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THE ACADEMIC ECOSYSTEMS: A SYSTEMATIC LITERATURE REVIEW

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ABSTRACT. The academic ecosystem is a new and postulated direction for transforming higher education institutions (HEIs). HEIs should not only become integrators of such ecosystems but also strive to create and maintain them. This is in line with the achievement of the third mission by universities around the world and the social, economic and cultural development of the regions in which they operate. Despite the importance of the academic ecosystem, knowledge on this subject is rather fragmented. To fill this gap, the aim of our study is to integrate and synthesize knowledge on the academic ecosystem and propose directions for future research in this area. Publications were collected using the Web of Science and Scopus databases and analyzed according to the Theory – Context – Characteristics – Methodology (TCCM) framework. A comprehensive conceptual framework of the academic ecosystem was provided, which synthesizes existing research and outlines future directions for further studies in the field of the academic ecosystem.

Keywords: ecosystem, academic ecosystem, higher education institution, systematic literature review

Introduction

The need to reinvent universities is increasingly emphasized in the literature, which results from the significant challenges they face, including growing competition, pressure for continuous learning, transparency, openness, inclusiveness and digital transformation (Fernández et al., 2023; Potjanajaruwit, 2023; Zhang et al., 2025). All this requires universities to look for ways to meet numerous challenges (Quarchioni et al., 2020; Staniec et al., 2023). It is of fundamental importance that they should take into account the needs and expectations of various key stakeholders in all their activities and build an academic ecosystem understood as "research and educational practices, and consider their complex situated interplay" (Juhl & Buch, 2019, p. 117). The potential of the academic ecosystem results from building a cooperation environment, as well as complementarity and co-evolving various stakeholder groups. It is recognized as the basis for all activities related to value co-creation and capture, creation of innovation and service development (Piantoni et al., 2023). It is believed that ecosystems allow universities to improve their functioning, flexibility, creativity, innovation, learning, responsiveness to changes emerging in the university environment and the growing

expectations of broadly understood stakeholders, or more broadly, the transformation of higher education institutions in response to changes in their environment. The literature indicates that ecosystems are a new and postulated direction for universities (Fernández et al., 2023), in which they should not only become integrators of such ecosystems, but also strive to create and maintain them.

The potential of ecosystems results from the cooperation environment, as well as the complementarity and co-evolving of various stakeholder groups. Moreover, it is indicated that ecosystems are a new postulated direction in the context of HEI, which should not only become integrators of ecosystems, but should also strive to create and maintain them. Such ecosystems contribute to educating students in innovation and entrepreneurship, as well as developing the skills and competences necessary to meet the needs of the modern world. Contemporary research demonstrates that effective leadership styles significantly influence employee commitment in higher education institutions, with transformational approaches proving particularly effective in fostering organizational health and innovation capacity within academic environments (Maama, 2024). More broadly, they also help in transforming universities for the needs of sustainability (Liu et al., 2022; Mishchuk et al., 2023), learning, responsiveness to changes emerging in the university environment and the growing expectations of broadly understood stakeholders. It is believed that ecosystems allow universities to improve their functioning, while also promoting flexibility, creativity and innovation. In addition, in the context of universities, ecosystems are a postulated direction formulated in directives, reports or broadly understood policies (UNESCO, 2022). It is recognized that an ecosystem allows universities to provide continuous "reorganization, transformation, and change" (Liu et al., 2022, p. 539).

Despite the importance of ecosystems in HEI, a comprehensive understanding of this issue is yet to be achieved. This is partly due to the fact that the very concept of ecosystems continues to be understood in different ways, and that the concept of ecosystems in HEI is heterogeneous and viewed through the prism of "academic" (Slowik et al., 2021), "education" (Belitski & Heron, 2017), "university" (Bock et al., 2021), “university research” (Pandey & Pattnaik, 2015). On the one hand, emphasis is placed on the university improving the quality of students, with attention only then paid to the concept of an “education ecosystem”. On the other hand, attention is drawn to increasing the coherence and efficiency of conducting research in response to and for the benefit of members of society, which references the “university ecosystem”, “university research ecosystem” and “higher education ecosystem”. Another aspect that cannot be omitted is improvement in the quality of the university's functioning, which is related to management oriented towards transparency of roles, respect, communication, conflict management and empowerment. This is part of the "academic ecosystem" concept. In other words, despite the indisputable importance of the ecosystem in the context of HEI, it remains a complex and multidimensional concept, which implies the need to begin efforts to make it transparent.

Previous research on the academic ecosystem focused mainly on identifying the benefits for universities and students (Bock et al., 2021; Miklós & Lukács, 2024; Tutar et al., 2024). However, this research was conducted only from the STEM perspective, i.e. science, technology, engineering and mathematics, as well as education science or information science, and library science (Casarosa et al., 2020). A few studies concerned patenting, commercialization, technology transfer (Boh et al. 2016; Bolzani et al., 2021; Samoilikova et al., 2023), spin-offs, innovative shaping (Bock et al., 2021; Guo et al., 2025), the entrepreneurial skills of students (Alkhalaileh et al., 2023; Huezo-Ponce et al., 2021), the role of knowledge intermediaries (Hayter, 2016), aspects of regional development (Fuster et al., 2019), and the third mission of universities (Di Berardino & Corsi, 2018; Lacmanović & Škare, 2024). Despite

the importance of the issue of ecosystems in HEI, so far little attention has been paid to undertaking comprehensive considerations in this area. To the authors' knowledge, no systematic literature review (SLR) on the academic ecosystem has been conducted to date.

This makes it difficult for scientists to obtain a comprehensive and critical understanding on the subject. SLRs are crucial because they allow researchers for synthesizing fragmented knowledge, which enables creation of a solid theoretical and methodological basis for further empirical research (Kraus et al., 2020). Therefore, it seems reasonable to draw up a picture of the current state of knowledge in the field of ecosystems in HEIs. There are systematic literature reviews on ecosystems in HEI, but they refer to excellence in the research ecosystem (Jong et al., 2022), academic entrepreneurship ecosystems (Kobylińska & Lavios 2020) and the holistic learning educational ecosystem (Koul & Nayar, 2020). Other literature reviews on ecosystems, although they cover a wide range of ecosystem types, ignore those in the context of universities. Moreover, emphasis is placed on the fact that it is not possible to directly transfer knowledge in the field of ecosystems from various industries to the specific environment of HEI. Thus, to the best of our knowledge, there have been no reviews of the literature taking into account rigor, transparency and replicability, nor has a comprehensive picture of the state of knowledge on ecosystems in HEIs been provided or future research directions proposed in this area. Therefore, the academic ecosystem requires further conceptual work, in particular in terms of synthesizing the current state of knowledge.

Although several recent literature reviews have focused on ecosystems, no systematic review of the academic ecosystem literature that would provide a comprehensive overview of this scattered topic or present a clear plan for future research has yet been conducted. Moreover, the reviews in question are insufficient because the academic ecosystem is a complex and multidimensional concept, encompassing not only knowledge and technology transfer processes, but also the role of universities in fulfilling their social mission, shaping human capital, cooperating with the socio-economic environment, and building regional, national and global innovation. The lack of any systematic approach to this issue means that knowledge about the functioning of academic ecosystems remains fragmentary and scattered across different disciplines. For this reason, it is necessary to conduct an in-depth, systematic review of the literature, which will allow for synthesizing existing research, identifying theoretical and practical gaps, and proposing directions for further research.

Bearing in mind the above research gaps, the aim of this article is to synthesize knowledge on academic ecosystems as well as to identify and understand their consequences for the work of academics in all areas of their work: research, teaching and administrative tasks. This article poses the following research questions (RQs):

RQ1. What is the current state of knowledge on the academic ecosystem?

