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Analysis of the Value Chain of Academic Entrepreneurship in Iran: Identifying Institutional Gaps and Barriers in the Knowledge Commercialization Pathway

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ABSTRACT

Given that most entrepreneurial university models have been developed within the context of developed countries, the direct transfer of these models to Iran's higher education system is accompanied by institutional, cultural, and structural constraints. The purpose of this study was to design and conceptualize an indigenous entrepreneurial university model aligned with Iran's contextual conditions and to refine it through value chain analysis of academic entrepreneurship using an institutional and ecosystem perspective. This research was conducted using a mixed-methods approach (qualitative–quantitative). In the qualitative phase, a systematic review of domestic and international literature and a comparative analysis of more than 30 entrepreneurial university models were carried out, along with semi-structured interviews and expert questionnaires involving 40 national specialists in higher education and entrepreneurship. The data were analyzed using thematic analysis and comparative techniques. In the quantitative phase, the Fuzzy Analytic Hierarchy Process (Fuzzy AHP) was employed to prioritize the extracted dimensions and to manage uncertainty in expert judgments. In addition, value chain analysis of academic entrepreneurial activities was conducted with a focus on teaching-oriented universities in the country. The results led to the identification of eight core dimensions of the Iranian entrepreneurial university, including human capital, legal and institutional environment, social capital, supporting organizations, cultural environment, social environment, physical capital, and geographical context. The findings of the Fuzzy AHP analysis indicated that human capital and the legal–institutional environment had the highest priority. Furthermore, the value chain analysis revealed significant gaps in the stages of commercialization, market development, and scalability. The findings emphasize the necessity of reforming legal frameworks, strengthening support institutions, redesigning university incentive systems, and integrating the academic entrepreneurship value chain.

Keywords: Entrepreneurial university; Higher education in Iran; Indigenous model; Fuzzy AHP; Entrepreneurship ecosystem.

Introduction

The transformation of universities from traditional teaching and research institutions into entrepreneurial actors has emerged as one of the most significant developments in contemporary knowledge-based economies. This transformation reflects broader structural changes in the global economy, where knowledge, innovation, and entrepreneurship have become primary drivers of economic growth, competitiveness, and societal development. In this context, universities are no longer viewed solely as producers of knowledge but as central actors in the

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generation, diffusion, and commercialization of innovation (1). The concept of the entrepreneurial university has evolved in response to the increasing importance of innovation-driven economic systems, where higher education institutions play a critical role in fostering entrepreneurial capabilities, supporting technology transfer, and facilitating regional and national development (2). This transformation has been further reinforced by structural shifts in innovation systems, which emphasize collaboration among universities, industry, and government to promote innovation and economic development (3). As a result, universities have increasingly adopted entrepreneurial roles, including knowledge commercialization, startup creation, and engagement in innovation ecosystems, positioning themselves as key institutional actors in modern economies (4).

The theoretical foundations of the entrepreneurial university are closely linked to the emergence of the Triple Helix model, which conceptualizes innovation as the outcome of dynamic interactions among universities, industry, and government. This model highlights the evolving role of universities as hybrid organizations that combine traditional academic functions with entrepreneurial activities such as technology transfer, patenting, and firm creation (5). The entrepreneurial university operates as a central node within broader innovation systems, facilitating knowledge exchange, fostering innovation networks, and supporting entrepreneurial activities across multiple levels (6). This evolution reflects the transition from linear models of innovation to more complex, networked systems characterized by collaboration, openness, and knowledge exchange (7). The integration of universities into innovation systems has led to the development of new institutional arrangements, governance structures, and organizational practices aimed at enhancing entrepreneurial outcomes and supporting economic development (8). As a result, universities have become key drivers of innovation ecosystems, contributing to economic diversification, technological advancement, and societal progress.

