INNOVATION IN UNIVERSITY MANAGEMENT: DIGITIZATION AND INCLUSION

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Abstract

This paper aims to analyze innovation in university management from the perspectives of digitization, sustainability, and inclusiveness, in terms of its global relevance and correlation with the Sustainable Development Goals (SDGs). Underpinning the study is a bibliometric analysis, which was carried out using the VOSviewer tool, taking into account the co-occurrence of keywords and co-authorship networks in the literature. The methodology includes not only the identification of major thematic clusters but also connections with authors and the temporal evolution of scholarly interest in the field. Data were collected from the Scopus database using specific selection and filtering criteria. The results show the existence of a small but stable collaborative core with a strong focus on digitization and inclusion themes, coupled with managerial challenges emanating from competitive pressures and funding limitations. However, semantic analysis reveals a clear interdependence between the regional context and institutional strategies and the direction of sustainable development. The paper highlights the expansion of academic collaboration networks and the implementation of adaptive managerial policies as the most appropriate ways to gain support for transforming universities into active agents of social change and educational development.

1. INTRODUCTION

In recent times, with the ever-accelerating integration of digital technologies and the increasing prioritisation of social inclusion, a number of fundamental changes have also taken place in higher education.

More and more universities around the world are re-conceptualising their institutional strategies, modes of operation, and governance models precisely to be able to effectively manage global challenges such as the need for equal opportunities in education, digitalisation, and the strategic directions of sustainable development. It is precisely for this reason that the theme of innovation in university management has become the main topic in the research carried out to optimise the institutional framework.

Nowadays, research shows that there is a growing interest in the perception of digitisation not only as a mere tool for administrative optimisation, but as an important factor triggering change at the pedagogical and structural level.

It is timely to also address the increasingly clearly outlined "University 4.0" model, which involves the integration of technologies such as predictive analytics, artificial intelligence, and personalised digital platforms, with the aim of increasing institutional performance and enhancing the student experience.

On the other hand, the literature promotes the importance of social inclusion as an institutional mobilisation for diversity, equity, and participation, not simply physical or digital access to education.

The main purpose of this paper is to analyse the relationship between social inclusion and digitisation as strategic pillars in the process of innovation in university management.

Thus, based on this issue, we formulated the following research question in this paper: How can the integration of digitization and social inclusion contribute to the development of innovative, resilient, and sustainable models of university governance that address both global needs and regional specificities? At the same time, the working hypothesis assumes that universities that consider digitization and social inclusion as complementary dimensions of their management strategies can improve their institutional performance and develop more flexible, adaptable, and internationally competitive governance models than those that address digitization and social inclusion separately.

Based on a review of the literature, drawing on a variety of theoretical and empirical studies, we aim to identify key trends, challenges, and strategies related to academic governance reform. Specifically, we focus on how universities choose to integrate sustainability principles, adopt different models of innovation, and develop inclusive management processes. Subsequently, the validity of the working hypothesis will be verified through a bibliometric analysis, which aims to highlight the interdependencies between digital infrastructure, inclusive policies, and international academic collaboration. Together, these factors favor the formation of more efficient research networks and the implementation of more flexible and sustainable

management strategies, all of which contribute to the creation of adaptable, resilient, and socially responsible universities.

Bearing in mind that universities are increasingly required to link their mission to the Sustainable Development Goals (SDGs) set at the United Nations level, understanding the role of inclusion and digitisation in achieving academic performance is essential (Duarte et al., 2024).

This paper makes a significant contribution to the current debate on university reform, providing an integrative perspective linking governance, technology, and social equity.

Notable progress has been made so far in this research, particularly in the use of data for strategic decision-making, strengthening digital infrastructure, and supporting interdisciplinary community-integrated learning. However, there are still major challenges in developing integrated strategies at the institutional level that combine inclusion and innovation in a harmonious way, particularly regarding resistance to change, inequitable access to digital resources, and legislative constraints.

