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THE AMBIDEXTROUS UNIVERSITY CONCEPT: BALANCING EXPLOITATION AND EXPLORATION IN HIGHER EDUCATION

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Purpose: The purpose of this study is to evaluate the potential of ambidexterity as a strategy for the development of public universities. The study aims to identify the benefits of adopting ambidexterity in public universities and highlight the importance of integrated management concepts and methods in the transformation of traditional universities into ambidextrous organizations.
Design/methodology/approach: To achieve the study's objective, a bibliometric analysis and literature review were conducted to examine previous research on ambidexterity and its relevance to public universities. Additionally, a review and discussion of selected organizational system models were undertaken to outline the concept of an ambidextrous system functioning. This study focuses on seven areas of integration, which are crucial for ambidexterity in organizations.
Findings: The results of the study suggest that implementing the concept of ambidexterity can significantly contribute to the development of public universities. The study finds that the design and implementation of integrated management concepts and methods are viewed as a game changer in management. In the context of transforming traditional universities into ambidextrous organizations, integrated management concepts can play a critical role in ensuring a balanced exploration and exploitation of new opportunities.
Originality/value: This paper provides insights into the benefits of adopting ambidexterity as a strategy for public universities. The study highlights the importance of a systemic model review and discussion, which is the most useful in ambidextrous organization. This research can help public universities improve their management strategies and achieve their long-term goals in a rapidly changing environment. The study's originality lies in its focus on identifying the benefits of adopting ambidexterity in public universities and highlighting the importance of integrated management concepts and methods in the transformation of traditional universities into ambidextrous organizations.

Keywords: ambidexterity, ambidextrous university, ambidextrous structure, process and project orientation, process-project organization.

Category of the paper: Conceptual paper.

1. Introduction

The activity of contemporary public universities, both in the areas of teaching and research and development processes as well as scientific project implementation, constitute an important part of the economic environment and should serve as a driver of civilizational development. Universities are facing a rapidly changing environment, driven by technological advancements and increasing competition, which requires them to constantly adapt and innovate (Cakmak. Uzunboylu, 2018). In recent years, there has been a growing recognition of the need to move away from traditional university models towards more entrepreneurial and innovative models that better respond to the needs of the modern society (Kasavin, 2021).

From the perspective of university stakeholders, the expectation is first and foremost to increase knowledge, but also to generate a system state in which they can discount the benefits of scientific development. However, achieving these goals requires universities to balance the need for both exploitation of existing knowledge and exploration of new knowledge (March, 1991). The tension existing between these two activities can be relevant not only to companies, but to public organizations as well, including public universities. One possible solution to this challenge can entail implementation of ambidexterity concept. The activities of ambidextrous organizations can be oriented towards both exploitation of the existing profit-generating opportunities as well as exploration and discovery of new opportunities for organizational development (O'Reilly, Tushman, 2004). Research on ambidextrous organizations focuses on the organizational level, taking the antecedents and consequences of exploratory and exploitative activities into account (O'Reilly, Tushman, 2013). One important aspect of research in this area also entails the impact of individual organizational participants on the organization's capacity to balance exploitative and exploratory activities (Zhang et al., 2022).

As a result of the theoretical study carried out for the purpose of this article, a cognitive gap has been identified, consisting in the paucity of publications presenting the implementation of the assumptions of ambidexterity concept, with particular emphasis on universities. This should be discerned as a research frontier allowing exploration and design of integrated system formulas for organizational management in the public sector exists. The challenges faced by contemporary public universities, as well as the cognitive gap identified, highlight the need for further research on the implementation of ambidexterity in universities.