RQ2. What are the future research directions on academic ecosystems?

To answer the research questions, we adopt a two-stage hybrid systematic methodological approach. This approach is recommended in the literature as crucial in identifying significant primary research (Wohlin et al., 2022). Additionally, the systematic literature review is a gold standard amongst literature reviews (Davis et al., 2014). It is a repeatable and transparent method that constitutes a verifiable process for identifying all empirical evidence that meets the inclusion criteria and is relevant for answering the research questions (Snyder, 2019; Tranfield et al., 2023). The snowballing technique consists of searching for literature for further analyses using the bibliographies and references at the end of articles and is a complementary database search recognized in the literature (Mourão et al., 2020). In this study, a systematic literature review using the TCCM framework that provides a more complete and nuanced understanding of the topic by improving its comprehensiveness, depth and scope, leading to more reliable and repeatable results was chosen. This method

reduces bias by following a consistent procedure for selecting, analyzing and synthesizing the literature (Singh & Dhir, 2019). By applying the framework, it integrates and organizes diverse research results. This approach allows for identifying patterns, gaps, and emerging trends in the literature, leading to more comprehensive and insightful conclusions. The TCCM framework is valuable for conducting systematic literature reviews because it offers a structured approach to organizing and synthesizing research across different fields. This framework ensures comprehensive coverage by categorizing research based on its theoretical foundations, contextual settings, characteristics of the phenomena studied, and methodologies used. The TCCM framework also helps to integrate diverse research findings, setting a clear roadmap for future research directions and facilitating theory development.

This article contributes to existing research on the academic ecosystem, which, despite significant development, remains fragmented and requires systematization. As far as the authors are aware, it is the first systematic literature review on the academic ecosystem. In particular, we identify the current state of knowledge in this area. Based on the identified areas of research, we propose a comprehensive conceptual framework that allows for the analysis of key issues in the academic ecosystem and links the results with possible directions for research. In this way, we also offer a research program in order to enrich research with an understanding of both the theoretical and practical implications of academic ecosystem for academic staff.

1. Methodology

To identify a set of scientific literature relevant to this research, as well as to determine the current state of knowledge, a hybrid systematic literature review was conducted (Kraus et al., 2020), which took into account a combination of two systematic approaches to searching for articles (Wohlin et al., 2022). The selection of this approach was due to the fact that a hybrid search strategy is recommended in the literature as crucial in identifying significant primary research (Wohlin et al., 2022). Our approach included a search for literature using databases and the snowballing technique, with the literature search conducted using two databases, Web of Science and Scopus. We chose Web of Science and Scopus because they are considered to be a source of high-quality data, and feature robustness, extensiveness and a convenient interface (Kraus et al., 2020). We then applied the snowballing technique, which consists of searching for literature for further analyses using the bibliographies and references at the end of articles, and is a complementary database search recognized in the literature (Mourão et al., 2020). We conducted a systematic search process (Kraus et al., 2020) consisting of three stages: (1) searching the databases, (2) filtering the databases, and (3) excluding documents not related to the research topic. An overview of our search process is presented in the PRISMA chart (Figure 1).

Stage 1: Database search

The first stage of the systematic literature review began with collecting and selecting the literature. As part of the first stage for extracting the databases and the set of publications, we proceeded to the selection of keywords. To determine these, we took into account the formulated research questions, and also the desire to capture the comprehensive state of knowledge in the field of the ecosystem in HEI. Due to the fact that academic ecosystem is referred to in the literature using various terms, we broadened our search to include other terms. This approach resulted in the following five keywords: "academic ecosystem", "education ecosystem", "university ecosystem", "university research ecosystem" and "higher education ecosystem" combined with the term "OR" following Bole's logic.

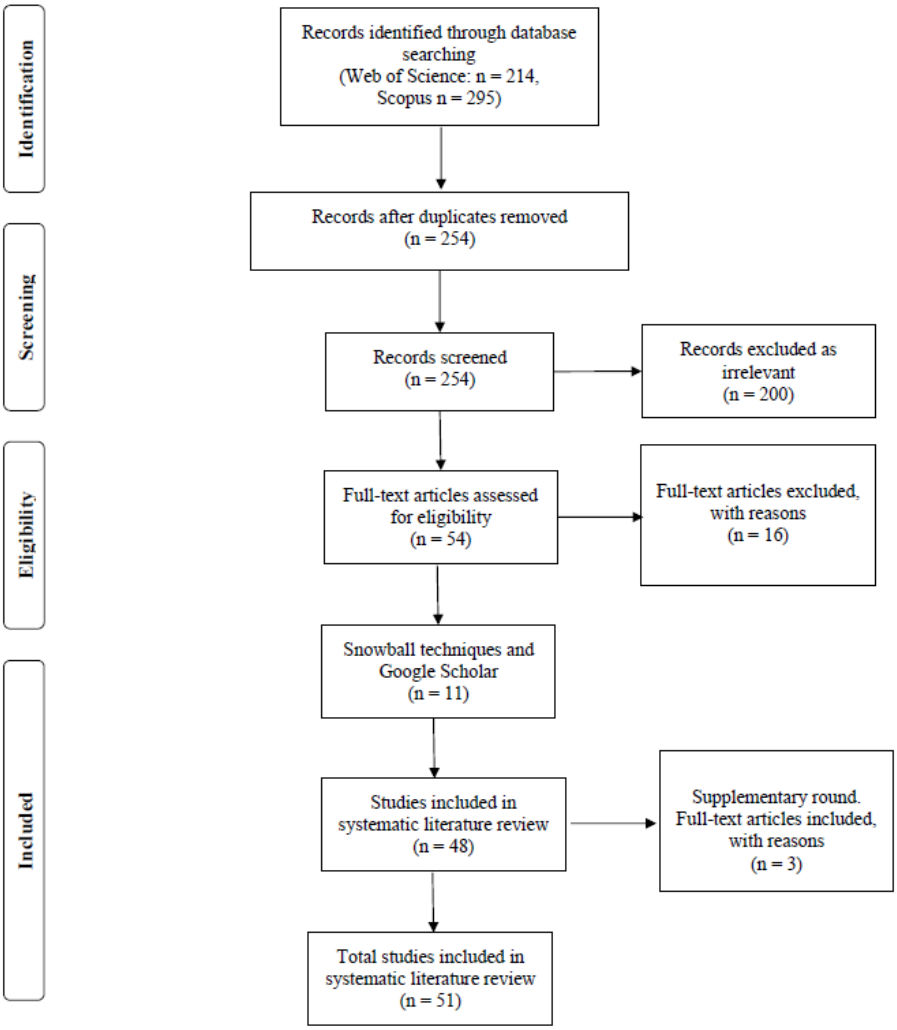

Figure 1. PRISMA Chart
Source: *own data*

It was decided that the search of the literature on the ecosystem in HEI will be limited to two electronic databases: Web of Science and Scopus. These are international and multidisciplinary databases that provide access to over 40,000 peer-reviewed journals (Birkle et al., 2020). In addition, both Web of Science and Scopus are recognized as sources of high-quality data (Baas et al., 2020). What is more, the literature shows that WoS and Scopus give more coherent and precise results than other databases (Kirk et al., 2015). Furthermore, bearing in mind that no database covers the full set of publications, and when a given issue is relatively new , it is necessary to identify all sources (Kraus et al., 2020). It was therefore decided to additionally search for publications using GoogleScholar.com. This search engine is considered a complementary method of searching for literature due to its range (Gusenbauer & Haddaway, 2020). The searches at this stage were conducted in April 2024 and resulted in over 509 publications (Web of Science: 214, Scopus: 295). A supplementary, updated search conducted in September 2025, using the same criteria as the initial search, yielded three additional publications.