The emergence of entrepreneurial universities is also closely linked to the development of entrepreneurship ecosystems, which provide the institutional, organizational, and cultural conditions necessary for entrepreneurial activity. Entrepreneurship ecosystems consist of interconnected actors, institutions, and processes that collectively support the creation and growth of entrepreneurial ventures (9). Universities play a central role in these ecosystems by providing knowledge, human capital, infrastructure, and institutional support for entrepreneurial activities (10). The effectiveness of entrepreneurial universities depends not only on internal organizational factors but also on their integration into broader regional and national innovation systems (11). These ecosystems facilitate the interaction of multiple stakeholders, including entrepreneurs, investors, policymakers, and academic institutions, creating an environment conducive to innovation and entrepreneurship (12). The success of entrepreneurial universities is therefore closely tied to their ability to engage with ecosystem actors, foster collaboration, and create value through knowledge commercialization and entrepreneurial activity.

Institutional theory provides an important framework for understanding the development of entrepreneurial universities, emphasizing the role of formal and informal institutions in shaping organizational behavior and innovation outcomes. Institutions, including laws, regulations, norms, and cultural values, influence the extent to which universities engage in entrepreneurial activities and commercialize knowledge (13). Institutional environments shape the incentives, constraints, and opportunities faced by universities, influencing their capacity to develop entrepreneurial capabilities and support innovation (14). The development of entrepreneurial universities requires institutional alignment, including supportive regulatory frameworks, effective governance structures, and appropriate incentive systems (15). Without supportive institutional environments, universities may face significant

barriers to entrepreneurial transformation, limiting their ability to contribute to innovation and economic development.

In addition to institutional factors, human capital plays a critical role in the development of entrepreneurial universities. Faculty members, students, and university administrators serve as key agents of entrepreneurial activity, contributing to knowledge creation, innovation, and venture development (16). Entrepreneurship education has emerged as a key mechanism for developing entrepreneurial competencies, fostering entrepreneurial intentions, and preparing students for entrepreneurial careers (17). Universities that effectively integrate entrepreneurship education into their curricula can enhance students' entrepreneurial readiness, improve their ability to identify and exploit opportunities, and increase the likelihood of venture creation (18). The development of entrepreneurial skills among students and faculty is essential for fostering innovation and supporting the commercialization of knowledge (19). Human capital development therefore represents a foundational element of the entrepreneurial university, influencing its capacity to generate innovation and create economic value.

The role of universities in supporting regional development and innovation has also received significant attention in the literature. Universities contribute to regional innovation by facilitating knowledge transfer, supporting entrepreneurial ventures, and engaging with local communities and industries (20). Through their engagement with regional actors, universities help create innovation networks, support economic diversification, and promote regional competitiveness (2). The integration of universities into regional innovation systems enhances their ability to support entrepreneurial activity and contribute to economic development (10). Entrepreneurial universities also play a critical role in supporting sustainable development by promoting innovation, supporting entrepreneurship, and contributing to societal transformation (21). These roles highlight the broader societal impact of entrepreneurial universities beyond traditional academic functions.

Recent developments in digital transformation and technological change have further expanded the role of universities in entrepreneurial ecosystems. Digital technologies have created new opportunities for knowledge commercialization, innovation, and entrepreneurial activity, enabling universities to develop new forms of academic entrepreneurship (22). Digital platforms, online education, and technology-enabled innovation processes have transformed the way universities engage with industry and support entrepreneurial activity (23). These developments have facilitated the emergence of new forms of entrepreneurial activity, including digital startups, platform-based businesses, and knowledge-intensive ventures (24). Universities that effectively integrate digital technologies into their entrepreneurial activities can enhance their ability to support innovation and entrepreneurship.

Despite the growing importance of entrepreneurial universities, significant challenges remain in developing effective entrepreneurial university models, particularly in emerging and developing economies. Institutional constraints, resource limitations, and structural barriers may hinder the development of entrepreneurial universities and limit their ability to support innovation and entrepreneurship (15). The effectiveness of entrepreneurial universities depends on their ability to develop supportive institutional environments, foster entrepreneurial culture, and integrate entrepreneurial activities into their core functions (1). Innovation ecosystems play a critical role in supporting the development of entrepreneurial universities by providing access to resources, networks, and institutional support (25). However, the effectiveness of these ecosystems depends on the strength of institutional linkages, the availability of resources, and the level of collaboration among stakeholders.