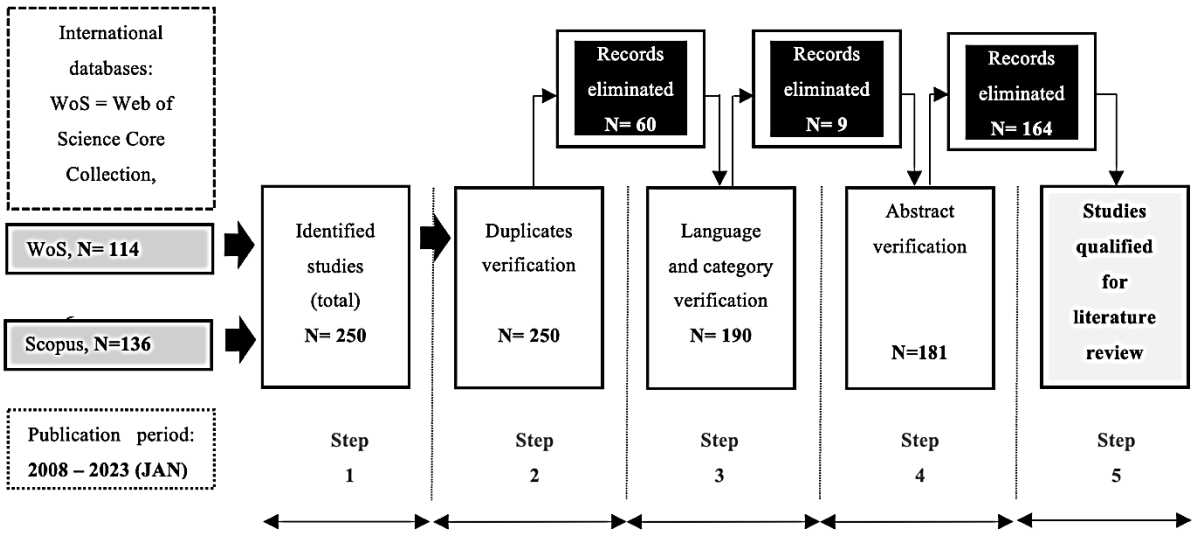
Therefore, the main objective of this paper is to identify, based on literature studies and a participatory observation of the activities aimed at process optimization at a public university, the factors supporting and limiting the implementation of the ambidexterity assumptions as a strategy for university development. In pursuit of the main objective, the following sub-objectives were formulated:SO1: Assessment of the current state of knowledge regarding the implementation of ambidexterity concept at universities. SO2: Overview of the system models supporting the implementation of the ambidextrous organization assumptions.

SO3: Conceptualization of a university system model, adopting the assumptions of the ambidexterity organization concepts.

This paper is a conceptual and theoretical study that aims to identify the factors that support and limit the implementation of an integrative approach in the management of public universities, with a particular emphasis on the ambidexterity concept.

2. Research design

To identify the current state of knowledge regarding the implementation of the assumptions of the described ambidexterity concept within university settings, a theoretical study was carried out. Such research methods as bibliometric analysis and literature review were used. The search for relevant publications involved the use of the raw data generated in two knowledge databases, Web of Science Core Collection and Scopus, which were then subjected to selection, extraction, analysis and synthesis (Tranfield et al., 2003). A publication selection approach was used, entailing a database search, extended in the methodology adopted to include publication titles, abstracts and keywords (Crossan, Apaydin, 2010). The temporal scope of the study covers the years 2008-2023, which is the period outlying the framework of the study, i.e., from the first publication identified in the Web of Science and Scopus databases to the year of the study. The five-step process of identifying the works qualifying for the literature review is shown in Figure 1.



