

Benchmarking Analysis of Innovation and Technology Transfer in HEIs From Central and Eastern Europe (CEE)

Andreea Maria Gabriela Militaru¹, Bogdan Fleacă¹, Hira Wajahat Malik² and Răzvan Mihai Dobrescu¹

¹National University of Science and Technology POLITEHNICA Bucharest, Bucharest, Romania

²Estonian Business School, Tallinn, Estonia

andreea.militaru95@upb.ro

bogdan.fleaca@upb.ro

hira.malik@ebs.ee

razvan.dobrescu@upb.ro

Abstract: This article aims to assess and benchmark the state of technology transfer and innovation processes (TTIP) in Higher Education Institutions (HEIs) across Central and Eastern Europe (CEE), focusing on how institutional and stakeholder-related knowledge transfer is shaped by regional contexts. The study is grounded in established theories of university–stakeholder interaction and innovation systems, with particular attention to the methodological approaches that dominate TTIP research and practice in CEE HEIs. Methodologically, the research combines an empirical comparative analysis with the development of a comprehensive mixed-methods survey framework. The proposed methodology employs stratified sampling across institutional employee types and research areas, integrating quantitative survey data with qualitative insights and administrative records related to technology transfer activities. The survey targets academic staff, researchers, administrative personnel, and doctoral students, who are identified as the primary actors in university technology transfer processes. The findings highlight that HEIs in CEE operate within distinct historical, institutional, and economic conditions that generate persistent challenges, including weak university–industry linkages, underdeveloped innovation ecosystems, limited and discontinuous funding, and uneven institutional support structures compared to Western European counterparts. Despite these constraints, technology transfer activities are shown to operate across diverse institutional environments through multiple mechanisms, including technology transfer offices (TTOs), collaborative research projects, intellectual property management, start-up creation, and academic spin-offs. The added value of this study lies in its integrated analytical and methodological contribution. First, it offers a contextualized benchmarking of TTIP performance in CEE HEIs that accounts for regional specificities often overlooked in pan-European analyses. Second, it introduces a robust and replicable survey-based methodology for capturing individual-level perspectives on technology transfer, enabling more nuanced performance measurement beyond institutional indicators. Finally, the study provides evidence-based insights to inform policymakers and university managers seeking to strengthen innovation systems in CEE higher education while respecting national and institutional diversity.

Keywords: Technology Transfer, Innovation System, Higher Education Institution, Benchmarking

1. Introduction

The transformation of Higher Education Institutions (HEIs) into engines of economic growth through technology transfer and innovation (TTI) has become an important trend in European policy over the past 10 years, alongside the development of international indicator frameworks for measuring innovation, for example, the Global Innovation Index (GII) and the European Innovation Scoreboard. Nowadays, this topic and its evolution are particularly critical in Central and Eastern European Countries (CEE), where universities are expected to be more involved than in the past, switching their position into playing a pivotal role in bridging the innovation gap, thereby contributing to regional economic development and competitiveness (Kergroach et al., 2018). The CEE region, comprising countries that joined the European Union (EU) in successive waves from 2004 to the present, presents a unique context for analyzing technology transfer dynamics. These nations share many traits, such as historical legacies, institutional reforms, and receipt of structural funds for investment in research and development (R&D) and innovation infrastructure (Barjak et al., 2016). Besides the characteristics of being part of the EU, the CEE countries could be divided into the following subregions: Central Europe (Poland – PL, Czech Republic – CZ, Hungary – HU, Slovakia – SK), the Baltic states (Estonia – EE, Latvia – LV, Lithuania – LT), Eastern Europe (Romania – RO, Ukraine – UA, the Republic of Moldova – MD, Belarus - BY), and South-Eastern Europe: (Bulgaria – BG, Serbia – RS, Slovenia – SI, Bosnia & Herzegovina - BA, Croatia – HR, Albania – AL, Montenegro – ME, North Macedonia – MK, Kosovo - XK). While this article is mainly focusing on CEE universities part of the EU and ERASMUS+ programme, all universities need more attention and research in this TTIP area.