The development of entrepreneurial universities also requires effective governance, organizational structures, and support systems to facilitate entrepreneurial activity. Universities must develop mechanisms to support startup creation, technology transfer, and knowledge commercialization (16). Support structures such as incubators, accelerators, and entrepreneurship support programs play a critical role in facilitating entrepreneurial activity and supporting venture creation (12). These structures provide access to resources, mentorship, and networks, enabling entrepreneurs to develop and grow their ventures. Furthermore, universities must foster entrepreneurial culture, promote innovation, and encourage risk-taking to support entrepreneurial activity (26).

The methodological complexity of studying entrepreneurial universities also requires the use of robust research approaches capable of capturing the multidimensional nature of the phenomenon. Mixed methods approaches provide an effective framework for analyzing complex institutional phenomena by integrating qualitative and quantitative data (27). In addition, multi-criteria decision-making methods such as the Fuzzy Analytic Hierarchy Process (Fuzzy AHP) provide effective tools for prioritizing complex factors and managing uncertainty in decision-making processes (28). These methodological approaches enable researchers to develop comprehensive models that capture the complexity of entrepreneurial universities and their institutional environments.

Overall, the literature demonstrates that the entrepreneurial university represents a complex, multidimensional phenomenon shaped by institutional, organizational, human, and ecosystem factors. The development of entrepreneurial universities requires supportive institutional environments, strong human capital, effective support structures, and integration into broader innovation ecosystems. Despite significant advances in the literature, important gaps remain in understanding how entrepreneurial university models can be adapted to specific institutional contexts, particularly in developing countries where institutional constraints, structural barriers, and ecosystem limitations may hinder entrepreneurial transformation. Therefore, the aim of this study is to design and conceptualize an indigenous entrepreneurial university model adapted to the institutional and ecosystem conditions of Iran and to analyze its academic entrepreneurship value chain in order to identify institutional gaps and barriers in the knowledge commercialization pathway.

Methods and Materials

This study is developmental–applied in terms of purpose and employs a mixed methods approach in terms of methodological nature. The selection of a mixed methods approach was based on the complex and multidimensional nature of the entrepreneurial university, a phenomenon whose proper conceptualization requires the integration of qualitative institutional analysis with quantitative prioritization of its components. The overall research strategy is exploratory–explanatory, meaning that in the qualitative phase, the dimensions and components of the model were first extracted and conceptualized, and subsequently, in the quantitative phase, their relative importance was assessed.

This approach enables the in-depth identification of the institutional dimensions of the entrepreneurial university and their transformation into measurable indicators, thereby contributing to the development of an indigenous model grounded in empirical evidence.

Qualitative Phase: Extraction of the Dimensions of the Indigenous Entrepreneurial University Model

Sources of Qualitative Data

In the qualitative phase, data were collected from three primary sources:

• A systematic review of the literature on entrepreneurial universities, entrepreneurship ecosystems, and academic entrepreneurship value chains;

• A comparative analysis of national and international entrepreneurial university models;

• Expert opinions from national-level specialists in higher education and academic entrepreneurship.

The literature review was conducted to identify dominant theoretical frameworks, key concepts, and existing gaps in the field. In the comparative analysis phase, structural and institutional differences among various models were examined, with particular emphasis on their transferability to the Iranian higher education context.

Expert Population and Data Collection Method

The expert population of this study consisted of 40 specialists in higher education, science and technology policy, and academic entrepreneurship at the national level. The criteria for expert selection included a strong academic background, executive experience in relevant institutions, and familiarity with Iran's higher education system.

Data were collected through semi-structured interviews and expert questionnaires. The interviews were designed to identify institutional, structural, and cultural factors influencing academic entrepreneurship. The interview questions were structured in a manner that allowed for the emergence of diverse and in-depth expert perspectives.

Qualitative Data Analysis Method

Qualitative data were analyzed using thematic analysis. In this process, open coding was first conducted to extract initial concepts. Subsequently, in the axial coding stage, similar concepts were grouped into broader categories. Finally, through selective coding, the final dimensions of the indigenous Iranian entrepreneurial university model were developed.

To enhance the validity of the qualitative findings, strategies such as cross-review of themes by multiple researchers, expert validation, and comparison of results with existing literature were employed. The output of this phase was the identification of eight core dimensions of the Iranian entrepreneurial university, which formed the basis for the quantitative phase of the study.