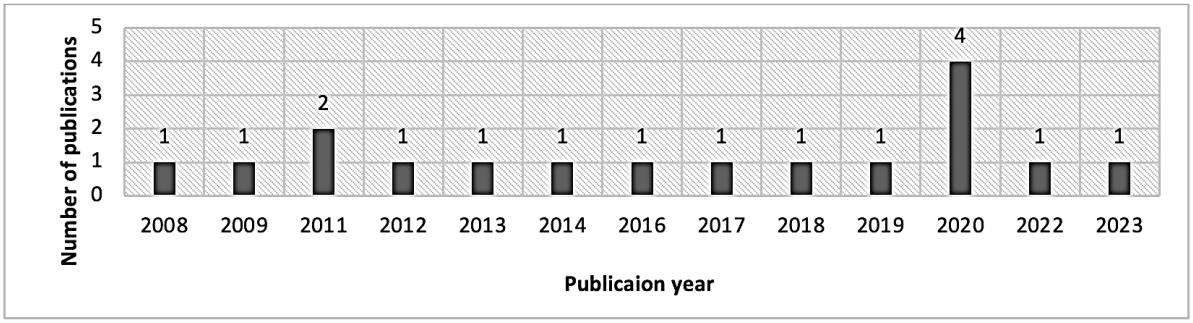
* Query: (‘ambidexterity’ OR ‘ambidextrous’) AND (‘university’ OR ‘college’ OR ‘higher education’ OR ‘polytechnic’ OR ‘institution of higher learning’ OR ‘technical university’).
** Knowledge base search criteria: WoS: topic, Scopus: title, topic, keywords.
*** Only documents such as articles, proceeding papers and book chapters were included in the study.

Figure 1. The process of identifying documents qualifying for literature review.

Source: Authors’ elaboration based on Web of Science Core Collection and Scopus, 25.01.2023.

As Figure 1 shows, based on the search query formulated, only 17 documents, out of the 250 identified, were qualified for the literature review. During the selection process, articles under database categories other than management, business, operations research management science (WoS), as well as business, management and accounting (Scopus), including papers written in languages other than English, were eliminated from the study. At the stage of abstract evaluation, documents addressing the issue of ambidexterity in the academic dimension, yet dealing not with the areas of strategy, system and organizational structure, but with, inter alia, the use of ambidexterity in teaching processes (Rezende et al., 2016), HR ambidextrous systems (Yasmeen et al., 2022), IT ambidexterity (Taleb, Pheniqi, 2022), tactics of ambidextrous model building for university lifelong learning (Zuo et al., 2014) or inclusion of ambidexterity at the level of academics (Kobarg et al., 2017), were additionally excluded from the sample.

The extracted collection of 17 publications allowed for the review of the literature on the subject, and therefore achievement of the theoretical objective of the article involving assessment of the current state of knowledge at the interface between the concepts of ambidexterity and university management. As a result of the elimination process, researchers focus on the growing interest in the concept of ambidexterity has been noted. Kassotaki (2021), in a review of 122 articles published since 1991, highlighted that researchers have studied ambidexterity from various angles, under different literature streams. Helbin (2019), Helbin and Van Looy (2021) note in their work that ambidexterity is a nascent emerging concept, capable of supporting business and public entities in business-process management and innovation under the conditions of global hypercompetition, both incrementally and disruptively. Guerrero (2021), in turn, notes that research on organizational ambidexterity has been exponentially rising, pointing out that "the proliferation of papers represents a consolidation stage of any phenomenon. Therefore, in this development cycle, the two possibilities maybe its decline or re-focus along new lines". It is worth noting here, however, that the subject of ambidexterity, in conjunction with such buzzwords as ‘university’, inter alia, is characterized by a small number of publications (Figure 2).



*Year of publication as per the WoS and Scopus indexing.
**Year 2023 – up to 25.01.2023.

Figure 2. The process of identifying studies qualifying for literature review, N = 17.

Source: Authors’ elaboration based on Web of Science Core Collection and Scopus, 25.01.2023.