This introduction sets the stage for a detailed literature review, which will focus on current trends in research and practice in the field of digital and inclusive university management.

2. LITERATURE REVIEW

Against the backdrop of the changes brought about by digitalization, globalization, and the growing demands of the contemporary social structure, the literature is increasingly concerned with how universities can actively contribute to the change process. According to the most recent studies in the field, organizational adaptive flexibility, the inclusion of digital technologies, and visionary leadership can make a significant contribution to fostering inclusion and innovation in the university environment.

In the following, we present an analysis of theoretical and application-oriented contributions that support the transformation of higher education institutions into dynamic, creative, results-oriented organizations, focusing on the impact of digital processes, the internal mechanisms of university functioning, and the importance of leadership factors in the university system.

In an education system marked by constant changes and challenges from the external environment, the ability of universities to adapt quickly and to learn constantly becomes a key factor in the process of consolidating an innovation-driven organizational identity.

Thus, once universities succeed in promoting the free expression of ideas, collective engagement, and the adoption of participative leadership, the chances that they will position themselves favourably to face the current demands of the labour market increase (Sutanto, 2017). Complementarily, fostering such a positive climate within universities can directly contribute to the creation of new, viable, innovative solutions

that can be applied to the academic community, subsequently leading to an increase in performance at the institutional level.

In today's context, according to the UNESCO paradigm, to strategically manage university academic training entails effectively integrating technology, knowledge, science, and innovation in such a way that supports the consolidation of an authentic strategic culture and educational governance geared towards the modernization of higher education (Makhbul & Ramli, 2017).

As the demand for adaptable human capital with expertise in the digital economy has increased, universities should comply and make some management reforms, supporting competitiveness and innovation in research and education, and developing and implementing private sector-inspired strategies. According to a study of Mykolas Romeris University in Lithuania, strategic restructuring, efficient allocation of resources to maintain academic performance and the development of strategies to attract foreign students were found to be practices that effectively respond to the challenges of demographic decline, increased international competition and financial constraints without compromising in any way the quality of the educational process or institutional autonomy (Bilevičiūtė, Drakšas, Nevera, & Vainiutė, 2019).

These measures also ensure better adaptability to the demands of the labor market and the global community, thus ensuring the relevance and sustainability of academic institutions.

In terms of digital transformation, this involves a shift from resource-focused management to infrastructure-focused management and access monitoring with the introduction of interconnected digital platforms (Khan & Dey, 2020).

To this end, universities are being asked to reorganize their administrative and educational structure by assimilating into international networks, promoting partnership relationships, and creating a core structure that can respond elaborately to stakeholder needs.

However, if we talk about digital transformation, by moving to the University 4.0 model, we refer not only to an integration of digital technologies, but to a much more complex process that also involves organizational and cultural changes to ensure competitiveness in the digital economy (Ramesh & Karthikeyan, 2021).

It involves building intelligent educational platforms that bring all information together in one place, extending online services, and personalizing the educational path for each student, while data is merged into a centralized digital system that supports decision-making and ensures a better quality of the educational process.

Beyond technological aspects, universities are also helping to facilitate the regional transition towards sustainable development through education, research, and collaboration with the local community.

Ensuring the success of such initiatives is not only ensured by institution-wide policies, but also requires the personal involvement of highly motivated leaders, the support of the university's leadership, and good

collaboration with key stakeholders at the regional level and relevant authorities, based on a constant dialogue between the parties involved (Wachter & Kaufmann, 2018).

In recent times, a number of key transformations have taken place in universities in relation to the management of non-academic staff. A good example of this is a recent study of universities in Australia, which tracks relevant changes affecting academic staff. This shows that although Australia has a balanced proportion of non-academic staff in the organization, the number of management positions that are highly remunerated has increased, while low-skilled support positions have decreased, thus making the shift towards a more corporatized academic institution, which also entails higher costs for non-academic staff (Croucher & Woelert, 2021). This suggests the need for more complex research on the impact these transformations have on the way universities operate and their internal regulations.