Quantitative Phase: Prioritization of Dimensions Using Fuzzy AHP

Rationale for Selecting Fuzzy AHP

Given the subjective nature of expert judgments and the presence of uncertainty in evaluating the importance of model dimensions, the Fuzzy Analytic Hierarchy Process (Fuzzy AHP) was employed. This method enables the conversion of linguistic judgments into fuzzy numerical values and reduces errors associated with human judgment. It is widely used in multi-criteria decision-making studies.

Hierarchical Structure of the Model

The hierarchical structure of the Fuzzy AHP model consisted of three main levels:

• Level 1: Goal (conceptualization of the indigenous Iranian entrepreneurial university model)

• Level 2: Main dimensions extracted from the qualitative phase

• Level 3: Subcomponents associated with each dimension

Pairwise comparisons were conducted by the experts, and fuzzy matrices were constructed based on standard scales. Subsequently, the final weight of each dimension was calculated using the fuzzy geometric mean method, and the consistency of expert judgments was evaluated.

Findings and Results

The analysis of data obtained from the systematic literature review, comparative analysis of entrepreneurial university models, and expert interviews led to the identification of a set of components that were aggregated into eight core dimensions through the selective coding process. These dimensions constitute the conceptual framework of the indigenous entrepreneurial university model within Iran's higher education system and reflect the institutional, networked, and multi-level nature of this phenomenon.

The qualitative findings indicate that the Iranian entrepreneurial university is not limited solely to internal university factors; rather, its realization depends on complex interactions among human capital, the institutional environment, support structures, and the socio-cultural context.

Table 1. Core Dimensions of the Indigenous Iranian Entrepreneurial University Model (Based on Qualitative Analysis)

No.	Core Dimension	Analytical Description
1	Human Capital	Includes the entrepreneurial competencies of faculty members, students, and university administrators
2	Legal and Institutional Environment	Laws, regulations, policies, and formal mechanisms governing entrepreneurial activities
3	Social Capital	Formal and informal networks, institutional trust, and inter-organizational interactions
4	Supporting Organizations	Incubators, accelerators, investment funds, and intermediary institutions
5	Cultural Environment	Attitudes, norms, and values related to risk-taking, innovation, and failure
6	Social Environment	Social acceptance of entrepreneurship and the relationship between the university, society, and the market
7	Physical Capital	Physical infrastructure, technological facilities, and support resources
8	Geographical Context	Regional characteristics, market access, and local capacities

The results of this section demonstrate that the Iranian entrepreneurial university model has an ecosystem-based and multidimensional nature, highlighting the significant role of the institutional and regional environment alongside internal university factors.

Although a substantial portion of the entrepreneurial university literature has focused on designing conceptual and institutional models, one of the common limitations of these studies is the neglect of the process logic of value creation within universities. An entrepreneurial university generates economic and social value only when a coherent linkage exists among the various stages of idea generation, capacity building, institutional support, and commercialization. This linkage corresponds to the concept known in management literature as the value chain (Porter, 1985).

Within the academic context, the academic entrepreneurship value chain is not limited solely to technological production; rather, it encompasses a set of knowledge-based, educational, institutional, and support activities. Therefore, value chain analysis enables the identification of operational gaps between policymaking, institutional structure, and the actual outputs of the university.

In this study, the academic entrepreneurship value chain is defined as a multi-stage and non-linear process consisting of five primary stages:

1. Creation of entrepreneurial ideas and knowledge
2. Capacity building and entrepreneurship skills training
3. Institutional and organizational support
4. Provision of resources and supporting infrastructure
5. Commercialization, market development, and scalability

This framework demonstrates that disruption in any of these stages can weaken the entire value creation chain and hinder the realization of sustainable academic entrepreneurship.

The findings of the study indicate that within Iran's higher education system, the primary value chain disruptions occur in the intermediate stages—particularly in practical capacity building, institutional support, and commercialization phases. In many cases, academic ideas remain confined to the knowledge production stage and fail to evolve into sustainable economic value due to deficiencies in business skills, the absence of effective intermediary institutions, and institutional constraints.

