19 pandemic have reduced traditional gaps between capital and regional institutions, supporting findings by Munaro and John (2025) on the growing sustainability of geographically dispersed HEIs.

Secondly, the perception of the importance of entrepreneurial education was found to be consistent across all fields of science. This outcome aligns with the growing recognition that entrepreneurial competencies are valuable across disciplines, not only in business and engineering but also in social sciences and humanities (Fayolle & Gailly, 2015; Nabi et al., 2017). The integration of entrepreneurial thinking into diverse curricula promotes innovation, self-employment, and industry collaboration, thereby fostering HEI resilience and relevance in modern knowledge economies (Scahill & Pirouzi, 2025).

The third finding concerned faculty age groups. Contrary to the expectation based on previous studies suggesting younger individuals tend to have stronger entrepreneurial attitudes (Syed et al., 2024), this study found no significant differences between age groups in their valuation of entrepreneurship education. This result may be explained by the strong institutional emphasis on entrepreneurial education promoted across Ukrainian HEIs, irrespective of faculty age, through policies, training programs, and accreditation requirements (Dehtjare & Uzule, 2023; Etzkowitz et al., 2000). Regular collaboration between younger and older faculty in curriculum design and research projects may also have minimized generational differences, creating a shared institutional culture valuing entrepreneurial competencies.

The most significant contribution of this study lies in confirming that the introduction of entrepreneurial components – particularly formal learning mechanisms such as staff training and inclusive learning initiatives – has a strong positive impact on institutional resilience (Henry & Lahikainen, 2024; Nabi et al., 2017).

Table 8. Summary of hypothesis testing

Hypothesis	Result	Conclusion
H1: The contribution of the entrepreneurial component to HEI resilience is higher in universities located in capitals than in regional universities.	Rejected	Capital-based HEIs showed slightly higher resilience scores, but the difference was not statistically significant (Mann-Whitney U, $p > 0.05$).
H2: The introduction of entrepreneurial components in education fosters institutional resilience.	Accepted	Regression analysis confirmed a significant relationship ($R^2 = 0.509$), with formal learning components (C3: Staff Training, C6: Inclusive Learning) being the strongest predictors ($p < 0.001$). Additionally, research & policy support (B6) and informal mechanisms (entrepreneurship clubs, D1; extracurricular activities, D4) also had a positive impact.
H3: The perceived importance of entrepreneurial components in education varies by field of science.	Rejected	Kruskal-Wallis test found no significant differences in perception of entrepreneurship across scientific disciplines ($p > 0.05$).
H4: Younger faculty members perceive the entrepreneurial component in education as more important than older faculty members.	Rejected	Kruskal-Wallis test found no significant differences across age groups ($p > 0.05$).

Regression analysis showed that formal education initiatives are the most powerful predictors of resilience, supporting previous findings that structured entrepreneurial education enhances adaptability, problem-solving skills, and innovation (O'Dwyer & Rogers, 2024; Pittaway & Cope, 2007). Furthermore, informal learning opportunities, such as entrepreneurship clubs and the recognition of extracurricular activities, also contributed positively, emphasizing the value of experiential learning environments in building social capital and entrepreneurial mindsets (Bae et al., 2014; Fayolle & Gailly, 2015).

In addition, institutional support for research commercialization and policy initiatives fostering entrepreneurship was found to be a significant factor for resilience, aligning with the Triple Helix model of university-industry-government collaboration (Etzkowitz et al., 2019). By embracing sustainable entrepreneurship within governance structures, HEIs can diversify their funding sources, strengthen external partnerships, and enhance long-term sustainability (Schaeffer et al., 2021).

Overall, these findings underscore the critical role of entrepreneurial education and governance innovation for ensuring the resilience of HEIs in a highly dynamic and uncertain environment, particularly in the context of Ukraine's ongoing geopolitical and economic challenges.