Stage 2: Database filtration

In the second step, the following restrictions were imposed on the identified articles. The literature search was narrowed down to peer-reviewed scientific articles due to the confirmation of their quality. It is pointed out in the literature that publications included in post-conference materials, although mostly peer-reviewed, are usually considered so-called work in progress, and thus constitute a preliminary version of an article for publication. As the concept of ecosystems in HEI is relatively new, we did not narrow the search to specific academic journals as it was important to include all peer-reviewed journals to ensure we captured every mention of the concept. Scientific articles published in English were included in the analysis due to the universal nature and recognition of English as a lingua franca in the literature (Kraus et al., 2020).

Due to the early state of knowledge about ecosystems in HEI, we did not narrow the search to a specific field or discipline of science. The search period for publications was also not limited, which resulted from the desire to include all publications related to the analyzed issues. Initial searches using the adopted inclusion and exclusion criteria yielded 54 results (25 - Web of Science; 29 – Scopus). The searches were then narrowed down to articles that included "academic ecosystem" OR "education ecosystem" OR "university ecosystem" OR "university research ecosystem" OR "higher education ecosystem" in the abstract title and keywords. This resulted in 49 searches.

Stage 3: Exclusion of unrelated publications

In the third and final stage, we downloaded all the identified publications. In cases where some of them were unavailable, we contacted their authors to obtain them. We then proceeded to read the title and abstracts of each of the identified articles. This allowed us to verify them in terms of adequacy regarding compliance with the adopted inclusion and exclusion criteria and the formulated research questions. In this way, we excluded 11 publications that did not include ecosystems in HEI as the main topic and did not refer to the formulated research questions in any way. Ultimately, this resulted in 38 publications on ecosystems in HEI. In addition, articles on ecosystems in HEI were searched for using Google Scholar.com and the snowball technique, combined with backward and forward searches (Webster & Watson, 2002). In practice, a review was made of the reference section in each publication (backward search) and a search using Google Scholar (forward search). This resulted in the identification of 10 additional publications (three by backward search; seven by forward search).

Ultimately, 48 scientific articles were qualified for further analysis. The content of each article was then systematized using a protocol based on assigning the following codes to each article and recording them in a table: (1) author(s); (2) title; (3) year of publication; (4) journal; (5) abstract; (6) keywords; (7) research gap(s); (8) research question(s); (9) theoretical framework; (10) methodology; (11) geographical area covered by the research; (12) data collection period, samples and analyses; (13) main results; (14) section for further comments. The protocol resulted in a final document of 256 pages. To analyze the collected material, descriptive and content analysis was used.

2. Findings

2.1. Descriptive analysis

As shown in Graph 2, 2021 saw the highest publication intensity, with 16 scientific articles. This was followed by 13 articles in 2022. It should be noted that the search was closed on 15 April 2024. Thus, an average of 4.36 articles appears annually (48 publications over 11

years). In 2021, the number of publications increased by 533.33% (compared to 2020). This growth rate is expected to continue in 2026, due to the fact that research on the ecosystem in HEI is an emerging field of research that is attracting more and more interest from academics.

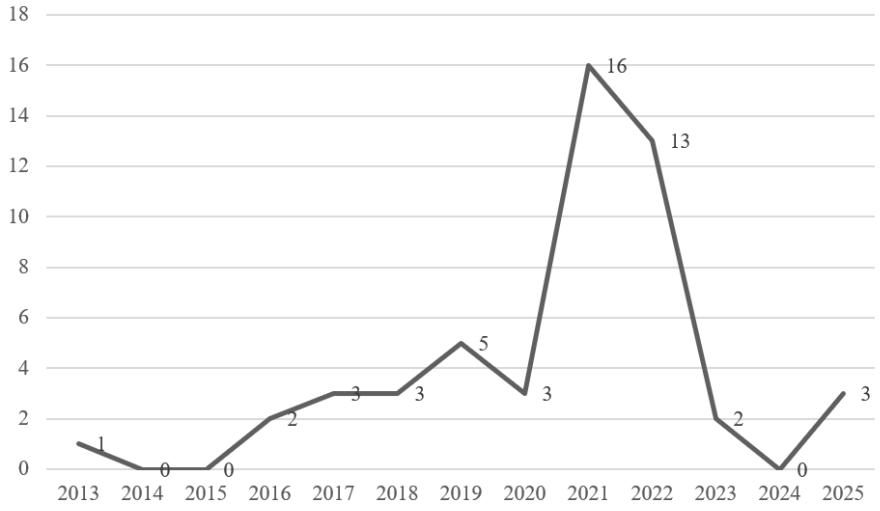

Figure 2. Number of publications on the academic ecosystem
Source: *own data*

In terms of the number of citations of the accumulated 48 scientific publications, the most cited article is by Hayter (2016), with 121 citations. This publication focuses on establishing the composition, input and evolution of a network of academic entrepreneurship-oriented faculty and students. The next most cited article is by Boh et al. (2016), with 109 citations. It refers to the issue of the importance of graduates and PhD students as participants in university spin-offs. Third place is taken by an article by Morris et al. (2017), with 68 citations. The publication focuses on universities stimulating the establishment of start-ups by students. The remaining 45 publications have a total of 393 citations.

With regard to journals, the peer-reviewed publications appeared in many international journals listed in Journal Citation Reports. More specifically, most articles on the ecosystem in HEI were published in Technological Forecasting and Social Change, and the Journal of Technology Transfer. A total of 120 different affiliations can be noted, with the largest number of scientific articles published by researchers from the Colorado School of Mines and the Universidad de Malaga (8 articles each). In second place is the Pennsylvania Commonwealth System of Higher Education (seven articles), while Duke University, Lun University, the University of Colorado Boulder, and the University of Colorado System (six papers each) came in third. Taking into account the affiliations of the first author, the largest contribution to research on the ecosystem in HEI was made by China (nine articles; 18.75%). The second country is the United States of America (7 articles; 14.58%). The third – Brazil and Germany (4 articles for each country; 8.33%). Taking into account the continents of the countries where publications on ecosystem in HEI were published, 19 articles were published in Europe (39.58%), 10 in Asia (20.83%), and 9 in North America (18.75%). For the other publications, there were 6 in South America (12.5%), 3 in Oceania (6.25%) and 1 in Africa (2.08%).

2.2. Content analysis

2.2.1. Theories

The literature shows that the academic ecosystem enables and intensifies acquisition or co-usage of access to valuable and unique resources, including skills, knowledge and experience, which may ultimately lead to the sharing and accumulation of knowledge (Katz & Martin, 1997). A review of 48 studies on academic ecosystems showed that only 9 of them used different theories, including systemic and ecological approaches (2 studies; Heim et al., 2025; Yin et al., 2024), psychological (1 study; Arora et al., 2023), network (3 studies; He, 2024; Siddiqui, 2015; Suryanto et al., 2025) and management (3 studies; Rajan, 2025; Renick et al., 2025; Shailendra et al., 2024). The ecological approach provides tools for analyzing the dynamics of change and systemic barriers at various organizational levels (Yin et al., 2024), while the systemic approach offers a structural framework for modelling specific value flows and roles in external relationships within the academic ecosystem (Heim et al., 2025). In turn, the psychological approach using Social Cognitive Theory has made it possible to identify significant structural barriers in the functioning of the academic ecosystem (Arora et al., 2023). Within the network approach, using Actor Network Theory (He, 2024), Data Assemblages (Siddiqui, 2015) and Socio-Technical Interaction Network (Suryanto et al., 2025), the focus was mainly on practices in the academic ecosystem and the identification of problems in collaborative relationships within the academic ecosystem. Finally, the management approach referred to development of a framework for work in the academic ecosystem (Rajan, 2025), organizational readiness for the academic ecosystem (Renick et al., 2025) and the integration of generative artificial intelligence into the academic ecosystem (Shailendra et al., 2024).