One of the important findings of this study is that the dominant logic underlying the design of university-based businesses in Iran remains influenced by a production-oriented model, whereas academic entrepreneurship at the global level has increasingly become service-oriented, digital, and knowledge-based. This misalignment increases operational costs, reduces flexibility, and raises the risk of failure among university-based ventures.

Value chain analysis indicates that insufficient attention to knowledge-based services, consulting, educational services, and platform-based activities represents one of the missing links in academic entrepreneurship in Iran. This issue is particularly strategically significant for teaching-oriented universities.

The value chain analysis conducted in this study is directly aligned with the indigenous entrepreneurial university model developed in the preceding sections. The prominence of human capital in the stages of idea creation and capacity building, as well as the importance of the legal and institutional environment in the support and commercialization stages, indicates that the prioritization of conceptual model dimensions is consistent with the operational logic of the value chain.

In other words, the indigenous entrepreneurial university model can only be effectively realized when the academic entrepreneurship value chain operates in an integrated manner without institutional discontinuities.

In the quantitative phase, the extracted dimensions were incorporated into a hierarchical structure and analyzed using the Fuzzy AHP method. Expert judgments were collected in the form of fuzzy pairwise comparisons, and the final weight of each dimension was calculated.

Table 2. Final Weights and Ranking of Entrepreneurial University Model Dimensions (Fuzzy AHP Results)

Rank	Dimension	Final Weight
1	Human Capital	0.214
2	Legal and Institutional Environment	0.198
3	Supporting Organizations	0.152
4	Social Capital	0.134
5	Cultural Environment	0.112
6	Social Environment	0.083
7	Physical Capital	0.061
8	Geographical Context	0.046

The results indicate that human capital and the legal–institutional environment have the highest priority in realizing the Iranian entrepreneurial university, while physical capital and geographical context rank at lower levels of importance.

Discussion and Conclusion

The findings of this study provide important empirical and conceptual insights into the structure and operational dynamics of the entrepreneurial university in the context of Iran's higher education system. One of the most

significant findings of the qualitative phase was the identification of eight core dimensions shaping the indigenous entrepreneurial university model, including human capital, legal and institutional environment, supporting organizations, social capital, cultural environment, social environment, physical capital, and geographical context. This multidimensional structure confirms that the entrepreneurial university is not merely an organizational transformation confined within university boundaries but rather a systemic and ecosystem-based phenomenon. This finding aligns with the conceptualization of entrepreneurial universities as complex institutional actors embedded in broader innovation systems characterized by interactions among universities, government, industry, and society (4). The identification of multiple institutional and environmental dimensions reinforces the argument that entrepreneurial universities operate as hybrid institutional arrangements integrating academic, economic, and social functions (15). Furthermore, the results are consistent with the ecosystem perspective, which emphasizes that entrepreneurship outcomes depend on interactions among institutional, cultural, and organizational elements rather than isolated organizational efforts (9).

Among the identified dimensions, human capital emerged as the highest-priority factor based on the Fuzzy AHP analysis. This finding highlights the central role of faculty members, students, and university administrators as primary drivers of academic entrepreneurship and knowledge commercialization. Human capital represents the foundation of entrepreneurial capability, influencing innovation capacity, opportunity recognition, and venture creation. This result is strongly supported by prior research, which emphasizes that the entrepreneurial university depends fundamentally on the entrepreneurial competencies, motivations, and capabilities of academic actors (16). The importance of entrepreneurship education and skill development in fostering entrepreneurial behavior among university students has been widely documented, demonstrating that universities play a critical role in enhancing entrepreneurial readiness and venture creation potential (17). Recent empirical studies have also confirmed that students' entrepreneurial readiness, intentions, and competencies significantly influence the development of academic entrepreneurship and innovation outcomes (18). Similarly, digital academic entrepreneurship research demonstrates that entrepreneurial capabilities among students and faculty are key determinants of entrepreneurial success in modern knowledge-based economies (22). These findings collectively confirm that human capital is the primary enabling factor in transforming universities into entrepreneurial institutions.