3. Theoretical background

3.1. Ambidextrous university

Within the scope of the publications identified, the researchers' voicing, highlighting the changes taking place in terms of the approach to the management of a contemporary university, is quite discernible. In the implementation of modern university management system solutions, it is worth emphasizing the transfer of the management concepts used in enterprises (Tahar et al., 2011). Exemplary university management solutions include such concepts as entrepreneurial university, engaged university (Thomas, 2023), or ambidextrous university, which, according to Tahar et al. (2011), entails a promising orientation of university development. Against this background, it is also important to note the role of universities in the innovation creation ecosystem, articulated in the assumptions of the triple helix model (Etzkowitz, Leydesdorff, 1995), the quadruple helix model (Carayannis, Campbell, 2009), or the extensions of the basic model - the quintuple helix model, in which it is indicative that 'government-industry-universities' behave as the real actuators in the generation of knowledge and innovation, while the society and environment experience the changes (Maruccia et al., 2019). Over the past decade, universities have increasingly become ambidextrous organizations, conciliating the academic and commercial missions (Huyghe et al., 2014). The literature recognizes the intertwining of the assumptions of an entrepreneurial university with those of ambidexterity (See: Thomas, 2023; Centobelli et al., 2019a). The developing new model of a multidextrous university, in which universities fulfill both the economic and social missions through teaching, research and engagement (Thomas, 2023), is also worth noting.

Ambidextrous universities refer to those which have the ability to explore the potential opportunities and to improve the learning process (Centobelli et al., 2019a). The main components of the ambidextrous university approach, based on the publications identified, include knowledge transfer and innovation generation. Many works highlight the aspect of knowledge management, with particular emphasis on the processes of knowledge management and knowledge transfer in an organization (Cabeza-Pullés et al., 2020). According to Cabeza-Pullés et al. (2020), based on a survey of a sample of 249 public university research group directors, only knowledge absorption has a positive and significant impact on innovation ambidexterity. This should be understood to mean that the development of knowledge absorption processes stimulates innovation ambidexterity in universities. The aspect of the innovation generated by the exploratory layer, in turn, has been signaled in the works (Cabeza-Pullés et al, 2020; Thomas, 2023).

In the context of balancing the exploitative and exploratory activities, a debate has been ongoing in the literature on whether the processes of exploration and exploitation occur sequentially or simultaneously (Tushman, O'Reilly, 1996). Consideration, in terms of the issue under elaboration, of an attempt to study two approaches to ambidextrousness achievement:

structural and contextual, is particularly noteworthy. As a result of an empirical investigation, on the example of 474 academic patents originated in Taiwan, Chang et al. (2009) concluded that the advantage of contextual ambidexterity over structural ambidexterity is primarily manifested in the support of university start-ups' equity participation. Another study, in contrast, has shown that the University of Indonesia reflects both structural and contextual ambidexterity (Kusumastuti et al., 2016). The two ways of achieving ambidexterity were also indicated by Centobelli et al. (2019a).

As a result of the literature review, it has been found that the researchers describing ambidexterity at higher education institutions have the same understanding of the need to balance exploitation and exploration. Most of the works devoted to both entrepreneurial and ambidextrous universities deal with exploitative processes (issues related to the internal university organization), rather than with exploratory ones (relational, environmental and political issues) (Centobelli et al., 2019a). It should be noted, however, that in the examined body of publications, a different perspective on exploitation and exploration at universities is discernible. While in the work of Olk (2020), ambidexterity applies to educational programs (traditional vs. new academic programs and activities), in the work by Baumann and Leišytė, (2021), ambidexterity, within the sphere of the issue under discussion, is understood as the balancing of teaching and research activities. Other researchers, by contrast, emphasize the aspect of bridging the scientific areas with commercialization (Huyghe et al., 2014; Chang et al., 2009; Ambos et al., 2008). According to Thomas (2023), in the context of viewing universities as ambidextrous organizations, tensions between teaching and research have been recognized in the literature (Thomas, 2023). The view of Ambos et al., (2008), according to whom the tension between the academic and commercial demands is more apparent at the level of individual researchers than at the level of organizations, constitutes an important thread in the discussion. Universities show that they are able to deal with the tension between the academic and commercial demands, by creating dual structures, for instance. On the flip side, at the individual level, the tensions are more acute, and those who deliver commercial results differ from those who are used to delivering academic results. Researchers have hypothesized that, at the individual level, scientists typically follow either a traditional academic publishing career, or a trajectory that was more open to producing commercial outputs, but not both, in order to follow the assumptions of ambidexterity (to become ambidextrous). Research results show that this is a more complex phenomenon, as the 'embeddedness' of the principal investigator in academia (in terms of his/her seniority and years in the profession) is significantly and negatively associated with the likelihood of a project generating a commercial output, but the scientific excellence of the principal investigator (in terms of citations of his/her work) was positively and significantly associated with the generation of commercial outputs. (Ambos et al., 2008).