2.2.2. Context

Based on a content analysis of 48 studies, five main areas of research on academic ecosystems were identified, reflecting the diversity and complexity of the contemporary academic environment. Higher education institution ecosystems constitute the broadest area of research, covering various aspects of the functioning of universities and other educational institutions (25 studies). The next thematic area referred to the research environment (11 studies). The third thematic area involved start-up and commercialization ecosystems (8 studies). The fourth and final area, with two studies, focused on the processes of commercializing academic knowledge and creating enterprises.

Higher education ecosystems constitute the broadest research area, covering various aspects of the functioning of universities and other educational institutions. For example, Heim et al. (2025) analyze the ecosystem of higher education institutions covering academic-industrial partnerships, focusing on structured roles and requirements for effective knowledge exchange in education. In turn, Yin et al. (2024) concentrate on an ecosystem characterized by reforms of the academic personnel system. Shailendra et al. (2024) examine the adoption of generative artificial intelligence in university curricula and education systems, while Suryanto et al. (2025) analyze the adoption of chatbot technology in higher education institutions, focusing on resource constraints and the need for strategic support. Arora et al. (2023) examine university governance, institutional workload models, performance evaluations, and reward systems, focusing on academic citizenship among faculty members, while Kobylinska and Lavios (2020) focus on university entrepreneurship and examine networks, configurations, spin-offs, and university-industry collaboration.

Within the thematic area related to the research environment, the research focuses on the processes of creation, distribution and evaluation of scientific knowledge. For example, He (2024) analyses the education ecosystem, focusing on the impact of funding institutions on

universities, research institutes and academic journals. Zhu et al. (2022) examine the ecosystem related to scientific journal publishing, focusing on open science, international collaboration and ethical standards.

The third area of the research concerns ecosystems of interdisciplinary collaboration and focuses on interactions between different disciplines and fields of knowledge. For example, Bisbee and Munger (2025) examine interactions between academics from diverse fields such as economics, political science, sociology and psychology. Kopera et al. (2018) analyze interdisciplinarity in the development of technology start-ups, focusing on collaboration between different fields of knowledge. Asfaw et al. (2022) examine an ecosystem comprising researchers from academia, government, industry and national laboratories in the context of educational program development.

The fourth thematic area relates to start-up ecosystems and commercialization and focuses on the processes of commercializing academic knowledge and creating enterprises. DeChant et al. (2022) examine the startup ecosystem focusing on product development and startup formation, as well as the building of interdisciplinary project teams and connections between engineers, physicians, and scientists, analyzing the cultural shift in academic institutions that supports discovery, translation, and commercialization. Mackall et al. (2024) analyze the research environment partnering with the academic ecosystem for manufacturing and regulatory collaboration.

Institutional quality serves as a fundamental factor in sustainable development processes, with effective institutional frameworks directly contributing to the realization of sustainable economic development goals through enhanced organizational capacity and governance quality (Staniek, 2023).

2.2.3. Characteristics

In the existing literature, academic ecosystem is defined in various ways using different approaches and with emphasis on various aspects. The concept of an academic ecosystem has evolved over time to encompass various dimensions of interaction, collaboration and knowledge transfer within and beyond educational institutions. In total, 5 definitions of academic ecosystem were identified in the 48 analyzed scientific publications.

Several scholars have provided insights into the multifaceted nature of this ecosystem. Pandey and Pattnaik (2015) define the academic ecosystem as a community of researchers who interact not only with one another but also with their surrounding environment and other stakeholders interested in their areas of research. These interactions facilitate the transfer of knowledge and lead to the emergence of system-level processes, where research becomes a dynamic, collaborative endeavor. This definition emphasizes the interconnectedness of knowledge exchange and the importance of external influences in shaping academic outcomes. Juhl and Buch (2019) expand on this by describing the academic ecosystem as a multitude of practices that are deeply interwoven in complex ways. These practices include teaching, leadership, administration, student activities and research practices, all of which are situated within specific contexts. The complexity arises from how these practices interact with one another, creating a system that is both dynamic and context-dependent. Dorner and Mårtensson (2021) take a more organizational approach, highlighting that members of the academic community (such as faculty and researchers) intentionally interact with each other and the surrounding environment. They focus on the synergies created at different levels of organizational complexity: the micro, meso and macro levels. The micro level pertains to individual academic development, the meso level to networks and collaborations within departments and teams, and the macro level to larger institutional or societal systems. This multi-level perspective underscores the depth and scope of interactions that define the academic

ecosystem. Slowik et al. (2021) broaden the perspective by considering universities as entities that interact not only within their academic sphere but also with society at large. This interaction is especially crucial for marginalized groups, such as minorities and women, as they navigate their careers within the academic environment. This perspective highlights the role of academic ecosystems in fostering inclusivity and addressing social equity. Finally, Marchant-Pérez and Ferreira (2023) offer a more regional perspective, describing the academic ecosystem as a combination of social, political, economic and cultural features that support innovation, research and business development. This approach connects the academic ecosystem with broader regional development, illustrating how universities contribute to and are shaped by the social and economic fabric of their surroundings.

In the literature, the terms education ecosystem, university ecosystem, university research ecosystem and HEI ecosystem are used interchangeably to refer to AES, however, academic ecosystem predominates in publications, suggesting this term to be dominant. This may be due to its semantic flexibility, which allows it to include both academic institutions as a whole, as well as the complex relations between units and practices and the socio-economic environment (Dorner & Mårtensson, 2021; Marchant-Pérez & Ferreira, 2023).

An analysis of the content of 48 scientific publications reveals a wealth of variables used in research on academic ecosystems, covering a variety of aspects from individual characteristics of actors to systemic performance indicators. Qualitative variables describing relationships and interactions dominate, reflecting the complexity and multidimensionality of the ecosystems studied. A significant proportion of the research focuses on barriers and challenges, pointing to the need to understand the factors that limit the effective functioning of academic environments. The research takes into account technological factors, including the adoption of generative artificial intelligence (Shailendra et al., 2024), the implementation of chatbots (Suryanto et al., 2025), and digital platforms and databases (He, 2024). Researchers also consider political and regulatory factors, which include personnel system reforms (Yin et al., 2024) and government policies (He, 2024). Socio-cultural factors are also gaining importance, taking into account gender differences in academic careers (Sart et al., 2018), minority identities (Harris et al., 2024), and internationality and local practices (Li & Xue, 2021).

Research on academic ecosystems consistently identifies key individual actors as fundamental elements of the system. Students are the most frequently analyzed group, appearing in studies by Heim et al. (2025), Shailendra et al. (2024), Kopera et al. (2018) and Dash and Gupta (2023). Lecturers and academic staff play an equally important role, as analyzed by Heim et al. (2025), Arora et al. (2023), Sart et al. (2018) and Kumar et al. (2022). Research focusing on specialist academic roles, such as academic care workers (Rajan, 2025), data curators and digital humanities practitioners (Siddiqui, 2015), and journal editors (Cai et al., 2025), is also noteworthy. Academic ecosystems are characterized by the influence of external actors. Companies and industrial partners are analyzed by Heim et al. (2025), Kopera et al. (2018) and DeChant et al. (2022), reflecting the growing importance of academic-industrial collaboration. Government and regulatory bodies are analyzed in studies by He (2024), Shailendra et al. (2024) and Zhu et al. (2022), while funding entities are considered by Renick et al. (2025) and Kobylinska and Lavios (2020).