A similar approach is presented by a study conducted on a South African university, this time, which examines how "managerialism", a stricter implementation of managerial strategies in the private sector, negatively influences the strategic work carried out by middle managers in universities (Badat, 2017).

Even if this practice should favour the efficient functioning of universities, it limits the autonomy of middle-level managers and turns them into passive actors executing decisions taken at the top level, thus reducing the relevance of strategies and even innovation through the rigid bureaucratic culture that is imposed. Precisely to address this problem, the study comes up with the proposal to impose a more flexible and collaborative approach, which would allow the strategic potential of middle-level managers to be harnessed and balance the balance between autonomy and control (Davis, Jansen van Rensburg, & Venter, 2016).

A study conducted at Uppsala University in Sweden emphasizes that integrating specific tools such as SMURF and AIMday and employing dual-skilled staff from both industry and academia will also promote academic participation in innovation processes (Jonsson et al., 2015).

While this initiative favours closer collaboration between the socio-economic environment and universities, it still presents a number of significant challenges, such as higher costs, the fluctuating nature of interactions, and the complexity of measuring long-term effects, which can be difficult. This study highlights the importance of the role of universities as key actors in the knowledge economy, using complex interaction models involving simultaneously government, industry, and civil society.

A very important role is played by universities when it comes to realizing the Sustainable Development Goals (SDGs) set by the UN, as they must also incorporate the principles of sustainable development in their management in order to remain globally competitive. To achieve these goals, universities must constantly improve the quality of education and their equity, promote environmental protection and health, support research focused on sustainable solutions, and develop partnerships at the international level (Utama et al., 2018).

As universities adapt to the transformations taking place in the economic, social, and technological fields, they will maintain their relevance and foster socio-economic and ecological progress.

3. RESEARCH METHODOLOGY

This research uses a bibliometric approach to analyse the structure of academic collaborations and major themes in the academic management literature, with a particular focus on innovation and inclusion issues. Bibliometric analysis is recognized for its systematic and objective nature, allowing for mapping relationships between authors, identifying collaborative networks, and highlighting the concepts that organize the scientific discourse in a given field (Donthu et al., 2021). The importance of this methodology lies in its ability to provide an overview of the structure of knowledge, to reveal influential actors, and to identify priority research directions, thus supporting the substantiation of strategic decisions in university management.

For the selection of the set of articles analysed, a query was performed in the Scopus database using combinations of terms relevant to university management and innovation. Additional filters were applied to restrict the results to the most highly cited papers, on the premise that they make a recognized contribution and have a significant impact on the development of the field. Thus, the ten most cited were selected articles that address higher education management issues from perspectives such as institutional governance, innovation strategies, academic inclusion, or structural transformation (Van Eck & Waltman, 2017).

The bibliographic data related to the selected articles, including authors, paper title, year of publication, source, and keywords, were exported from Scopus in CSV format, ensuring compatibility with the analysis program used. Obtaining these data involved careful review of the query results, checking for thematic relevance, and further processing of the exports to ensure the integrity and consistency of the information.

The actual analysis was performed in VOSviewer, specialized software for bibliometric visualizations. Co-authorship maps were generated in order to identify the structure of collaborative networks between authors and to highlight the central actors in university management research. In parallel, keyword co-occurrence maps were developed, useful for exploring major themes, links between concepts, and relevant thematic clusters. This method was used to obtain a coherent and detailed picture of how research in university management is organized, highlighting the academic networks and conceptual directions that structure this field of study (Van Eck & Waltman, 2010).