Despite funding and support, CEE HEIs from the EU and ERASMUS+ programme, continue to face challenges in translating research outputs into commercial use and real-world applications, establishing fewer effective

linkages between academia and industry, and working harder in creating sustainable innovation ecosystems (Lacka et al., 2023). The performance of technology transfer varies significantly both between and within countries, reflecting differences in institutional capacity, policy frameworks, and entrepreneurial culture (Birkner et al., 2022). Understanding these variations and identifying the characteristics that distinguish high-performing institutions from low-performing ones is essential for policymakers, university administrators, and innovation practitioners seeking to strengthen the region's innovation capacity.

This article addresses the need for a comprehensive benchmarking analysis of TTIP awareness and engagement across HEIs in CEE countries, including Romania. The study analyses the historical evolution of TT understanding among HEIs, develops a methodology based on publicly shared best practices from universities, and provides detailed country-specific assessments through a survey.

The main objectives of the present study are to contextualize the HEI technology transfer processes for CEE countries within the global innovation landscape; providing a comparative country-level analysis of innovation performance, TTO structures, strengths, challenges and recent trends; proposing a comprehensive survey methodology for primary data collection that operationalizes key variables from the literature; developing actionable recommendations tailored to different stakeholders groups (researchers, professors, TTO officers, students, policymakers).

The article is organized to provide insights in the following structure and order: first, a comprehensive literature review covering the historical evolution of HEI technology transfer processes in CEE; comparative metrics for benchmarking; the theoretical framework; key concepts in university technology transfer; innovation ecosystems; and knowledge transfer mechanisms. Then, it presents a detailed country-by-country comparative analysis of the target nations, describes the research methodology employed in the present study, and proposes a comprehensive survey methodology framework for primary data collection. Finally, it concludes with a discussion of the data and implications, providing a ground for different stakeholders' groups and future research directions.

2. Literature Review

The technology transfer and innovation landscape for CEE HEIs is continuously changing. In countries that joined the EU in waves, universities have been forced to undergo a greater transformation. The immediate integration period to the EU involved the adoption of legal and policy frameworks to support university-industry collaboration and technology commercialization. Often, young EU member states adopted models from Western European countries (Anderson et al., 2018) that did not address the needs of their local specificities or industries.

2.1 Theoretical Foundations of Technology Transfer in HEIs

There is still an uneven approach to technology transfer at the HEI level, encompassing a range of activities that shape how academic outputs are translated into commercial use and societal benefits.

There has been a switch in time from the traditional university missions of teaching and research to “the third mission”, translated into engaging directly with stakeholders and contributing to societal development, as mentioned by Pinheiro et al. (2015). This “third mission” implies three main dimensions: knowledge transfer and commercialization, continuous education and lifelong learning, and societal engagement and civic responsibility (Garcia et al., 2018; Berghaeuser et al., 2020).

It can be argued that this “third mission” considers levels of definitional ambiguity and variation across contexts. In European discourse, “third mission” has become prominent in education policy, though in Latin American contexts it is more often emphasized as an extension of the current policy (Dassoler et al., 2023).

Particularly in the European Research Area, it is strongly emphasized that adopting “the third mission” requires new organizational structures (such as TT structures) and, in turn, cultural change in how academics perceive their roles and how HEIs allocate resources and recognition.

In the CEE context, the third mission represents a significant evolution from the historical role of universities, which were focused primarily on teaching and secondarily on research, often conducted by separate academic institutes (Marozau et al., 2026).

Table 1 presents the EU status of the CEE countries in correlation to the number of HEIs and the innovation ranking. For the innovation ranking, the European Innovation Scoreboard for 2025 is considered the official EC composite score, based on 32 indicators, for measuring national or regional innovation.

It can be argued that EU membership adds value to HEIs, as CEE countries that are part of the EU are beyond the emerging-innovator status. However, just one of the CEE countries is considered a strong innovator – EE, four countries are considered moderate innovators – CZ, LT, HR, and SI, and the rest of the countries, EU members or not, are considered emerging innovators. Among EU members, HR, PL, SK, LV, BG, and RO are emerging innovators.