6. Conclusions

This study confirms that integrating entrepreneurial components into Higher Education Institutions (HEIs) significantly strengthens their institutional resilience. Formal learning mechanisms, such as staff training and inclusive learning practices, alongside informal activities like entrepreneurship clubs, have a notable positive impact. Contrary to expectations, no significant differences were found in the perceived importance of entrepreneurial education across university locations, fields of science, or faculty age groups, highlighting the universal relevance of entrepreneurial competencies in contemporary HEIs.

The findings are particularly important in the Ukrainian context, where universities are facing unprecedented geopolitical, economic, and infrastructural challenges. The demonstrated role of entrepreneurial education in fostering adaptability, innovation, and sustainability provides actionable insights for Ukrainian HEIs striving to maintain academic quality, financial stability, and social relevance during times of crisis.

Future research could further explore longitudinal effects and cross-country comparisons to deepen the understanding of entrepreneurial education's role in HEI resilience.

Disclosure statement

Authors do declare to have to not any competing financial, professional, or personal interests from other parties.

References

Adeel, S., Daniel, A. D., & Botelho, A. (2023). The effect of entrepreneurship education on the determinants of entrepreneurial behaviour among higher education students: A multi-group analysis. *Journal of Innovation & Knowledge*, *8*, Article 100324. https://doi.org/10.1016/j.jik.2023.100324

Anubhav, K., Dwivedi, A. K., & Aashish, K. (2024). Entrepreneurship education in higher education (2002–2022): A technology-empowered systematic literature review. *The International Journal of Management Education*, *22*(3), Article 100993. https://doi.org/10.1016/j.ijme.2024.100993

American Psychological Association. (2020). *Publication Manual of the American Psychological Association* (7th ed.). https://doi.org/10.1037/0000165-000

Bae, T. J., Qian, S., Miao, C., & Fiet, J. O. (2014). The relationship between entrepreneurship education and entrepreneurial intentions: A meta-analytic review. *Entrepreneurship Theory and Practice*, *38*(2), 217–254. https://doi.org/10.1111/etap.12095

Castillo-Vergara, M., & Álvarez-Marín, A. (2016). Entrepreneurship perception in higher education: A comparative study among students, faculty members, and directors. *Revista Latinoamericana de Ciencias Sociales, Niñez y Juventud, 14*(1), 221–233. https://doi.org/10.11600/1692715x.14114261114

Creswell, J. W. (2014). *Research design: Qualitative, quantitative, and mixed methods approaches* (4th ed.). Sage.

Dehtjare, J., & Uzule, K. (2023). Sustainable higher education management: Career drivers of academic staff. *Journal of Teacher Education for Sustainability*, *25*(2), 89–105. https://doi.org/10.2478/jtes-2023-0018

Dillman, D. A., Smyth, J. D., & Christian, L. M. (2014). *Internet, phone, mail, and mixed-mode surveys: The tailored design method* (4th ed.). Wiley. https://doi.org/10.1002/9781394260645

Etzkowitz, H., Webster, A., Gebhardt, C., & Tera, B. R. C. (2000). The future of the university and the university of the future: Evolution of Ivory Tower to entrepreneurial paradigm. *Research Policy*, *29*(2), 313–330. https://doi.org/10.1016/S0048-7333(99)00069-4

Etzkowitz, H., Germain-Alamartine, É., Keel, J., Kumar, C., Smith, K. N., & Albats, E. (2019). Entrepreneurial university dynamics: Structured ambivalence, relative deprivation and institution-formation in the Stanford innovation system. *Technological Forecasting & Social Change*, *141*, 159–171. https://doi.org/10.1016/j.techfore.2018.10.019

Fayolle, A., & Gailly, B. (2015). The impact of entrepreneurship education on entrepreneurial attitudes and intention: Hysteresis and persistence effects. *Journal of Small Business Management*, *53*(1), 75–93. https://doi.org/10.1111/jsbm.12065

Field, A. (2018). *Discovering statistics using IBM SPSS statistics* (5th ed.). Sage. http://repo.darmajaya.ac.id/5678/1/Discovering%20Statistics%20Using%20IBM%20SPSS%20Statistics%20%28%20PDFDrive%20%29.pdf