According to Centobelli et al., (2019a), in terms of the issue at hand, exploitation is defined as "the management of internal knowledge, resources and capabilities for research, teaching and entrepreneurial university activities", while exploration is identified as "the management of external knowledge, resources and capabilities to support university traditional activities, research commercialization and other entrepreneurial outcomes".

In this paper, the authors focus on an approach in which ambidexterity is understood as a management concept involving dynamic balancing, at a systemic and structural level, of the teaching processes (exploitation) with research processes and scientific projects (exploration).

3.2. Overview of system models supporting implementation of ambidexterity

The business environment in the VUCA world changes constantly, becoming more dynamic and less predictable (Papulova, Gazova, 2016), the more emphasized the role of such success factors as flexibility (particularly the flexibility of thinking and behavioral flexibility, which contribute to making adequate managerial decisions, and the flexibility of corporate visions, missions and development strategies) (Popova, Shynkarenko, 2016) and adaptability (Minciu et al., 2019), becomes. The above considerations implicate the search for a systemic model of an organization that would proactively allow the transformation of universities into organizations capable of meeting the challenges posed by the VUCA conditions. Selected models of systemic organization are presented in Table 1.

Table 1.
Selected organizational system models supporting implementation of ambidextrous organization

Area of integration	Selected organizational models		
	VSM	**EFQM**	**SGMM**
Environment	Viable systems are those which are able to maintain separate existence. If they are to survive, they need not only the capacity to respond to familiar events, such as customer orders, but the potential to respond to unexpected events as well. They have the capacity to evolve and adapt to changing environments.	Organizations are able to achieve the best results, in conjunction with high customer and employee satisfaction, good public reception and strong leadership.	Environment is the space of the possibilities and expectations specifically relevant to an organization. Environmental spheres (society, nature, technology, economy) are the key fields of reference for organizational value creation. The environmental spheres particularly important for an organization must be continuously analyzed, to identify important changes and trends.

Cont. table 1.

Technology and its significance	Both technology and resources contribute to organizational processes.	Not included	Technology is one of the environmental spheres and is closely linked to another environmental sphere – economy.
Organizational structure	Structure influences the design of communication and information systems.	It has not been addressed directly in the model. The model is focused on the pursuit of organizational excellence, which translates into the search for process improvement opportunities.	An organization's configuration provides information on the basic criteria according to which task and value creation activities are bundled as well as on who is responsible for those criteria.
Strategy	Not included	It represents one of the elements of the model.	The SGMM practice perspective focuses on the demand creation and the decision-making processes underlying the development of strategic orientation. The SGMM links the strategy to questions and tasks regarding the securing of the organization's long-term future.
Organizational culture	Not included	Not included	Organizational culture refers to an organization's entire 'way of life' and practice. Organizational culture is illustrated with the image of an iceberg. This image is not meant to suggest that an organization's culture is neither visible nor influenceable. Rather, it is precisely those managers to whom employees attribute major influence and power, whose behavior and symbolic actions may decisively affect the development of organizational culture.
Processes	An organization's structure is viewed as a network of stable 'real life' on-going communication, or organizational processes, as opposed to static formal reporting relations.	In the capability part of the model, organizations should design, manage and improve their processes, in order to fully meet the needs of and provide increasing value to customers and other stakeholders. The 'results' part of the model assumes that the manner in which processes are executed has a direct impact on customer satisfaction and thus on key business outcomes.	A process-oriented design of organizational value creation is decisively supported by suitable application of modern information and communication technologies. An organization's processes do not end at their boundaries. They couple the organization with its specific environment by manifold involvement of the stakeholders in organizational value creation.