Table 1: Benchmarking technology transfer and innovation potential for CEE countries

Country	Acronym	EU status	Sub-region	No. HEIs	ERASMUS+ Charter	Innovation ranking EIS
Czech Republic	CZ	EU member	Central Europe	62	73	Moderate
Hungary	HU	EU member		64	56	Emerging
Poland	PL	EU member		361	302	Emerging
Slovakia	SK	EU member		35	32	Emerging
Estonia	EE	EU member	Baltic	18	18	Strong
Latvia	LV	EU member		22	44	Emerging
Lithuania	LT	EU member		22	28	Moderate
Belarus	BY	Non-EU	Eastern Europe	51	0	Not applicable (N/A)
Republic of Moldova	MD	Non-EU		16	0	Emerging
Romania	RO	EU member		80	78	Emerging
Ukraine	UA	Non-EU		207	0	Emerging
Albania	AL	Non-EU	South-Eastern Europe	35	17	Emerging
Bosnia & Herzegovina	BA	Non-EU		28	23	Emerging
Bulgaria	BG	EU member		51	53	Emerging
Croatia	HR	EU member		47	45	Moderate
Kosovo	XK	Non-EU		7	11	N/A
Montenegro	ME	Non-EU		17	4	Emerging
North Macedonia	MK	Non-EU		23	27	Emerging
Serbia	RS	Non-EU		32	49	Emerging
Slovenia	SI	EU member		44	86	Moderate

Source: ENIC-NARIC (2023), UniRank (2026), Erasmus (2021), EIS (2025)

As shown in Table 1, there is a mismatch between the country's size and its innovation output. For example, Romania, with 80 declared HEIs, is an emerging innovator, while Estonia, with 18 HEIs, is a strong innovator.

Moving further, it can be emphasized that HEIs in CEE countries play a critical role in National Innovation Systems (NIS), serving as primary generators of research outputs and human capital, and potential providers of technology transfer to industry. Lower national innovation performance is consistently associated with weaker measurable technology-transfer outputs from HEIs.

In most cases, knowledge flows from universities are conditional on public R&D investments and strong interaction between universities and industry (Runiewicz-Wardyn, 2014). The dependence on public funding, rather than on market-driven sources, highlights structural weaknesses associated with the status of a moderate or emerging innovator. HEIs in countries with lower EIS rankings tend to have weaker university-industry collaboration rates, less-developed TTOs, and lower success in valorisation and commercialization metrics, such

as spin-off creation and licensing revenues. The ERASMUS+ Charter column is emphasizing the membership in the ERASMUS+ Programme, being one of the most coherent exchange and mobility programme at the EU level.

Technology transfer still lacks a universally accepted definition. The concept of technology transfer varies across national and regional contexts (Wahab et al., 2011). Technology transfer is the process of translating research outcomes from an HEI into a market solution, typically in at least one industry. This is why it would be very relevant for each HEI to have a Technology Transfer and Innovation-related entity to raise awareness, provide guidance, and evaluate how TT is acquired at the HEI level and translated into industry (Bozeman, et al., 2000). A general term for this entity is usually the Technology Transfer Office (TTO). At the institutional level, a TTO serves as a boundary, a structural mediator between academic researchers, professors, PhD students, and industry partners, reducing bureaucratic noise, keeping information consistent, and making knowledge exchange transaction cost-relevant (Siegel et al., 2005; Debackere et al., 2005).

Critically, TT is not a linear process; it is highly dynamic, with a multi-directional flow of knowledge shaped by all the actors involved and by the culture of each HEI and country. The capacity to absorb knowledge is addressed by many theories, such as the Quadruple Helix context, which argues that universities, industry, government, and society actors must build Intentional interactions and complementary processes to enable effective innovation diffusion and knowledge transfer (Militaru et al., 2025). Therefore, TT mechanics cannot work efficiently without a human and cognitive foundation.

2.2 Technology Transfer Mechanism in CEE HEIs

Technology transfer from universities to industry serves multiple critical functions for CEE countries. Firstly, provides a mechanism for translating publicly funded research into economic and social value, strengthening the need for continuous investment in higher education and R&D (Stankeviciene et al., 2017). Secondly, maintains university-industry linkages, creating feedback loops that improve academic research's responsiveness to market needs and challenges (Serbanica et al., 2015). Thirdly, it contributes to regional economic development by creating high-value workplaces, fostering an entrepreneurial mindset, and providing opportunities for researchers and graduates to commercialize ideas locally rather than migrating to more developed national innovation systems (Stoicovici et al., 2017; Birkner et al., 2022).