Finally, research on the academic ecosystem takes into account barriers, including structural, cultural and resource barriers. With regard to structural barriers, researchers point to a lack of regulation, a lack of established standards (Shailendra et al., 2024) and a lack of institutional readiness (Renick et al., 2025). An analysis of cultural barriers points to systemic challenges. For example, Yin et al. (2024) identify a mismatch in discourse at different levels of the academic ecosystem, while Shailendra et al. (2024) point to challenges related to

academic integrity, privacy and ethical issues, Rajan (2025) emphasizes the need to reassess academic reward systems, and Icbay (2025) documents the marginalization of scholars in traditional academic environments. Resource constraints constitute another category of barriers. Shailendra et al. (2024) identify accessibility issues leading to educational inequalities, Suryanto et al. (2025) point to insufficient information and communication infrastructure, DeChant et al. (2022) analyze high costs, and Sart et al. (2018) document difficult access to funding.

2.2.4. Methods

The qualitative approach was most commonly used in studies on the academic ecosystem (15 studies), which indicates the exploratory nature of contemporary research on academic ecosystems (Arora et al., 2023; Aviv-Reuven et al., 2024; Sart et al., 2018). The dominant research methods were in-depth interviews (Arora et al., 2023), semi-structured interviews (Aviv-Reuven et al., 2024) and in-depth interviews (Sart et al., 2018). In turn, eight studies used a quantitative approach with advanced statistical techniques, ranging from structural equation modelling to Bayesian change point analysis (Bisbee & Munger, 2025; El Khatib, 2023; Suryanto et al., 2025). Mixed approaches were used in four studies (Dash & Gupta, 2023; Giannakoulopoulos et al., 2024; Icbay, 2025). The remaining articles adopted a conceptual approach to develop conceptual frameworks or models (Rajan, 2025; Shailendra et al., 2024; Wang, 2022).

2.3. Future directions for further research using TCCM

2.3.1. Theory

Theoretical consolidation poses a challenge for future research. The analysis reveals that only 9 of the 48 studies applied scientific theories. Future research should aim at integrating the identified theoretical approaches: ecosystem (Heim et al., 2025), ecological (Yin et al., 2024), network (He, 2024) and psychological (Arora et al., 2023). The combination of multi-level systems analysis from the ecological approach with structural modelling of value flows from the ecosystem approach seems particularly promising. It is necessary to develop a meta-theoretical framework that could integrate different theoretical perspectives into a coherent analytical model. Such a framework should take into account both micro-level psychological processes and macro-level systemic dynamics.

Furthermore, future research should use institutional theory to analyze isomorphism processes in academic ecosystems. This theory could explain how structural barriers (Yin et al., 2024) and external pressures (Rajan, 2025) lead to the homogenization of academic practices through coercion, imitation and normative mechanisms. Bourdieu's concept of the academic field could enrich the analysis of power dynamics (He, 2024) in academic ecosystems by offering a framework for understanding how different forms of capital shape the positions and strategies of academic actors. In turn, Williamson's theory of transaction costs could explain the choices between different forms of governance in academic ecosystems, particularly in the context of academic-industrial partnerships (Heim et al., 2025) and venture capital collaboration (Kopera et al., 2018). Academic ecosystems exhibit characteristics of complex adaptive systems. This theory could enrich our understanding of how knowledge exchange mechanisms (Heim et al., 2025) emerge from local interactions between actors, leading to global organizational patterns. Future research could use chaos theory to analyze bifurcation points in the evolution of academic ecosystems, particularly in the context of systemic reforms (Yin et al., 2024). Future research could use Coleman and Putnam's social capital theory to analyze the role of social capital in the functioning of academic ecosystems, going beyond

current analyses of collaborative relationships (Renick et al., 2025) to include trust, norms of reciprocity, and social networks. Future research could use Schumpeter's theory of creative destruction to determine how digital technologies (He, 2024) and artificial intelligence (Shailendra et al., 2024) may affect the academic ecosystem.

2.3.2. Context

Content analysis of 36 studies on academic ecosystems reveals five main research areas and research gaps. Within the thematic area of the functioning of universities and other educational institutions, according to the authors of the analyzed articles, future researchers may focus on determining the long-term effects of digital transformation in universities on the academic ecosystem. In particular, research may focus on the analysis of hybrid ecosystems combining traditional institutions with digital platforms (Lightner & Lightner-Laws, 2024), decentralized governance models, inspired by research on competence centers as independent intermediary nodes, the impact of personnel system reforms on academic autonomy in different cultural contexts, and the analysis of mechanisms for maintaining autonomy in the face of digital platforms.

Within the area of "research environment" researchers are encouraged to analyze mechanisms of inequality in access to knowledge, research on alternative models of knowledge assessment and distribution, analyses of the impact of open science on knowledge exchange mechanisms in the academic ecosystem, and the impact of artificial intelligence on the processes of creation, validation, and distribution of scientific knowledge. Research on the ethical aspects of the use of artificial intelligence in research and studies on changes in research competences in the context of artificial intelligence are also important. New research proposals also refer to the marginalization of various academic groups from a global perspective and the analysis of the impact of reward systems on the deepening of inequalities in the academic ecosystem.

The third thematic area referred to start-up ecosystems and commercialization. Researchers propose that future research should focus on interdisciplinary communication and cooperation in various fields, analysis of mechanisms for overcoming interdisciplinary barriers in different institutional contexts, cooperation between academia and society in different institutional models, the role of digital platforms in supporting interdisciplinary cooperation, and the impact of external pressures on shaping the research agenda.

The fourth and final area focuses on the processes of commercializing academic knowledge and creating enterprises. Further findings on cooperation between universities and business, the impact of commercialization on academic autonomy and research integrity are important. Further research should address technology transfer offices in shaping the academic ecosystem, the impact of institutional cultures on academic entrepreneurship, and forms of academic-industrial cooperation in the digital age.

2.3.3. Characteristics

An analysis of 48 publications on academic ecosystems reveals gaps in terms of variables and actors. The first of those is research on technology adoption and its importance for improving ecosystem performance. It is suggested that social capital be included as a mediator, as it can play a key role in the process of knowledge transfer, cooperation between actors, and building the trust necessary for the effective implementation of innovation. This approach would allow for a better understanding of the relationship between technology and the performance of the academic ecosystem and would open up space for the development of more comprehensive analytical models. Another interesting direction for research might take into account the cultural context in the academic ecosystem. This can influence perception of the role of universities and actors in the ecosystem, as well as the mechanisms of cooperation,

the level of trust and the willingness to share knowledge. Analyses based on a cultural perspective could provide valuable insights into the differences and similarities in the functioning of academic ecosystems in different countries and regions, as well as identify potential factors determining the success or failure of their development.

2.3.4. Methods

An analysis of the research methods used in 48 studies on academic ecosystems indicates that the dominance of qualitative approaches with limited representation of longitudinal studies and methodological fragmentation point to the need to propose recommendations for future researchers. Using a mixed methodology that combines the advantages of qualitative and quantitative approaches, allowing not only for a deeper understanding of phenomena, but also for their empirical verification and generalization of results can be recommended here. Integration of different methods could increase the reliability and credibility of analyses and facilitate the development of coherent and cumulative knowledge in the field of academic ecosystems.

The review indicates a predominance of cross-sectional studies, with limited representation of longitudinal studies, which could better capture the dynamics of change in academic ecosystems. Such an approach would allow for analyzing changes in relationships between actors, identifying mechanisms for adaptation to new technologies and innovations, and assessing the impact of public policies, institutional reforms and global crises. Longitudinal studies can also reveal development trajectories and factors that promote or inhibit the transformation of ecosystems, which is important for formulating strategic recommendations.