4. RESULTS AND DISCUSSION

The co-authorship network analysis conducted in VOSviewer outlines a clear collaborative core within the literature on innovation in university management, with a particular focus on the digitization and inclusion dimensions. Author Setyono B. occupies a central position in the network, with the most direct connections, suggesting a coordinating and aggregating role in research topics.
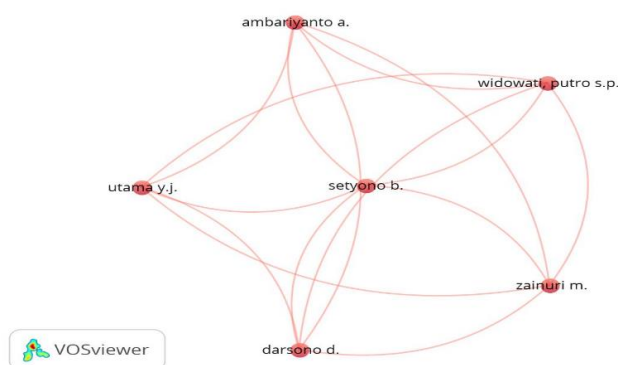
FIGURE 1. CO-AUTHORSHIP NETWORK MAP IN THE UNIVERSITY MANAGEMENT LITERATURE
Source: VOSviewer

Ambariyanto A., Darsono D., and Widowati Putro S.P. appear as close partners in this ensemble, supporting group cohesion and helping to structure a relatively stable collaborative model. However, the concentration of interactions around this small core can be interpreted as a form of semi-open collaboration, which, although effective in strengthening existing partnerships, might limit the participation of researchers outside the immediate network.

This configuration highlights the importance of digital infrastructures in supporting scholarly collaboration and points to the need for institutional policies that encourage the expansion of networks, the diversification of partnerships, and the promotion of inclusion in scholarly research on an international scale (Borgatti, Everett, & Johnson, 2018).

The keyword co-occurrence analysis conducted in VOSviewer highlights the central thematic structure of the literature on innovation in university management, with a focus on digitization and inclusion. The terms higher education and university appear in crucially related positions, underlining the field's focus on the general characteristics of the university system and how it provides the framework for reforms and innovation.
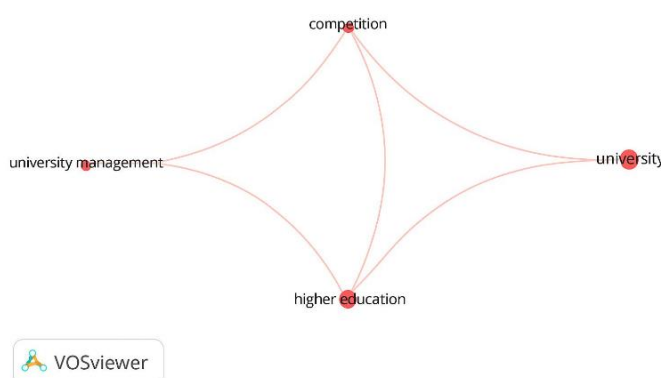

FIGURE 2. KEYWORD CO-OCCURRENCE MAP IN THE UNIVERSITY MANAGEMENT LITERATURE
Source: VOSviewer

The presence of the concept of competition in the network indicates a specific concern with competitive pressures shaping the managerial strategies and priorities of higher education institutions. In turn, the term university management connects with the other terms, highlighting the orientation towards institutional governance and processes of adaptation to contemporary challenges.

This thematic configuration suggests a focus of research around the relationship between academic competition, managerial practices, and transformations in higher education, while highlighting the importance of digitalization and inclusion as strategic directions for the sustainable development of the university system (Saiz-Alvarez, 2024).