There are 20 countries in CEE; hypothetically, if each university has one TTO, that would result in more than 1,000 TTOs. Taking this potential into account, HEIs in CEE could build a foundation for technology transfer outputs at the regional and national levels.

Characteristics such as the ability of local markets and industries to recognize, assimilate, and apply knowledge generated by universities, as well as organizational capabilities for technology transfer in HEIs, influence the dynamics of technology transfer and innovation capacity (Runiewicz-Wardyn, 2014). From the analysis of several HEIs included in the primary study, both *institutional mechanisms* such as TTOs, formal procedures, intellectual property (IP) management, incubators/accelerators, and *relational mechanisms* based on networks among academic staff, interpersonal connections, affiliation to science and technology (S&T) parks, were identified (Miller et al., 2016).

Table 2 provides an overview of the TT institutional and relational mechanisms found on the HEIs' websites shared by respondents in the primary dataset.

Table 2: TT institutional-relational framework overview

TT Institutional characteristics (TTIC)		TT relational characteristics (TTRC)	
Name	Definition	Name	Definition
IC1. Dedicated TTO/innovation structure	Established TTO, innovation/knowledge transfer unit/center	RC1. International networks	Part of international research networks
IC2. Formal TT regulations/procedures	Existing internal procedural frameworks	RC2. Industry partnerships	Shared programs, visible partnerships
IC3. IP management	Explicit mention of patent filing, IP registration, licensing	RC3. Academic exchange and mobility programmes	Bilateral exchange, ERASMUS+

TT Institutional characteristics (TTIC)		TT relational characteristics (TTRC)	
Name	Definition	Name	Definition
IC4. Research infrastructure	Existing research labs, dedicated physical Innovation spaces	RC4. External funding	External funding support (EU projects, national research grants) available to academic staff
IC5. Performance metrics	Explicit metrics for valorisation and commercialisation	RC5. Regional/national innovation roles	Explicit affiliation to high-tech parks, regional innovation hubs

Source: author's structure developed

The institutional-relational framework is relevant for benchmarking TT in the CEE context because HEIs face challenges both in building internal infrastructure and in integrating into European and global research and innovation networks.

3. Methodology

The methodology for the current study focuses on both secondary and primary analyses. The secondary research consists of an analysis of several databases, such as the OECD and local university websites, as well as a literature review. The primary research consists of an applied survey covering several variables related to technology transfer and innovation absorption at the university, as perceived by HEI staff. The applied survey reached around 150 persons from CEE HEIs and gathered 31 responses, 29 from CEE HEIs, one from Hungary, and one from Türkiye.

This study establishes a pilot benchmarking methodology to assess the current state of technology transfer in HEIs across CEE. Table 3 shows the variables available in the dataset and their description. The study deliberately excluded TTO officers to capture the academic side of TT processes at the HEI institutional level.

Table 3: Research variables

Research Objective	Research Variables	Variable Role Measurement
RO1 Defining TTO structures	TTO existence	Whether there is a TTO or an innovation-related structure within HEI
	Authority linkages and autonomy	Identifying the type of communication between academic staff and TTO
	Strategic planning	Identifying local regulations available for TTI
RO2 Measuring perception of academic staff over TTO involvement	Academic staff reach	Understanding the awareness about TTI
	Visibility	Identifying available TT opportunities
	Communication channels	Understanding the communication means
	Academic recognition	Whether there is a way to recognize involvement in TTI activities
RO3 Benchmarking the technology transfer and innovation indicators at the HEI level	Performance metrics	Understanding relevant indicators to measure TTI, and which ones are tracked
	Succes stories	Whether there are heard or/and experienced

Source: author's structure developed

The study was conducted among academic staff from 10 CEE countries, nine EU, one Non-EU, and Türkiye. The roles answering the study were professors, PhD students (doctoral students), researchers, and administrative staff. All respondents agreed to give permission for the use of their data for research purposes.

The applied survey consisted of 20 questions: 19 mandatory, closed-ended, and one non-mandatory, open-ended. The first questions covered demographics such as role in academia, home HEI, and country. The interpretation and graphical elements of the current study were developed in Microsoft Forms, JAMOVI, and Microsoft Excel. Table 4 consists of 39 JAMOVI variables derived from 20 survey items; Q5 and Q20 are missing from the Table 4 dataset because they gathered the websites where the TT information was available for each HEI.