The legal and institutional environment was identified as the second most important dimension, highlighting the critical role of institutional structures, regulatory frameworks, and governance mechanisms in enabling or constraining academic entrepreneurship. This finding is consistent with institutional theory, which emphasizes that organizational behavior and innovation outcomes are significantly shaped by formal institutions such as laws, policies, and governance systems, as well as informal institutional norms and expectations (13). Institutional environments determine the incentives, opportunities, and constraints that influence entrepreneurial activity, particularly in organizational contexts such as universities (14). Prior research has demonstrated that supportive institutional frameworks are essential for enabling universities to engage effectively in knowledge commercialization, technology transfer, and startup creation (2). Conversely, institutional barriers such as rigid regulations, bureaucratic constraints, and lack of policy coherence can significantly hinder entrepreneurial activity within universities. The importance of institutional alignment in enabling entrepreneurial university transformation has also been emphasized in studies examining the transition of universities from traditional academic institutions to entrepreneurial actors within innovation systems (1).

The prominence of supporting organizations, including incubators, accelerators, and intermediary institutions, further reinforces the importance of ecosystem-based support structures in facilitating academic entrepreneurship. Supporting organizations play a critical role in bridging the gap between knowledge creation and commercialization by providing access to resources, mentorship, funding, and entrepreneurial networks. This finding aligns with research highlighting the importance of entrepreneurial support infrastructure in enabling startup creation and innovation within university environments (12). Entrepreneurial support programs have been shown to significantly enhance the capacity of universities to facilitate entrepreneurship and contribute to sustainable innovation outcomes, particularly in complex institutional contexts (21). Moreover, the development of innovation ecosystems requires strong institutional intermediaries capable of facilitating collaboration, knowledge transfer, and entrepreneurial activity across organizational boundaries (25). The presence of effective support structures is therefore essential for enabling the operationalization of entrepreneurial university models.

Another important finding of this study is the significant role of social capital, cultural environment, and social environment in shaping academic entrepreneurship. These dimensions reflect the importance of trust, networks, social norms, and cultural attitudes in enabling entrepreneurial activity. Social capital facilitates knowledge exchange, collaboration, and access to resources, which are essential for entrepreneurial success. Prior research has demonstrated that universities embedded in strong innovation networks are more effective in supporting entrepreneurial activity and regional development (20). Cultural factors, including attitudes toward risk-taking, innovation, and failure, also play a critical role in shaping entrepreneurial behavior. Entrepreneurial culture influences individuals' willingness to engage in entrepreneurial activities and their ability to navigate uncertainty and risk (19). In addition, entrepreneurial ecosystems characterized by supportive social and cultural environments are more likely to foster sustainable entrepreneurial activity and innovation outcomes (10). These findings highlight the importance of social and cultural conditions in enabling entrepreneurial university transformation.

The analysis of the academic entrepreneurship value chain provides further important insights into the operational challenges of entrepreneurial universities. The findings indicate that significant gaps exist in the intermediate stages of the value chain, particularly in capacity building, institutional support, and commercialization. This suggests that while universities may be effective in generating knowledge and ideas, they face significant challenges in translating these ideas into marketable innovations and sustainable ventures. This finding is consistent with prior research demonstrating that knowledge production alone is insufficient for successful innovation without effective mechanisms for commercialization and entrepreneurial development (8). The concept of open innovation emphasizes the importance of integrating internal and external knowledge resources to facilitate innovation and commercialization (7). The absence of effective commercialization mechanisms can therefore limit the impact of academic entrepreneurship and reduce its contribution to economic development.

The findings also highlight the persistence of a production-oriented logic in university entrepreneurship in Iran, which contrasts with the increasingly service-oriented and digital nature of academic entrepreneurship globally. Modern entrepreneurial universities are increasingly engaged in knowledge-based services, digital innovation, and platform-based entrepreneurship rather than traditional technology production alone (1). Digital transformation has significantly expanded the scope and nature of academic entrepreneurship, enabling universities to develop new forms of entrepreneurial activity and value creation (24). Universities that successfully adapt to digital and service-oriented entrepreneurship are more likely to achieve sustainable entrepreneurial outcomes and contribute to innovation ecosystems (23). The failure to align academic entrepreneurship models with global trends in digital and

service-oriented innovation may therefore limit the effectiveness of entrepreneurial universities in developing contexts.