Co-occurrence analysis of keywords with the highlighting of thematic clusters reveals the conceptual structure of the literature on innovation in university management, with a focus on digitization and inclusion. The green cluster, formed around the terms funding, competition, and university, suggests a focus on financial resources and competitive pressures influencing the strategies of HEIs.
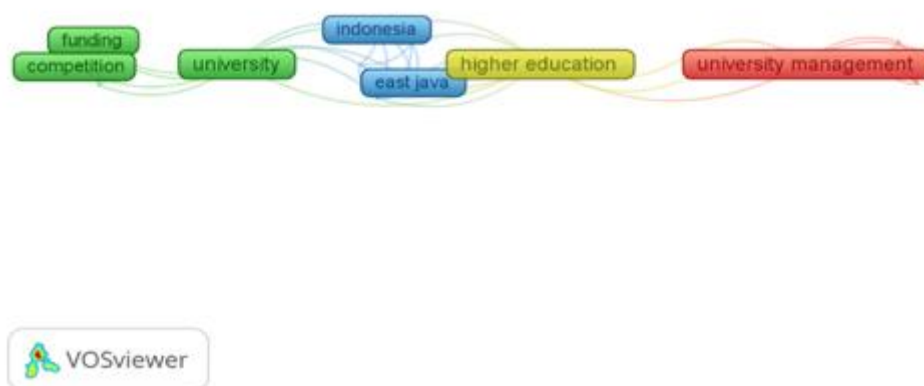

FIGURE 3. KEYWORD CO-OCCURRENCE MAP HIGHLIGHTING THEMATIC CLUSTERS
Source: VOSviewer

The blue cluster, centered on Indonesia and East Java, indicates a regional contextual anchoring of the research, revealing geographic specificity and possible interest in local case studies. The term higher education, positioned in a distinct cluster (yellow), appears as a linking element between the general themes of the university system and the particular topics, while university management, associated with the red cluster, reflects the orientation of the research towards the analysis of managerial processes and institutional strategies.

This network structure highlights the interdependence between financial and competitive challenges, the regional context, and the managerial dimension of university innovation, emphasizing the importance of digitalization and inclusiveness as strategic directions capable of integrating these components into a coherent vision of higher education development (Liu, Cheng, & Chen, 2020).

The co-occurrence analysis of temporally colored keywords highlights the thematic evolution in the literature on innovation in university management, with a specific focus on digitization and inclusion. The terms HEIs and post, located in the older chronological area (roughly 2016-2018), suggest earlier research directions focused on traditional institutional structures and educational stages.
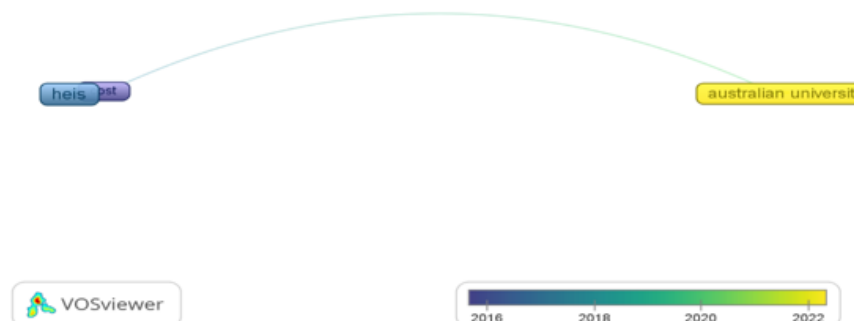

FIGURE 4. KEYWORD CO-OCCURRENCE MAP WITH TEMPORAL COLORING
Source: VOSviewer

In contrast, the term Australian universities is highlighted in the color corresponding to the recent period (2022), indicating a reorientation of scholarly interest towards specific geographical contexts and contemporary case studies. This temporal transition signals the adaptation of research to current challenges, integrating regional aspects into university management analysis and highlighting the potential of digitization and inclusivity for modernizing higher education governance (Zupic & Čater, 2015).

5. CONCLUSIONS

In the structure of this paper, the literature on innovation in university management has been assessed, correlating rational bibliometrics with thematic analysis, giving more importance to inclusion, digitization, and strategic governance.