Table 4: JAMOVI dataset

Demographics	RO1
Q1.role_HEI Q2.name_HEI Q3.country_HEI	Q4.TTO_HEI Q6.regulationsTT_HEI Q7.regulationtypesTT_HEI
RO2	
Q8.resourceTT_HEI Q9.resourcetypeTT_HEI Q10.interactionTTO_HEI Q11.commoncommunicationchannelsTTO Q12.aware_opportunitiesTT	Q13.sources_opportunitiesTT Q14.academicrecognition_TT Q15.type_incentive Q16.awareness_sessions_TTO
RO3	
Q17.indicatorTT_resindexp Q17.indicatorTT_inventiondis Q17.indicatorTT_actrescontracts Q17.indicatorTT_patentsfilledyear Q17.indicatorTT_patentsgrantedyear Q17.indicatorTT_actlicensingagree Q17.indicatorTT_licensingrev Q17.indicatorTT_spinoffsstartupscreated Q17.indicatorTT_activespinoffs Q17.indicatorTT_resindcolab Q17.indicatorTT_relevjobscreated	Q17.indicatorTT_revenuespinoffs Q17.indicatorTT_socialenvcommtech Q17.indicatorTT_studentrepreate Q17.indicatorTT_techtranfeSMEregion Q17.indicatorTT_invetiondisclosurepatfil Q17.indicatorTT_averagepatfillicensingagree Q17.indicatorTT_IPtrainingses Q17.indicatorTT_partofSTPark Q17.indicatorTT_coordinatingEUfundprog Q18.5indicators_tracked Q19.succes_storiesTT

Source: author's structure developed

4. Results and Discussions

The primary data frame an exploratory database of N31 across 9 countries, a quite small sample, with a geographic concentration in CEE countries. Table 5 presents a matrix of the sample's demographic profiles. Each row represents a country and an HEI, with the values indicating the number of respondents from that institution who answered the survey.

The 31 universities are showing the following roles and count: 4 administrative staff, 7 PhD students, 19 professors, and one researcher. As main observations, RO was the most-represented country, with 16 responses across 5 HEIs, 10 professors, and 5 PhD students. POLITEHNICA Bucharest has the highest percentage of respondents, 12. MD responses came from three different HEIs in the professor role, in total 61% responses for geographic concentration.

HR responses came from two administrative staff members and one researcher.

BG, CZ, EE, LV, and PL each have only 1-2 responses, indicating that survey penetration and engagement on the topic were quite low. Hungary and Türkiye are not CEE countries; however, they are neighbouring them, and the respondents could have a close perception, which will be further analysed.

The role distribution is important because it shows a clear interest among professors in the topic (61% of respondents), while administrative staff and researchers (12%) are underrepresented, indicating that TT awareness is present among professors and less among researchers and administrative staff (other than TTO officers).

Table 5: Dataset distribution among respondents

Country HEI	Academia Role				Total
	Administrative staff	PhD (doctoral student)	Professor	Researcher	
BG	1	1	1		3
University of Ruse Angel Kanchev		x	x		
Technical University of Varna	x				
HR	2		1		3
Sibenik University of Applied Sciences			x		
University of Dubrovnik	x				
University of Zadar	x				
CZ			1		1
Brno University of Technology			x		
EE		1			1
Estonian Business School		x			
Hungary			1		1
Budapest University of Technology and Economics			x		
LV				1	1
Riga Technical University				x	
PL			1		1
Lodz Technical University			x		
MD			3		3
Cahul State University			x		
Moldova State University			x		
Technical University of Moldova			x		
RO	1	5	10		16
Alexandru Ioan Cuza University		x			1
Academy of Land Forces of Sibiu			x		1
POLITEHNICA Bucharest		3	8		11
SNSPA		x	x		2
University Titu Maiorescu	x				1
Turkiye			1		1
University of Istanbul			x		
	4	7	19	1	31

Source: author's structure developed

The underrepresentation of administrative staff and researchers could be considered a red flag regarding the TT's interest and capacity; therefore, researchers show low engagement in TT processes. Consistent with the study, the professors show the highest awareness of TT regulations, the PhD students show the lowest, and the administrative staff are divided in their opinions; the descriptive statistics suggest greater uncertainty about institutional TT infrastructure among early-career academics. Only 39% of the respondents were aware of the local HEI regulations for TT. The most common TT documentation, which only 26% of the respondents were aware of and took into consideration, was the Rector's action plan, and the IP local policy, with 17% of the respondents.

