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Evolution of Higher Education Research in Developing Countries: A Scopus-Based Bibliometric Study

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Abstract

In the past two decades, higher education research in developing countries has experienced significant growth, driven by globalization, digitalization, and educational transformation. However, the scientific contribution of developing countries remains relatively low compared to developed nations. This study aims to analyze the evolution, trends, and collaboration patterns of higher education research in developing countries using a Scopus-based bibliometric approach. Following the PRISMA 2020 protocol, data were collected from 2000–2025 and analyzed using VOSviewer and Bibliometrix to identify publication trends, thematic structures, and author networks. The results reveal a substantial increase in publication productivity after 2015, reflecting stronger international collaboration and growing interest in issues such as institutional change, digital transformation, and socio-economic development. Social sciences and health-related disciplines dominate, while emerging research areas such as digitalization, knowledge management, and sustainability are gaining attention. The novelty of this research lies in the development of a socio-technical–institutional model that integrates technological innovation, organizational transformation, and human capital development as key drivers of sustainable academic progress. This study contributes theoretically by mapping the evolution of research themes and empirically by offering insights into the collaboration networks that shape global higher education research. Practically, it provides policymakers and institutions with a data-driven understanding to strengthen research capacity, promote equity, and enhance the visibility of developing countries in the global academic ecosystem.

Keywords: *Higher Education, Developing Countries, Bibliometric Analysis, Digital Transformation, Research Collaboration.*

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1. Introduction

In the past two decades, higher education research has experienced rapid growth in line with the increasing globalization, digitalization, and shifting paradigms of learning across various countries. This shift is particularly noticeable in developing countries, which face challenges in enhancing scientific productivity, improving institutional quality, and ensuring the relevance of research to social and economic needs. Recent studies indicate that the issue of organizational change in higher education institutions has become a major research focus over the past five years (Alzahmi et al., 2025)(Enescu et al., 2023; Shao et al., 2022). Additionally, global bibliometric data highlights the growing attention to the development of soft skills among students in the context of higher education, in response to the future workforce needs (Verdugo Arcos et al., 2025)(Alarcón et al., 2025; Nguyen et al., 2025). However, much of this research is still dominated by institutions in developed countries, while the contribution of developing countries to higher education research remains relatively low. Therefore, a comprehensive bibliometric study is needed to map the evolution and dynamics of higher education research in (Brunckhorst et al., 2024; Enescu et al., 2023; Ryu & Mah, 2023).

This issue is highly significant as it is directly related to the achievement of Sustainable Development Goal (SDG) 4 on quality education and SDG 9 on innovation and infrastructure. Enhancing the research capacity of higher education has become one of the key indicators in the National Research Master Plan (RIRN), particularly in strengthening human resources in science and technology, multifactor productivity, and the development of cross-sectoral collaborative research(Garoufali & Garoufallou, 2024; Nguyen et al., 2025). In the context of the Fourth Asta Cita, strengthening science, technology, and education is a strategic step to enhance national competitiveness and the independence of scientific knowledge. Bibliometric research like this can provide an empirical foundation for assessing the extent of developing countries' contributions to the global higher education research network and how these dynamics have evolved over the past two decades(Ponce & Escuadra, 2024; Wu et al., 2023).

Previous research on higher education studies has widely used bibliometric approaches to map trends and research directions. For example, a study by Giraldo et al. (2025) traced research trends in marketing within higher education curricula and found that topics related to professional skills and the digitalization of learning have dominated in recent years (Giraldo et al., 2025). Meanwhile, research on game-based learning has shown a significant increase in interactive approaches and the use of technology as a learning tool in higher education (Akhmetova et al., 2025)(Jasti et al., 2022; Wu et al., 2023). Another study emphasized the importance of students' perceptions of future workforce readiness as an indicator of the relevance of higher education to the global labor market's needs (Ferhataj et al., 2025)(Chauhan et al., 2025; Zainal Abidin et al., 2023).

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Although diverse, most of these studies still focus on sector-specific themes and have yet to explore collaboration patterns, scientific productivity, and thematic evolution in the specific context of developing countries(Narong, 2025; Ponce & Escuadra, 2024).

Despite the ongoing development of higher education research, there remains a gap in the literature concerning the evolution of higher education research in developing countries. First, most studies have not systematically mapped annual productivity, dominant fields of study, or cross-country collaboration within the context of developing nations. Second, bibliometric and network visualization approaches, which can identify relationships among authors, countries, and institutions, are still rarely used in depth (Alzahmi et al., 2025)(Kataeva et al., 2024; Liu & Ghasemy, 2025). Third, limited international collaboration leads to lower citation rates and research visibility from developing countries in global databases such as Scopus. This highlights the need for a comprehensive study that can provide an empirical overview of the position, trends, and directions of higher education research in these regions(Bouaamri & Otike, 2025; Roman et al., 2025).