The use of social network analysis (SNA) can provide tools for quantitative and visual analysis of the structure of connections in academic ecosystems. It makes it possible to examine the intensity and direction of relationships between institutions, researchers, research units and other stakeholders, as well as to identify key actors and peripheral areas. Network analysis allows us for capturing the flows of knowledge, resources and innovation, as well as for understanding the mechanisms of cooperation and competition. The use of SNA in longitudinal studies also allows us for observing how cooperation networks evolve over time, which can be a valuable contribution to research on academic ecosystems.

2.4. A comprehensive conceptual framework of the academic ecosystem

A systematic review of the literature allowed for integrating and synthesizing knowledge on the academic ecosystem and proposing directions for future research in that area. Those findings were integrated into the Theory-Context-Characteristics-Methodology (TCCM) framework. Based on this, a comprehensive conceptual model of the academic ecosystem was proposed (Table 1).

The proposed comprehensive conceptual framework of the academic ecosystem provides some insight into theories, contexts, characteristics and methodology. The first part contains an overview of the most important theories used in the literature to date in research on the academic ecosystem, including systemic, network, institutional and psychological approaches. The second part focuses on the "contexts" in which the academic ecosystem has been studied so far, i.e. areas of research, including academic ecosystem institutions, the research environment, interdisciplinary collaboration, start-ups and the commercialization of knowledge. The third part analyses the key "features" of the academic ecosystem, such as actors, variables and factors, and barriers. The last part explains the research methodologies used so far, such as quantitative, qualitative and mixed methods. In addition to integrating the current state of knowledge, the proposed framework also includes future research directions.

Table 1. A comprehensive conceptual framework of academic ecosystem

What do we know about academic ecosystems?	What are the future research directions for academic ecosystems?
Theories	
• Systemic and ecological – ecosystem framework for value flow, ecological systems theory for analyzing organizational barriers • Psychological – Social Cognitive Theory • Network – Actor Network Theory, Data Assemblages, Socio-Technical Interaction Network • Management – framework for working in an academic ecosystem, Organizational Readiness Framework • Recommended directions:	institutional theory, academic field concept, transaction cost theory, complex adaptive systems and chaos theory, social capital theory, Schumpeter's theory of creative destruction
Context	
• Higher Education Institutions (HEI) – academic-industrial partnerships, personnel reforms, AI in education, chatbots in HEI, academic citizenship, university entrepreneurship • Research environment – processes of knowledge creation, distribution and evaluation, journal publishing, research funding • Interdisciplinary collaboration – integration of social sciences, economics, political science, psychology, collaboration in technology start-ups • Start-ups and knowledge commercialization – spin-offs, translation of discoveries, building interdisciplinary project teams • Recommended directions:	hybrid academic ecosystems, decentralized governance models, open science, marginalization of academic groups, effects of commercialization on university autonomy
Characteristics	
• Definitions: a community of researchers interacting with their environment; complex academic practices; a multi-level micro-meso-macro system; a social actor responding to the needs of marginalized groups; a regional driver of innovation • Variables and factors: technological (AI, chatbots, platforms), political (reforms, regulations), socio-cultural (gender, minority identity, internationalization) • Actors: students, academic staff, care workers, journal editors, industry partners, governments, regulators, funders, venture capital • Barriers: lack of regulations and standards, lack of institutional readiness, mismatch of discourse, integrity and ethical issues, marginalization, inadequate ICT infrastructure, high costs, funding difficulties	research on the role of social capital as a mediator (trust, norms, cooperation), and consideration of the cultural context (differences in the perception of universities, willingness to share knowledge).
Methods	
• Qualitative – in-depth, semi-structured interviews • Quantitative – SEM, big data analysis big data, Bayesian change point analysis • Mixed	development of longitudinal research to capture the dynamics of change, use of mixed methods for triangulation and validation, application of network analysis (SNA) to study knowledge flows and relationships, integration of SNA with a longitudinal approach for analyzing the evolution of academic collaboration networks.

Source: *own data*

3. Conclusion

This article contributes to the understanding of the academic ecosystem through a systematic review of the literature using the TCCM framework. This article makes two important scientific contributions to the current state of knowledge in this area. Firstly, we offer a structured synthesis of existing research. Evidence suggests that research on ecosystems in higher education is an emerging field of research that is attracting more and more interest from academics. Secondly, this review has provided future directions for further research, thus supporting further knowledge in the field of academic ecosystems. Finally, thirdly, the SLR conducted has made it possible to provide a comprehensive conceptual framework of the academic ecosystem, which may prove useful for future researchers in conducting research on the academic ecosystem.

The results are important for the design and implementation of internal university policies. First and foremost, universities should strive to consolidate theoretical approaches that have so far been applied in a fragmented manner. The integration of the systemic, ecological, institutional and social capital perspectives would allow for a better understanding of the multidimensionality of the processes taking place in the academic ecosystem. In practice, this means building a coherent analytical framework for management that encompasses both micro-processes, such as student-teacher relationships, and macro dynamics resulting from regulatory and ranking pressures or global trends in higher education.

Another recommendation refers to the conscious design of university ecosystems in which traditional forms of education are combined with digital platforms and artificial intelligence. However, such hybrid solutions require a balance between the commercialization of knowledge and the integrity of research, which makes the role of technology transfer offices and mechanisms supporting academic entrepreneurship crucial. At the same time, institutions should develop open science practices and equal access to knowledge policies to reduce inequalities and increase inclusiveness in the research environment.

Finally, recommendations on management methods point to the need to use modern analytical tools. Network analysis can identify key actors and peripheral areas in academic cooperation networks, enabling better design of development strategies. Conducting longitudinal research within universities, such as systematic studies of graduates' careers or monitoring changes in the dynamics of research collaboration, will make it possible to capture adaptation processes and assess the effectiveness of policies. It is equally important to implement mixed approaches that combine quantitative and qualitative analyses, ensuring more reliable and credible results and laying the foundations for the cumulative development of knowledge about academic ecosystems.

References

Adams, J., Black, G., Clemmons, J. R., & Stephan, P. E. (2005). Scientific teams and institutional collaborations: Evidence from U.S. universities, 1981–1999. *Research Policy, 34*(3), 259–285.

Alkhalaileh, M. Y. ., Kovács, S., & Katonáné Kovács, J. (2023). Factors influencing digital entrepreneurship intention among undergraduate business students in Jordan. *Human Technology, 19*(3), 400–418. https://doi.org/10.14254/1795-6889.2023.19-3.5

Arora, M. P., Khosa, A., Burch, S., & Tharapos, M. (2025). Accounting faculty's motivation to engage in academic citizenship: Evidence from Australia and New Zealand. *Issues in Accounting Education, 40*(2), 1-21.

Asfaw, A., Blais, A., Brown, K. R., Candelaria, J., Cantwell, C., Carr, L. D., ... & Singh, C. (2022). Building a quantum engineering undergraduate program. *IEEE Transactions on Education*, *65*(2), 220-242.

Baas, J., Schotten, M., Plume, A., Côté, G., & Karimi, R. (2020). Scopus as a curated, high-quality bibliometric data source for academic research in quantitative science studies. *Quantitative Science Studies, 1*(1), 377–386.

Belitski, M., & Heron, K. (2017). Expanding entrepreneurship education ecosystems. *Journal of Management Development*, 36(2), 163–177.

Birkle, C., Pendlebury, D. A., Schnell, J., & Adams, J. (2020). Web of Science as a data source for research on scientific and scholarly activity. *Quantitative Science Studies, 1*(1), 363–376.

Bisbee, J., & Munger, K. (2025). The vibes are off: did Elon musk push academics off twitter?. *PS: Political Science & Politics*, *58*(1), 139-146.

Bock, C., Dilmetz, D., Selznick, B. S., Zhang, L., & Mayhew, M. J. (2021). How the university ecosystem shapes the innovation capacities of undergraduate students–evidence from Germany. In *Innovation and Entrepreneurship in the Academia* (pp. 73–108). Routledge.