Cont. table 1.

Stakeholder relations	A viable system is co-evolving with a range of agents. The environment is largely beyond the knowledge and control of the people within the viable system.	The model assumes that organizations develop and manage their relationships with customers, as well as design and provide products and services based on customer needs and expectations.	To shape the environment entrepreneurially, organizations need to develop robust relationships with specific stakeholders (target groups). An organization creates value through active engagement with diverse stakeholders. An organization's stakeholders are individuals, communities or organizations participating in or affected by the organization's value creation.

Source: Beer, 1981, 1985; Espejo, 1990; Rüegg-Stürm, Grand, 2019; Waterman, 1982.

The first of these models is the Viable System Model (VSM). As Espejo (1990) emphasizes, most of the approaches used in the designing or restructuring of organizations are focused on improving the value chain processes, without a clear understanding of how these business processes interact with the myriad of the organizational processes jointly creating the emergent organization. It is primarily a tool to observe institutions and support connectivity in the quest for the desirable transformation, as well as steer interactions in directions producing effective structural mechanisms. VSM serves as a holistic framework for linking business and organizational processes as well as local and global processes (Espejo, 1990).

The EFQM Model, by contrast, is a tool creating a framework for improvement, enabling organizations to assess where they stand on the road to excellence. The EFQM recommends that organizations conduct self-assessments, as a strategy to improve their overall efficiency (Hakes, 2007).

The third selected organizational model is new St. Gallen Management Model, which aims to open up the interplay of management practice and organizational values to close scrutiny. The SGMM holds that the key point of reference for management is to design and advance the organizational value creation. The SGMM distinguishes two perspectives of organizational value creation: task perspective and practice perspective. The task perspective assumes that an organization's value creation and its development can be influenced, unproblematically, from the outside, whereas from a task perspective, organizations are clearly identifiable entities consisting of tasks and problems capable of being systematically captured in analytical terms and processed rationally (Rüegg-Stürm, Grand, 2019).

The choice of the organization models presented (Table 1) was driven by the search for a systemic solution suitable for ambidextrous universities. It stemmed from the need to take a holistic approach to university functioning in the VUCA world, and therefore view it from the perspective of the relationship a university builds with the business ecosystem, including its attitude towards meeting the stakeholder expectations. In the exploitative layer of university activity, dissemination of new knowledge is of great significance, whereas in the exploratory

layer, the emphasis is on the research activities implemented in the form of projects. In the Authors' opinion, a model corresponding to the assumptions of an ambidextrous university should meet the demands of the overall system of university activities, i.e., exploitative and exploratory, not only in terms of mutual relations, but also in the relations with other areas of activity and, above all, in the activities of the university as a whole. In the context of the issue under consideration in the article, the required areas of integration such a model should meet have been outlined: environment, technology, organizational structure, strategy, organizational culture, processes and stakeholder relations (Table 1).

Having analyzed the criteria differentiating the organizational system models, the Authors have assessed that the St. Gallen Management Model represents a solution most conducive to the implementation of the ambidexterity concept assumptions into the concept of an ambidextrous university. This has been dictated by the fact that the Model takes an organization's relations with the different spheres of the environment into account, recognizing these relations as posing opportunities for creation of added value by, inter alia, establishment of relationships with diverse stakeholders (students, academia, business partners), as well as draws attention to the contractors' responsibility for tasks, emphasizing those which generate added value (business-university-government). Organizational process orientation is here supported by modern ICT solutions, and against this background, implementation of a long-term strategy focused, on the one hand, on strengthening the scientific potential of a university and centered around development and commercialization of innovative solutions, on the other, becomes possible.