Garus, M., & Odlanicka-Poczobutt, M. (2023). Measuring the entrepreneurial level of a university using the HEInnovate tool – A case study. *Scientific Papers of Silesian University of Technology. Organization and Management Series*, *180*, 145–171. https://doi.org/10.29119/1641-3466.2023.180.8

Goddard, J. (2021). COVID-19. Civic universities, societal innovation and the recovery of local communities. Symphonya. *Emerging Issues in Management*, (1), 56–63. https://doi.org/10.4468/2021.1.06goddard

Guerrero, M., Cunningham, J. A., & Urbano, D. (2015). Economic impact of entrepreneurial universities' activities: An exploratory study of the United Kingdom. *Research Policy*, *44*(3), 748–764. https://doi.org/10.1016/j.respol.2014.10.008

Hämäläinen, M., Joensuu-Salo, S., Peltonen, K., & Raappana, A. (2022). HEI teacher perceptions of entrepreneurship education: The role of teachers' entrepreneurial backgrounds and HEI managerial support. In C. Henry, B. F. C. C. Gabriel, K. Sailer, E. Bernado-Mansilla, & K. Lahikainen (Eds.), *Strategies for the creation and maintenance of entrepreneurial universities* (pp. 114–141). IGI Global. https://doi.org/10.4018/978-1-7998-7456-0.ch006

Hayat, E., Liyanage, C., Haigh, R., & Amaratunga, D. (2018). Development of research and innovation capacity index of HEIs on disaster resilience related studies. *Procedia Engineering*, *212*, 1249–1256. https://doi.org/10.1016/j.proeng.2018.01.161

HEInnovate. (n.d.). *Is your higher education institution prepared for future challenges?*. https://heinnovate.eu/en

Henry, C., & Lahikainen, K. (2024). Exploring intrapreneurial activities in the context of the entrepreneurial university: An analysis of five EU HEIs. *Technovation*, *129*, Article 102893. https://doi.org/10.1016/j.technovation.2023.102893

Howard, G., Weinstein, R., & Yang, Y. (2024). Do universities improve local economic resilience? *The Review of Economics and Statistics*, *106*(4), 1129–1145. https://doi.org/10.1162/rest_a_01212

Huggins, R., & Johnston, A. (2009). The economic and innovation contribution of universities: A regional perspective. *Environment and Planning C: Government and Policy*, *27*(6), 1088–1106. https://doi.org/10.1068/c08125b

Jongbloed, B., & Kottmann, A. (2022). *Guidelines for using HEInnovate and the value proposition canvas in entrepreneurial change processes in higher education institutions*. CHEPS, University of Twente. https://www.beyondscale.eu/wp-content/uploads/2022/04/R4_3_Guidelines-for-using-HEInnovate-and-the-VPC.pdf

Khelifi, S. (2023). Informal university entrepreneurship: The missing link in transition higher education systems. *International Journal of Educational Development, 97*, Article 102725. https://doi.org/10.1016/j.ijedudev.2023.102725

Klingler-Vidra, R., Chalmers, A. W., & Pacheco Pardo, R. (2025). Communicating the societal value of the entrepreneurial university: Evidence from South Korea. *Technology in Society*, *81*, Article 102846. https://doi.org/10.1016/j.techsoc.2025.102846

Krejcie, R. V., & Morgan, D. W. (1970). Determining sample size for research activities. *Educational and Psychological Measurement*, *30*(3), 607–610. https://doi.org/10.1177/001316447003000308

Marques, M. C. C. (2025). The management of higher education institutions in Portugal from a sustainable perspective. *Procedia Computer Science*, *256*, 706–717. https://doi.org/10.1016/j.procs.2025.02.170

Munaro, M. R., & John, V. M. (2025). Towards more sustainable universities: A critical review and reflections on sustainable practices at universities worldwide. *Sustainable Production and Consumption*, *56*, 284–310. https://doi.org/10.1016/j.spc.2025.03.022