Overall, the findings of this study reinforce the ecosystem-based and institutional nature of entrepreneurial universities, highlighting the importance of human capital, institutional environments, and ecosystem support structures. These results are consistent with theoretical and empirical research demonstrating that entrepreneurial universities operate as central actors within innovation ecosystems, facilitating knowledge creation, innovation, and economic development (6). The findings also confirm that the transformation of universities into entrepreneurial institutions requires systemic changes encompassing institutional frameworks, organizational structures, cultural conditions, and ecosystem integration (15). By identifying institutional gaps and value chain discontinuities, this study contributes to a deeper understanding of the structural and institutional barriers to academic entrepreneurship and provides a foundation for developing context-specific entrepreneurial university models.

One of the limitations of this study is that it focuses primarily on teaching-oriented universities within a specific national context, which may limit the generalizability of the findings to other types of universities or institutional environments. In addition, the use of expert-based evaluation methods, while appropriate for capturing institutional complexity, may introduce subjective bias in the prioritization of model dimensions. The cross-sectional design of the study also limits the ability to capture dynamic changes in entrepreneurial university development over time. Furthermore, the study primarily focuses on institutional and structural dimensions and does not directly examine individual-level entrepreneurial behavior or specific entrepreneurial outcomes such as startup formation or commercialization success rates.

Future research should examine the entrepreneurial university phenomenon using longitudinal research designs to capture the dynamic evolution of institutional, organizational, and ecosystem factors over time. Comparative studies across different national and institutional contexts would provide valuable insights into how institutional environments influence entrepreneurial university development. Future studies should also examine the micro-level mechanisms through which human capital, institutional support, and ecosystem integration influence entrepreneurial outcomes. In addition, integrating quantitative performance indicators such as startup formation rates, patent outputs, and commercialization success could enhance the empirical robustness of entrepreneurial university research.

From a practical perspective, the findings highlight the need for policymakers and university leaders to prioritize human capital development through entrepreneurship education, skill development programs, and faculty training initiatives. Institutional reforms aimed at creating supportive legal and regulatory frameworks are essential for enabling academic entrepreneurship and reducing institutional barriers. Universities should also invest in developing entrepreneurial support infrastructure, including incubators, accelerators, and innovation support centers, to facilitate knowledge commercialization and startup creation. Strengthening collaboration among universities, industry, and government can enhance ecosystem integration and support entrepreneurial activity. Finally, universities should adapt their entrepreneurial models to align with emerging trends in digital, service-oriented, and knowledge-based entrepreneurship to enhance their contribution to innovation and economic development.

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Authors' Contributions

All authors equally contributed to this study.

Declaration of Interest

The authors of this article declared no conflict of interest.

Ethical Considerations

All ethical principles were adheried in conducting and writing this article.

Transparency of Data

In accordance with the principles of transparency and open research, we declare that all data and materials used in this study are available upon request.