4. Results

The concept of an ambidextrous university calls for a holistic, systemic and structural approach to the organization's activity, not only in terms of the interaction between processes and projects (Sliż, 2022), but also with regard to the activities of the university as a whole.

Table 2 outlines the structure of the factors supporting and limiting the application potential of both the process-project organization assumptions and the public university ambidexterity concept.

Table 2.
Set of factors supporting and limiting implementation of the ambidextrous organization assumptions at a public university

Area of integration	Supporting factors	Limiting factors
Environment	The concept of Quintuple Helix innovation can be viewed as a framework for interdisciplinary analysis and transdisciplinary problem-solving, as it has been developed on the understanding of knowledge generation (research) and knowledge application (innovation), both to be contextualized by the natural environment of society (Carayannis, Campbell, 2019). Stimulation of the dialogue between the university and society, through development of measures to fulfill the universities' triple mission (Compagnuccia, Spigarellib, 2020).	Industries' low or absent absorptive capacity, which gives rise to a cognitive distancing from the university - geographically close, yet cognitively apart, due to the maturity level gap (Pohlmann et al., 2022; Meijer et al. 2019; Forouhar et al. 2016;).
Technology and its significance	Emphasis on establishment of flagship research centers specializing in the subject of artificial intelligence.	Technologies generated in academic environment are at the early stage of maturity (Pohlmann et al., 2022; Bazan, 2019; Drivas, Panagopoulos, 2016). Technologies generated in academic environment need simplification, because they are too complex to be introduced on the market (Pohlmann et al., 2022; Meijer et al., 2019; Forouhar et al., 2016).
Organizational structure	Experience in simultaneous implementation of processes and projects using structural ambidexterity (spatial separation) (Benner, Tushman, 2003, Simsek, 2009) Establishment of dual structures within universities, as a factor for bridging the tensions between academic and commercial demands (Ambos et al., 2008)	In an atomized organizational arrangement of a university in particular, there are no multidisciplinary research centers bringing academic units and researchers together (Pohlmann et al., 2022). A clash of different attitudes in science and industry: in science – stable academic structure based on years of professional advancement – in industry: mobility, flexibility, commitment, and change (Mazurkiewicz, Poteralska, 2016). High structure hierarchy, the main object of organizational structure building is departments, rather than teams (Sliż, et al., 2022). Structure design based on the criterion of high specialization
Strategy	Formation of new ventures, such as inter-institutional merger in higher education (Ripkey, 2017), start-ups (Schmitt, Grassler, 2013) Development of strategic partnerships between universities and key agents of strong entrepreneurial innovation presence and global recognition (Klofsten et. al. 2019)	Lack of new ventures, such as spin-offs, start-ups (Pohlman et al., 2022; Alavi, Hąbek 2016). Too great focus on the advancement and dissemination of knowledge, e.g., making results public before the patenting thereof, which deeply collides with the industry demands (Hall et al., 2001).

Cont. table 2.

Organizational culture	Proactive, innovative, risk-taking culture and atmosphere may be enhanced by entrepreneurial orientation across university units and departments (Todorovic et al., 2011; Ziman, 2000)	Different approaches towards the results desired are taken by both the technology provider and the recipient. Usually, these include innovation-oriented vs. market-oriented approaches or focus on superior technologies vs. easily implemented technologies (Harder, Benke, 2005).
Processes	Transfer of business management concepts to higher education organizations (Tahar et al., 2011; Schubert, 2009). Expansion of a university's knowledge management activities (Cordero, Ferreira, 2019), increase in the impact of knowledge management models, tools and practices on universities (Centobelli et al., 2019b) Promotion of new educational programs (Olk, 2020), delivering entrepreneurship education focused on business start-up programs (Mason et al., 2020)	Lack of a measurement system for university processes (Sliż et al., 2022). Lack of a plan for the implementation of research results and ex-post analysis of implementation outcomes (Harder, Benke, 2005). Lack of identified management processes at a university (Sliż et al., 2022)
Stakeholder relations	Through adoption of an entrepreneurial orientation, internal stakeholders (administration, academic faculties, staff, students, alumni) are more likely to share a common vision, commitments, achievements and the key role in supporting the university's entrepreneurial agenda (Klofsten et al., 2019)	Lobbies or interest groups effectively impede changes and amelioration in the legal system, making technology transfer impossible or inefficient (Harder, Benke, 2005).