Table 6 highlights correlations among Jamovi variables. There is a statistically significant, moderate positive correlation between Q8XQ10. There is a direct connection between the resources available to learn about TT

and interaction with their TTO, which seems natural; only 16% of respondents confirmed that they are aware of the resources to learn about TT.

Table 6: Correlation matrix Jamovi Q8, Q10, Q14

Q8.resourceTT_HEI x Q10.interactionTTO_HEI	Q8.resourceTT_HEI x Q14.academicrecognition_TT	Q10.interactionTTO_HEI x Q14.academicrecognition_TT
Spearman's rho 0.331	Spearman's rho 0.700	Spearman's rho 0.259
p-value 0.069	p-value <0.001	p-value 0.159

Source: author's structure developed

On the other hand, there is a large positive correlation between the resources available to learn about TT and academic recognition (incentives or other) for the involvement in activities related to TT and innovation (Q8XQ14). This structural relationship is confirmed by local practice, as active patents and licensing are taken into consideration when advancing in the academic hierarchy within CEE HEIs, and, at the same time, the correlations show that where resources are available, academics are more likely to have their TT activities recognized.

The third correlation between Q10XQ14 is not statistically significant; the interaction with TTO employees does not necessarily guarantee that interacting with TTO employees is also motivated to get involved in the process and hence obtain academic recognition.

The survey examined academic staff perceptions of TT indicators across CEE HEIs. The reliability analysis of the Q17 indicators collectively indicates a reliable and consistent scale for measuring the relevance of the indicators, as evidenced by Cronbach's α in Table 7. It can be suggested that the respondents perceive the TT indicators as a holistic, interconnected set rather than independent ones. Figure 1 - The correlation heatmap confirmed strong positive inter-item correlations across all pairings.

Table 7: Reliability Statistics Q6-Q10-Q17

	Mean	SD	Cronbach's α
scale	3.24	0.736	0.951

Source: author's structure developed

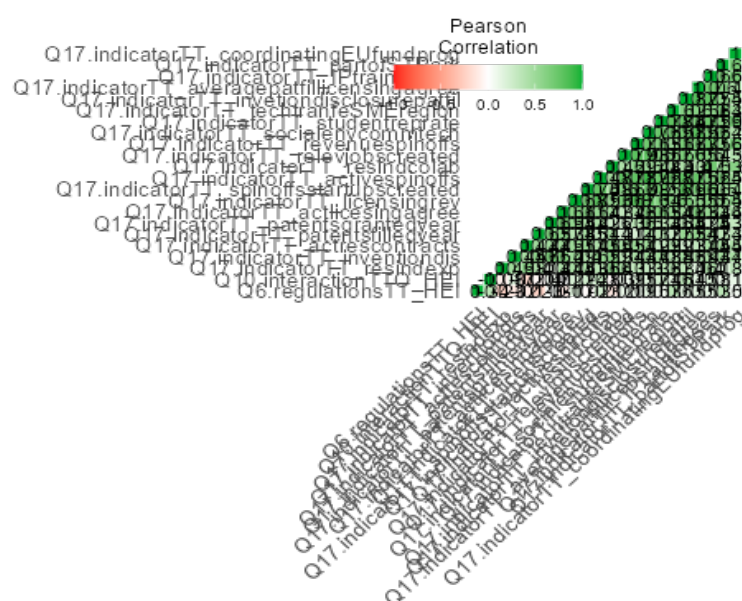


Figure 1: Correlation Heatmap Pearson Q6-Q10-Q17 variables

For CEE HEI respondents, the following indicators were considered as already part of their practice: 14% - number of researchers with industry collaboration, 14% - number of active research with industry, 14% - coordinating EU research-funded programs, 9% number of patents granted per year, 7% number of research industry collaboration agreements signed, and 6% of the total highlighted that there is none indicators used by their HEI to track TT processes. After analyzing the data, although all respondents considered the 20 indicators measured at Q17 to be, to some degree, relevant, their real-life application is quite scarce in CEE HEIs, given the pilot sample. 74% of respondents reported not knowing any success stories related to TT and innovation at their university.