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References

1. Audretsch DB. From the entrepreneurial university to the university for the entrepreneurial society. The Journal of Technology Transfer. 2014;39(3):313-21. doi: 10.1007/s10961-012-9288-1.
2. Guerrero M, Urbano D. The development of an entrepreneurial university. The Journal of Technology Transfer. 2012;37(1):43-74. doi: 10.1007/s10961-010-9171-x.
3. Etzkowitz H, Leydesdorff L. The dynamics of innovation: From national systems and Mode 2 to a triple helix of university-industry-government relations. Research Policy. 2000;29(2):109-23. doi: 10.1016/S0048-7333(99)00055-4.
4. Etzkowitz H. The triple helix: University-industry-government innovation in action: Routledge; 2008.
5. Etzkowitz H. Research groups as quasi-firms: The invention of the entrepreneurial university. Research Policy. 2003;32(1):109-21. doi: 10.1016/S0048-7333(02)00009-4.
6. Carayannis EG, Campbell DFJ. Mode 3 knowledge production in quadruple helix innovation systems: Springer; 2012.
7. Chesbrough H. Open innovation: The new imperative for creating and profiting from technology: Harvard Business School Press; 2003.
8. Mowery DC, Nelson RR, Sampat BN, Ziedonis AA. Ivory tower and industrial innovation: University-industry technology transfer before and after the Bayh-Dole Act: Stanford University Press; 2015.
9. Isenberg DJ. The entrepreneurship ecosystem strategy as a new paradigm for economic policy: IIEA; 2011.
10. Stam E. Entrepreneurial ecosystems and regional policy. European Planning Studies. 2015;23(9):1759-69. doi: 10.1080/09654313.2015.1061484.
11. Mason C, Brown R. Entrepreneurial ecosystems and growth oriented entrepreneurship: OECD LEED Programme; 2014.
12. Wright M, Siegel DS, Mustar P. An emerging ecosystem for student start-ups. The Journal of Technology Transfer. 2017;42(4):909-22. doi: 10.1007/s10961-017-9558-z.
13. Scott WR. Institutions and organizations: Ideas, interests, and identities: SAGE; 2014.
14. Bruton GD, Ahlstrom D, Li HL. Institutional theory and entrepreneurship: Where are we now and where do we need to move in the future? Entrepreneurship Theory and Practice. 2010;34(3):421-40. doi: 10.1111/j.1540-6520.2010.00390.x.
15. Guerrero M, Urbano D, Fayolle A, Klofsten M, Mian S. Entrepreneurial universities: Emerging models in the new social and economic context. Small Business Economics. 2016;47(3):551-63. doi: 10.1007/s11187-016-9755-4.
16. Rothaermel FT, Agung SD, Jiang L. University entrepreneurship: A taxonomy of the literature. Industrial and Corporate Change. 2007;16(4):691-791. doi: 10.1093/icc/dtm023.

17. Nabi G, Liñán F, Fayolle A, Krueger N, Walmsley A. The impact of entrepreneurship education in higher education. Academy of Management Learning & Education. 2017;16(2):277-99. doi: 10.5465/amle.2015.0026.
18. Bahaw P, Smith T, Short A, Winkel D. Entrepreneurial readiness of university students: a latent profile analysis approach. Entrepreneurship Education. 2025:1-41. doi: 10.1007/s41959-025-00134-z.
19. Chervona L, Бондаренко H. Theoretical Foundations of Innovative Development of Student Entrepreneurship. International Scientific Journal of Universities and Leadership. 2025(19):135-47. doi: 10.31874/2520-6702-2025-19-135-147.
20. Benneworth P, Charles D. University-community engagement and regional innovation. Regional Studies. 2005;39(1):1-15.
21. Buzzao G, Long TB, Argade P. Sustainable entrepreneurship support programs in nature-protected areas: How universities third mission aids sustainability transitions. Business Strategy and the Environment. 2025;34(2):1643-68. doi: 10.1002/bse.4050.
22. Garcez A, Franco M, Silva R. The Influence of the Pillars of Digital Academic Entrepreneurship on University Students' Entrepreneurial Intention. European Journal of Innovation Management. 2025;28(2):210-34. doi: 10.1108/EJIM-01-2023-0051.
23. Wheatley A, Power H. Engineering, Entrepreneurship, and Library Support in University Campus Startup Competitions. Science & Technology Libraries. 2025:1-14. doi: 10.1080/0194262X.2025.2503943.
24. Vujovic P, Baloutsos S. Reimagining Entrepreneurial Ecosystems through Novel University-Driven Collaborative Formats. Triple Helix. 2025;1(aop):1-31. doi: 10.1163/21971927-bja10056.
25. Bielialov T, Ashyrov E. Innovation Ecosystem as a Tool for Development of an Entrepreneurial University. Economic Scope. 2025(198):3-8. doi: 10.30838/ep.198.3-8.
26. Kanchanawongpaisan S. Unlocking the Entrepreneurial Journey: Factors Influencing University Graduates' Entrepreneurial Intentions in Bangkok. Journal of Information Systems Engineering & Management. 2025;10(49s):992-1002. doi: 10.52783/jisem.v10i49s.10021.
27. Kvale S, Brinkmann S. InterViews: Learning the craft of qualitative research interviewing: SAGE; 2009.
28. Kahraman C, Cebeci U, Ruan D. Multi-attribute comparison of catering service companies using fuzzy AHP. International Journal of Production Economics. 2004;87(2):171-84. doi: 10.1016/S0925-5273(03)00099-9.