Source: own compilation based on the literature indicated.

Implementation of activities which are traditionally attributed to the scientific and didactic role of universities (i.e., efforts to ensure the quality of scientific research, through establishment of interdisciplinary research teams, and high quality education, through implementation of curricula reflecting the needs of employers), with simultaneous focus on activities arising from the implementation of the third mission (e.g., cooperation with the business environment for the benefit of internal and external stakeholders, efforts to intensify the innovative solution commercialization activities, or development of networks of relations between scientists and business representatives), enables universities to become the engines contributing to social, economic and cultural development of the regions in which they operate (Agasisti, et al., 2019).

The supporting factors listed in Table 2 should bring universities closer to implementing the assumptions of a ambidextrous organization and achieving the goals of the ambidextrous university concept. As Tahar et al. (2011) point out, the pursuit of organizational ambidexterity at a university should entail an overarching entity which simultaneously manages and meets the needs of many small, diverse, non-centralized knowledge-creating sub-units and few, but large, centralized sub-units focused on stability, routinization and efficiency, under the roof of a common mission, strategy and set of values. Ambidexterity at a university can also be achieved when traditional research-oriented, decentralized structures across faculties are

complemented by strong leadership and management capabilities, at the level of the university's board, and by centralized structures organized toward efficiency. The latter consist of technology platforms devoted to research and teaching, infrastructure, and resources for various units, as well as to general administrative functions, such as control, optimization, steering and strategy-making. These ‘back offices’ are dedicated to the efficient running of the university itself and provide support to the faculties, as the academic ‘front-office’.

5. Conclusion

The concept of an ambidextrous university requires a holistic, systemic, and structural approach to the organization's activity. The supporting factors for the implementation of the ambidextrous organization assumptions at a public university include the use of the Quintuple Helix innovation framework, stimulation of the dialogue between the university and society, the emphasis on the establishment of flagship research centers specializing in artificial intelligence, and the experience in simultaneous implementation of processes and projects using structural ambidexterity. However, there are also limiting factors, such as the low or absent absorptive capacity of industries, the fact that technologies generated in academic environments are at the early stage of maturity and too complex to be introduced on the market, and the atomized organizational arrangement of universities, which lacks multidisciplinary research centers. Other limiting factors include the clash of different attitudes in science and industry, high structure hierarchy, and structure design based on high specialization. In addition, there is a lack of new ventures such as spin-offs and start-ups, too much focus on the advancement and dissemination of knowledge, and no measurement system for university processes. To overcome these limiting factors, the study suggests the formation of new ventures such as inter-institutional mergers in higher education, strategic partnerships between universities and key agents of strong entrepreneurial innovation presence and global recognition, and delivering entrepreneurship education focused on business start-up programs.The study also suggests that universities should adopt an entrepreneurial orientation, which can enhance proactive, innovative, risk-taking culture and atmosphere. However, interest groups can impede changes and amelioration in the legal system, making technology transfer impossible or inefficient.

Overall, this study provides insights into the complex nature of implementing an ambidextrous university and offers suggestions for addressing the challenges and maximizing the potential benefits. Further research is needed to continue exploring this topic and refining our understanding of the best practices for creating ambidextrous organizations in higher education.

Further research should aim to expand the investigation into the identification of the degree of ambidexterity implementation, different approaches to ambidexterity, and the presentation of results from comparative analysis between traditional universities, technical universities, as well as between public and private institutions. This would provide a comprehensive understanding of how various types of universities adopt and integrate ambidextrous practices and strategies.

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