To benchmark the CEE HEIs in the study, the synthesized characteristics from Table 2 were used, and calculations were applied to the 10 characteristics based on the primary data gathered. Table 8 presents the comparative analysis.

Table 8: TTO website characteristics comparative analysis

HEI	IC1	IC2	IC3	IC4	IC5	RC1	RC2	RC3	RC4	RC5	Score
University of Ruse Angel Kanchev	1	0	0	1	0	1	1	1	1	0	6
Technical University of Varna	1	0	0	1	0	1	1	1	1	0	6
Sibenik University of Applied Sciences	0	0	0	1	0	1	1	1	1	0	5
University of Dubrovnik	0	0	0	1	0	1	1	1	1	0	5
University of Zadar	1	1	1	1	0	1	1	1	1	0	8
Brno University of Technology	1	1	1	1	1	1	1	1	1	0	9
Estonian Business School	1	0	1	1	0	1	1	1	1	0	7
Budapest University of Technology and Economics	1	1	1	1	1	1	1	1	1	0	9
Riga Technical University	1	1	1	1	0	1	1	1	1	0	8
Lodz Technical University	1	1	1	1	0	1	1	1	1	0	8
Cahul State University	0	0	0	1	0	1	1	1	1	0	5
Moldova State University	1	1	1	1	1	1	1	1	1	0	9
Technical University of Moldova	1	1	1	1	0	1	1	1	1	0	8
Alexandru Ioan Cuza University	1	1	1	1	0	1	1	1	1	0	8
Academy of Land Forces of Sibiu	0	0	0	1	0	1	1	1	1	0	5
POLITEHNICA Bucharest	1	1	1	0	1	1	1	1	1	0	8
SNSPA	0	0	0	1	0	1	1	1	1	0	5
University Titu Maiorescu	0	0	0	1	0	1	1	1	1	0	5
University of Istanbul	1	1	0	1	0	1	1	1	1	0	7

Source: author's structure developed

Legend: 1 – present characteristic confirmed on the HEI/TTO's website; 0 – absent characteristic not found on the website, N/A – respondent did not identify any TTO.

Score interpretation (1-10): sum of (IC1 -RC5), 1-5 minimum/emerging, 6-10 developing/moderate.

There are some characteristics that all universities tick, for example, being part of international networks and organizing academic exchange, which are most of the time visible on the university's International Relations page, not on the TT office/department sections. Some characteristics are lacking in some universities because there are no TT structure and local regulations, which make the activity hard to access.

Most HEIs in Central Europe demonstrate strong institutional and relational characteristics, with scores ranging from 7 to 9 out of 10. The Baltic countries are interested in implementing TT processes using locally developed models. Moldova demonstrates an emerging character, with significant fresh involvement in this area. Bulgaria and Romania show significant institutional heterogeneity, reflecting the diversity of HEIs.

5. Conclusions

The analysis of the technology transfer HEI characteristics was based solely on publicly available website information; it may not fully reflect the true state of practice in internal TT processes. However, it is a starting point for a more in-depth analysis of CEE and Romanian HEIs. This study reveals significant heterogeneity in both institutional and relational TT characteristics. This institutional-relational framework has important implications for primary research of TT on HEI academic staff.

The absence of TTO officers' responses was a design decision, not a limitation, defining the demand side of TT rather than the supply side. The academic awareness of TT processes is concentrated mostly in the professors' layer rather than the researchers' layer, where intellectual property usually originates.

The present study provides a comprehensive basis for understanding the state of technology transfer and innovation across a diverse sample of CEE universities, introduces a novel framework for benchmarking HEIs, and uses primary data to emphasize the need to improve both structural and relational TTI at the HEI level in CEE countries.

This study can be considered by fellow academic staff for research design development to strengthen TTI in CEE, and by fellow stakeholders to understand the innovation system and improve connections with the HEI.

Ethics Declaration

No ethical clearance required.

AI Declaration

The authors acknowledge that a preliminary systematic literature search was conducted using AI-powered tools on the Scispace platform (SciSpace, RRID: SCR_024503). The tool was used to screen titles and extract keywords. Grammarly was used for grammar correction and proofreading.

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