Nabi, G., Liñán, F., Fayolle, A., Krueger, N., & Walmsley, A. (2017). The impact of entrepreneurship education in higher education: A systematic review and research agenda. *Academy of Management Learning & Education*, *16*(2), 277–299. https://doi.org/10.5465/amle.2015.0026_

Nyakotyo, C., & Goronga, P. (2024). Resilience strategies for higher education institutions. In M. Kayyali (Ed.), *Rebuilding higher education systems impacted by crises: Navigating traumatic events, disasters, and more* (pp. 1–18). IGI Global. https://doi.org/10.4018/979-8-3693-1926-0.ch001

Orioque, J. A., Pajaron, S. A., Laurente, C. O., & Larisma, C. C. M. (2024). Resilience and adversities: The case of HEI faculty and students. *Journal of Innovative Technology Convergence*, *6*(3), 9–20. https://doi.org/10.69478/JITC2024v6n3a02

O'Dwyer, M., & Rogers, D. (2024). Education and resilience in the entrepreneurial university: An analysis of past and present practice at tangent, trinity's ideas workspace. In D. Hack-Polay, D. Lock, A. Caputo, M. Lokhande, & U. Salunkhe, (Eds.), *Global higher education practices in times of crisis: Questions for sustainability and digitalization* (pp. 111–125). Emerald. https://doi.org/10.1108/978-1-83797-052-020241008

Palkova, K., Palkova, A., Rakstins, V., Juļa, L., Filipenko, N., Lukashevysh, S., & Andrieieva, O. (2024). *Handbook for academic and scientific institutions: Improve risk management and institutional resilience in the face of security threats*. Rīga Stradiņš University. https://doi.org/10.25143/handbook_ISBN-978-9934-618-61-1

Saunders, M., Lewis, P., & Thornhill, A. (2019). *Research methods for business students* (8th ed.). Pearson. https://elibrary.pearson.de/book/99.150005/9781292208794

Siegel, D. S., & Wright, M. (2015). Academic entrepreneurship: Time for a rethink?. *British Journal of Management*, *26*(4), 582–595. https://doi.org/10.1111/1467-8551.12116

Patrício, L. D., & Ferreira, J. J. (2023). Aligning entrepreneurial universities' HEInnovate dimensions with entrepreneurs' needs: A graduate entrepreneur-centered perspective. *The International Journal of Management Education*, *21*(3), Article 100882. https://doi.org/10.1016/j.ijme.2023.100882

Pittaway, L., & Cope, J. (2007). Entrepreneurship education: A systematic review of the evidence. *International Small Business Journal*, *25*(5), 479–510. https://doi.org/10.1177/0266242607080656

Schaeffer, P. R., Guerrero, M., & Fischer, B. B. (2021). Mutualism in ecosystems of innovation and entrepreneurship: A bidirectional perspective on universities' linkages. *Journal of Business Research*, *134*, 184–197. https://doi.org/10.1016/j.jbusres.2021.05.039

Scahill, S., & Pirouzi, M. (2025). Scoping review of entrepreneurship in community pharmacy: Bringing together education and practice. *Currents in Pharmacy Teaching and Learning*, *17*(5), Article 102308. https://doi.org/10.1016/j.cptl.2025.102308

Syed, R. T., Singh, D., Ahmad, N., & Butt, I. (2024). Age and entrepreneurship: Mapping the scientific coverage and future research directions. *International Entrepreneurship and Management Journal*, *20*(2), 1451–1486. https://doi.org/10.1007/s11365-024-00964-8

Uzule, K. (2020). Teacher training and education programs in Latvia: Are e-competences included? *Business, Management and Economics Engineering*, *18*(2), 294–306. https://doi.org/10.3846/bme.2020.12631

Vargas-Merino, J. A., Rios-Lama, C. A., Bello-Mamani, D. X., & Panez-Bendezú, M. H. (2025). Sustainable entrepreneurship in HEIs: A systematic review from the perspective of higher education in business. *The International Journal of Management Education*, *23*(2), Article 101137. https://doi.org/10.1016/j.ijme.2025.101137