Boh, W. F., De-Haan, U., & Strom, R. (2016). University technology transfer through entrepreneurship: Faculty and students in spinoffs. *The Journal of Technology Transfer*, *41*, 661–669. https://doi.org/10.1007/s10961-015-9399-6

Bolden, R., Gosling, J., O'Brien, A., Peters, K., Ryan, M. K., & Haslam, S. A. (2012). *Academic leadership: Changing conceptions, identities and experiences in UK higher education*. Leadership Foundation for Higher Education.

Bolzani, D., Munari, F., Rasmussen, E., & Toschi, L. (2021). Technology transfer offices as providers of science and technology entrepreneurship education. *The Journal of Technology Transfer*, *46*, 335–365.

Boud, D., & Brew, A. (2012). Reconceptualizing academic work as professional practice: implications for academic development. *International Journal for Academic Development*, *18*(3), 208–221. https://doi.org/10.1080/1360144X.2012.671771

Boyer, E. L. (1990). *Scholarship reconsidered: Priorities of the professoriate*. Princeton University Press, 3175 Princeton Pike, Lawrenceville, NJ 08648.

Bozeman, B., & Gaughan, M. (2011). How do men and women differ in research collaborations? An analysis of the collaborative motives and strategies of academic researchers. *Research Policy*, *40*(10), 1393–1402.

Braun, V., & Clarke, V. (2006). Using thematic analysis in psychology. *Qualitative Research in Psychology*, *3*(2), 77–101.

Brew, A. (2017). *Research and teaching: Beyond the divide*. Bloomsbury Publishing.

Caro-González, A., & Anabo, I. F. (2020). Beyond teaching and research: stakeholder perspectives on the evolving roles of higher education. *Ekonomicheskie i Sotsialnye Peremeny*, *13*(6), 252–266.

Casarosa, V., Ruggieri, S., Salvatori, E., Simi, M., & Turbanti, S. (2020). Educational ecosystems for Information Science: the case of the University of Pisa. *Education for Information*, *36*(2), 119–138.

Cobben, D., Ooms, W., Roijakkers, N., & Radziwon, A. (2022). Ecosystem types: A systematic review on boundaries and goals. *Journal of Business Research*, *142*, 138-164.

Davis, J., Mengersen, K., Bennett, S., & Mazerolle, L. (2014). Viewing systematic reviews and meta-analysis in social research through different lenses. *SpringerPlus*, *3*, 1–9.

DeChant, A. K., Fening, S., Haag, M., Harte, W., & Chance, M. R. (2022). Optimizing biomedical discoveries as an engine of culture change in an academic medical center. *Journal of Clinical and Translational Science*, *6*(1), e19.

Di Berardino, D., & Corsi, C. (2018). A quality evaluation approach to disclosing third mission activities and intellectual capital in Italian universities. *Journal of Intellectual Capital, 19*(1), 178-201.

Donthu, N., Kumar, S., Mukherjee, D., Pandey, N., & Lim, W. M. (2021). How to conduct a bibliometric analysis: An overview and guidelines. *Journal of Business Research, 133*, 285–296.

Dorner, H., & Mårtensson, K. (2021). Catalysing pedagogical change in the university ecosystem: Exploring 'big ideas' that drive faculty development. *Hungarian Educational Research Journal, 11*(3), 225-229.

Fanelli, D. (2010). Do pressures to publish increase scientists' bias? An empirical support from US States Data. *PLOS ONE, 5*(4), e10271.

Fernández, A., Gómez, B., Binjaku, K., & Meçe, E. K. (2023). Digital transformation initiatives in higher education institutions: A multivocal literature review. *Education and Information Technologies*. https://doi.org/10.1007/s10639-022- 11544-0

Fire, M., & Guestrin, C. (2019). Over-optimisation of academic publishing metrics: Observing Goodhart's Law in action. *GigaScience, 8*(6), giz053.

Fuster, E., Padilla-Meléndez, A., Lockett, N., & del-Águila-Obra, A. R. (2019). The emerging role of university spin-off companies in developing regional entrepreneurial university ecosystems: The case of Andalusia. *Technological Forecasting and Social Change, 141*, 219–231.

Gibbs, G. (2013). Reflections on the changing nature of educational development. *International Journal for Academic Development, 18*(1), 4–14.

Gill, R. (2014). Academics, cultural workers and critical labour studies. *Journal of Cultural Economy, 7*(1), 12–30.

Gonzalez-Brambila, C. N., Veloso, F. M., & Krackhardt, D. (2013). The impact of network embeddedness on research output. *Research Policy, 42*(9), 1555-1567.

Guan, J., Yan, Y., & Zhang, J. J. (2017). The impact of collaboration and knowledge networks on citations. *Journal of Informetrics, 11*(2), 407-422.

Gulbrandsen, M., & Smeby, J. C. (2005). Industry funding and university professors' research performance. *Research Policy, 34*(6), 932-950.

Guo, J., Liu, C., Zhang, H., Wang, D., & Lu, J. (2025). Performance evaluation of university-based scientific research institutions with a non-independent parallel system. *Evaluation Review*, 0193841X241312823. https://doi.org/10.1177/0193841X241312823

Gusenbauer, M., & Haddaway, N. R. (2020). Which academic search systems are suitable for systematic reviews or meta-analyses? Evaluating retrieval qualities of Google Scholar, PubMed, and 26 other resources. *Research Synthesis Methods, 11*(2), 181-217.

Hayter, C. S. (2016). Constraining entrepreneurial development: A knowledge-based view of social networks among academic entrepreneurs. *Research Policy, 45*(2), 475-490.

He, C. (2024). Digital Publishing and the New Academic Ecosystem: An ANT Approach to the Recent Disputes over a Chinese Journal Database Giant. *European Review, 32*(S1), S108-S123.

Healey, M., Jenkins, A., & Lea, J. (2014). Developing Research-Based Curricula in College-Based Higher Education. *Higher Education Academy.* http://www.heacademy.ac.uk/resources/detail/evidencenet/Summaries/developing_undergradu ate_research_and_inquiry

Heim, S., Hein, A., Wittges, H., & Krcmar, H. (2025). Roles and Requirements for Effective Knowledge Exchange in an IT Company's Academic Ecosystem: Insights from Modeling the SAP University Alliances Ecosystem. *Communications of the Association for Information Systems, 56*(1), 17.

Huezo-Ponce, L., Fernández-Pérez, V., & Rodríguez-Ariza, L. (2021). Emotional competencies and entrepreneurship: modelling universities. *International Entrepreneurship and Management Journal*, *17*(3), 1497-1519.

Iorio, R., Labory, S., & Rentocchini, F. (2017). The importance of pro-social behaviour for the breadth and depth of knowledge transfer activities: An analysis of Italian academic scientists. *Research Policy*, *46*(2), 497-509.

Juhl, J., & Buch, A. (2019). Transforming academia: The role of education. *Educational Philosophy and Theory*, *51*(8), 803-814.

Katz, J. S., & Martin, B. R. (1997). What is research collaboration? *Research policy*, *26*(1), 1-18.

Kessler, M. M. (1963). Bibliographic coupling between scientific papers. *American Documentation*, *14*(1), 10–25.

Kirk, M. A., Kelley, C., Yankey, N., Birken, S. A., Abadie, B., & Damschroder, L. (2015). A systematic review of the use of the Consolidated Framework for Implementation Research. *Implementation Science*, *11*, 1-13.

Kobylińska, U., & Lavios, J. J. (2020). Development of research on the university entrepreneurship ecosystem: trends and areas of interest of researchers based on a systematic review of literature. *Oeconomia Copernicana*, *11*(1), 117-133.