Subsequently, on the basis of the results obtained, a clear view was provided on the main research directions, as well as how the thematic structures and academic networks are evolving in this field.

The results of the co-authorship network analysis obtained from VOSviewer revealed the existence of a closely cooperating core, with Setyono B. as the core author, and some partners such as Ambariyanto A., Darsono D., and Widowati Putro S.P. These groups of authors represent the semi-open nature of scientific collaboration, effective in building new perspectives and research directions outside of the common networks. Digital infrastructure and institutional policies are thus important in creating the real conditions for expanding academic collaborations and integration. Keyword co-occurrence analysis revealed a thematic focus on digitization, inclusion, academic competition, and university management. The semantic clustering extracted four emerging interests: financial and competitive pressures on institutions (green

cluster), regional anchoring defined at the level of Indonesia and East Java (blue cluster), the general framework of higher education (yellow cluster), and managerial processes (red cluster). Such structuring demonstrates a multi-faceted and interrelated view of university innovation that is relatively limited to these imperative dimensions of digital transformation and inclusive imperative (Cobo et al., 2011).

The evolution of key terms over time shows a shift from more conventional points, such as institutional form to more recent approaches that emphasize contemporary geographic settings and the modernization of university governance. It therefore reiterates the need for research to address more contemporary challenges as well as to refocus on finding sustainable solutions that work within different paradigms.

The results, from a theoretical point of view, support the development of an integrative conceptual framework linking university governance models with those of open innovation and sustainable development. From a practical point of view, they point to the need for managerial strategies that are adaptive and based on digitization, equity, and international collaboration (Van Eck & Waltman, 2017).

It is recommended that the following be utilized in future research: national science and innovation systems across the core-periphery divide, regional comparative studies, alternative indicators of institutional performance, and flexible management strategies for inclusion and resilience.

However, the study also has some limitations that must be taken into account for the correct interpretation of the results. First, the bibliometric analysis is based on a limited source of data from major scientific databases, which may lead to the omission of relevant publications published locally or in lesser-known journals. In addition, the geographical distribution of the literature analyzed is mainly concentrated in Southeast Asia, with a particular focus on Indonesia and East Java, which limits the generalizability of the conclusions and may not fully reflect the diversity of academic contexts in other parts of the world.

Secondly, while bibliometric analysis is extremely useful for identifying trends, thematic clusters, and scientific collaboration networks, it is limited in capturing the true complexity of management and teaching processes. They tend to focus on quantitative aspects (term frequency, co-authorship, and semantic networks), while neglecting qualitative dimensions such as internal organizational dynamics, participant perceptions, or the sociocultural impact of digitization and inclusion.

Regarding the research question of how the integration of digitization and social inclusion promotes innovation, resilience, and sustainability in university management, the findings suggest that these two dimensions cannot be viewed in isolation. They work synergistically to improve both institutional performance and the ability of universities to respond to global and regional pressures. This confirms the initial hypothesis: universities that use digitalization and social inclusion complementarily in their management strategies develop more adaptable, flexible, and internationally competitive governance models than those that address these two dimensions separately.

The findings have direct implications for higher education management policy and practice. First, universities need to develop comprehensive digital and inclusion strategies that integrate technological infrastructure with support programs for students from disadvantaged backgrounds. Second, the emphasis on international collaboration and semi-open academic networks suggests the need for management policies geared toward transnational partnerships and the exchange of best practices. In addition, the financial pressures and academic competition identified in the analysis highlight the importance of developing management strategies that diversify resources and adapt to changes in the education market. Thus, this research has implications beyond theoretical considerations and offers concrete guidelines for university governance: adopting inclusion and digital policy guidelines, establishing institutional mechanisms for international collaboration, and increasing resilience through management flexibility.

In conclusion, changing university management as an innovation cannot be done without the global context of digitalization and sustainability. In the future, universities must take an active leadership role in building society and promoting open and accountable leadership.

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