Koul, S., & Nayar, B. (2021). The holistic learning educational ecosystem: A classroom 4.0 perspective. *Higher Education Quarterly*, *75*(1), 98-112.

Kraus, S., Breier, M., & Dasí-Rodríguez, S. (2020). The art of crafting a systematic literature review in entrepreneurship research. *International Entrepreneurship and Management Journal*, *16*, 1023-1042.

Lacmanović, S., & Škare, M. (2024). The comparative analysis of B Corp Impact Report results in higher education organizations. *Journal of International Studies, 17*(4), 255-277. https://doi.org/10.14254/2071-8330.2024/17-4/15

Lightner, C. A., & Lightner-Laws, C. A. (2024). A new day in higher ed: HyFlex Universities. *Interactive Learning Environments*, *32*(10), 7364-7381.

Liu, J., Kitamura, Y., & Savelyeva, T. (2022). Building an 'Ecosystem' for transforming higher education teaching and learning for sustainability. *Asia Pacific Education Review*, *23*(4), 539-542.

Maama, H. (2024). A critical review of leadership styles in higher education institutions: Implications for employee commitment in South Africa. *Economics, Management and Sustainability*, *9*(2), 84–93. https://doi.org/10.14254/jems.2024.9-2.7

Mackall, C. L., Bollard, C. M., Goodman, N., Carr, C., Gardner, R., Rouce, R., ... & Kohn, D. B. (2024). Enhancing pediatric access to cell and gene therapies. *Nature medicine*, *30*(7), 1836-1846.

Miklós, A., & Lukács, E. (2024). Choices Based on the Self-Perception of University Applicants in their Decisions on Applying to Higher Education. *Decision Making: Applications in Management and Engineering*, *7*(1), 603-623. https://doi.org/10.31181/dmame7120241274

Mishchuk, H., Czarkowski, J. J., Neverkovets, A., & Lukács, E. (2023). Ensuring Sustainable Development in Light of Pandemic "New Normal" Influence. *Sustainability*, *15*(18), 13979. https://doi.org/10.3390/su151813979

Morris, M. H., Shirokova, G., & Tsukanova, T. (2017). Student entrepreneurship and the university ecosystem: A multi-country empirical exploration. *European Journal of International Management*, *11*(1), 65-85.

Mourão, E., Pimentel, J. F., Murta, L., Kalinowski, M., Mendes, E., & Wohlin, C. (2020). On the performance of hybrid search strategies for systematic literature reviews in software engineering. *Information and Software Technology*, *123*, 106294.

O'Kane, P., Mangematin, V., Geoghegan, W., & Fitzgerald, C. (2015). University technology transfer offices: The search for identity to build legitimacy. *Research Policy, 44*(2), 421–437. https://doi.org/10.1016/j.respol.2014.08.003

Pandey, S. C., & Pattnaik, P. N. (2015). University research ecosystem: A conceptual understanding. *Review of Economic and Business Studies*, *8*(1), 169–181.

Piantoni, G., Arena, M., & Azzone, G. (2023). Exploring how different innovation ecosystems create shared value: insights from a multiple case study analysis. European Journal of Innovation Management, 26(7), 206–232. https://doi.org/10.1108/ejim-09-2022-0495

Potjanajaruwit, P. (2023). The influence of technology leadership on university lecturers integrating technology in Thailand. *Human Technology, 19*(3), 435–452. https://doi.org/10.14254/1795-6889.2023.19-3.7

Quarchioni, S., Paternostro, S., & Trovarelli, F. (2022). Knowledge management in higher education: a literature review and further research avenues. Knowledge Management Research & Practice, 20(2), 304–319. https://doi.org/10.1080/14778238.2020.1730717

Rajan, S. V. (2025). The hand that rocks the cradle: revaluing academic labour and recognizing the centrality of care work. *Journal of Philosophy of Education*, *59*(2), 290-305.

Renick, J., Furco, A., Janke, E. M., & Ozer, E. J. (2025). More than Just Money: Strategic Allocation of Resources to Support Community-Engaged Scholarship. *Innovative Higher Education*, 1-32.

Samoilikova, A., Kuryłowicz, M., Lyeonov, S., & Vasa, L. (2023). University-industry collaboration in R&D to reduce the informal economy and strengthen sustainable development. *Economics and Sociology, 16*(3), 339-353. https://doi.org/10.14254/2071-789X.2023/16-3/18

Shailendra, S., Kadel, R., & Sharma, A. (2024). Framework for adoption of generative artificial intelligence (GenAI) in education. *IEEE Transactions on Education*.

Siddiqui, N. (2015). Data Assemblages: A Call to Conceptualize Materiality in the Academic Ecosystem. *DHQ: Digital Humanities Quarterly*, *9*(2).

Singh, S., & Dhir, S. (2019). Structured review using TCCM and bibliometric analysis of international cause-related marketing, social marketing, and innovation of the firm. *International Review on Public and Nonprofit Marketing*, *16*(2), 335-347.

Slowik, L. H., Zhong, X., Archey, D. E., & Lee, W. (2021). An exploration of the academic ecosystem: faculty perspectives. *SN Social Sciences*, *1*(9), 232.

Snyder, H. (2019). Literature review as a research methodology: An overview and guidelines. *Journal of Business Research*, *104*, 333–339. https://doi.org/10.1016/j.jbusres.2019.07.039

Staniec, I., Kaczorowska-Spychalska, D., Kalinska-Kula, M., & Szczygiel, N. (2023). The need to work from home in higher education during the first phase of COVID-19: Employee productivity, autonomy, work relationships, job satisfaction and well-being. *Journal of International Studies, 16*(4), 257-280. https://doi.org/10.14254/2071-8330.2023/16-4/17

Staniek, Z. (2023). Institutions as a factor in sustainable development. *Journal of Sustainable Development of Transport and Logistics*, *8*(2), 195–208. https://doi.org/10.14254/jsdtl.2023.8-2.14

Suryanto, T. L. M., Wibawa, A. P., Nafalski, A., & Shili, H. (2025). A STIN Model Adoption for Chatbot in Higher Education Online Learning. *Electronic Journal of e-Learning*, *23*(3), 1-18.

Tranfield, D., Denyer, D., & Smart, P. (2003). Towards a methodology for developing evidence-informed management knowledge by means of systematic review. *British Journal of Management*, *14*(3), 207-222.

Tutar, H., Nam, S., Czarkowski, J. J., & Lukács, E. (2024). The mediating role of university students' psychological well-being in the relationship of poverty perception and social exclusion. *Economics & Sociology*, *17*(2), 194-208. https://doi.org/10.14254/2071-789X.2024/17-2/9

UNESCO. (2022). *Transforming education: The 2030 Agenda for Sustainable Development*. United Nations Educational, Scientific and Cultural Organisation.

Webster, J., & Watson, R. T. (2002). Analysing the past to prepare for the future: Writing a literature review. *MIS Quarterly*, xiii–xxiii.

Wohlin, C., Kalinowski, M., Felizardo, K. R., & Mendes, E. (2022). Successful combination of database search and snowballing for identification of primary studies in systematic literature studies. *Information and Software Technology*, *147*, 106908.

Zhang, G., Xie, Q., Gao, H., Lu, J., & Cucari, N. (2025). Implementation of social responsibility in digital transformation: An opportunity or a challenge to corporate innovation performance. *Corporate Social Responsibility and Environmental Management*, 32(1), 1245-1260.

Zhu, Z., Mei, H., Liu, H., Yan, B., Zhao, W., Yan, J., ... & Peng, B. (2022). Opportunities and challenges for China's scientific journal publishing in the new era. *Kexue TongbaoChinese Sci. Bull*, *67*, 221-230.