The main issue addressed in this study is the low contribution and scientific representation of developing countries in the global higher education research landscape. This situation results in knowledge disparities, limited innovation, and weak cross-border academic collaboration. If not promptly addressed, this gap could slow down the achievement of sustainable development goals and hinder the integration of higher education in developing countries into the global research ecosystem(Nguyen et al., 2025; Zakharova et al., 2023).

This study aims to analyze publication trends in higher education research in developing countries by identifying the number of publications per year, the fields of study involved, as well as contributions and cross-country collaboration(Garoufali & Garoufallou, 2024; Ilesanmi & Moyanga, 2024; van Coller et al., 2021). Additionally, this research seeks to identify the most influential authors, journals, and articles based on productivity, citation rates, and scientific impact. The study will also map the main topics that have been researched in the context of higher education in developing countries, analyzing their distribution and interconnections. Finally, this research aims to identify potential topics for future studies by analyzing the results of network visualizations and thematic evolution trends(Jiangmei & Ghasemy, 2025; Omar & Abdullahi, 2024).

This study contributes to the academic literature by mapping the evolution of higher education research in developing countries using Scopus data(Bouaamri & Otike, 2025; Roman et al., 2025). The findings are expected to enrich the understanding of scientific collaboration patterns, the distribution of research topics, and publication productivity, reflecting the development trajectory of this field.

Practically, this research can be used by policymakers, higher education institutions, and governments to enhance national research productivity, strengthen international collaboration, and expand the scientific impact of developing countries on the global stage. This aligns with the Fourth Asta Cita, which emphasizes strengthening human

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resources, science, technology, education, and health as the foundation for national development(Qi et al., 2025; Roman et al., 2025).

2. Research Method

This study employs a bibliometric approach based on data from Scopus to evaluate the development of research on higher education in developing countries. This method was chosen for its effectiveness in identifying trends, scientific distribution, author collaboration, and network visualizations within a specific field of study (Akhmetova et al., 2025; Wu et al., 2023)(Jiangmei & Ghasemy, 2025). The study follows the PRISMA 2020 protocol, which consists of four main stages: identification, screening, eligibility, and inclusion (Giraldo et al., 2025; Nguyen et al., 2025). These stages ensure that the article selection process is systematic and transparent, allowing for replication by other researchers. Additionally, the protocol was registered internally to maintain consistency and objectivity throughout the literature selection process.

Data was extracted from the Scopus database due to its strong reputation for providing high-quality bibliometric metadata. The search was conducted on a specific date (for example: November 1, 2025) using the following query string: (TITLE-ABS-KEY ("Higher Education") AND TITLE-ABS-KEY ("Developing Countries") AND TITLE-ABS-KEY (evolution)). Additional filters were applied to limit publications to those between the years 2000 and 2025, and only scholarly journal articles were included. This approach has been validated in previous bibliometric studies to ensure the relevance and quality of the results (Akhmetova et al., 2025; Giraldo et al., 2025; Kataeva et al., 2024).

The screening stage involved removing duplicates and evaluating titles and abstracts. Only articles published in English were included. Inclusion criteria comprised publications that: (1) focus on higher education, (2) explicitly discuss developing countries, and (3) evaluate or reflect on the evolution, historical topics, policies, or transformations in higher education. Articles that did not meet these three criteria were eliminated. This procedure aligns with the systematic review practices recommended by PRISMA (Hu et al., 2024; Nguyen et al., 2025; van Coller et al., 2021). Articles that passed the screening stage were then analyzed in full text to ensure their relevance to the topic. This evaluation was carried out by two independent researchers, and any disagreements were resolved through discussion or by involving a third party. After the final selection, the articles were included in the dataset for bibliometric analysis. This process is visually represented using a PRISMA flow diagram, showing the number of articles at each stage (Giraldo et al., 2025; Nguyen et al., 2025).

The analysis was conducted using VOSviewer and Bibliometrix (R Package) software to map publication trends, author collaboration networks, co-citation, and keyword co-occurrence. The goal of this analysis was to identify the main research domains, the most significant contributors, and the temporal dynamics within higher education research in

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developing countries (Enescu et al., 2023; Omar & Abdullahi, 2024; Ryu & Mah, 2023). The data were visualized in the form of network maps to facilitate the interpretation of collaboration patterns and research topics.

3. Result

3.1. Publication Trends and Research Collaboration in Higher Education in Developing Countries

This analysis aims to illustrate the development of higher education research in developing countries through the publication trends published annually. Data visualization also highlights the patterns of cross-country collaboration that contribute to strengthening the global research network in this field.

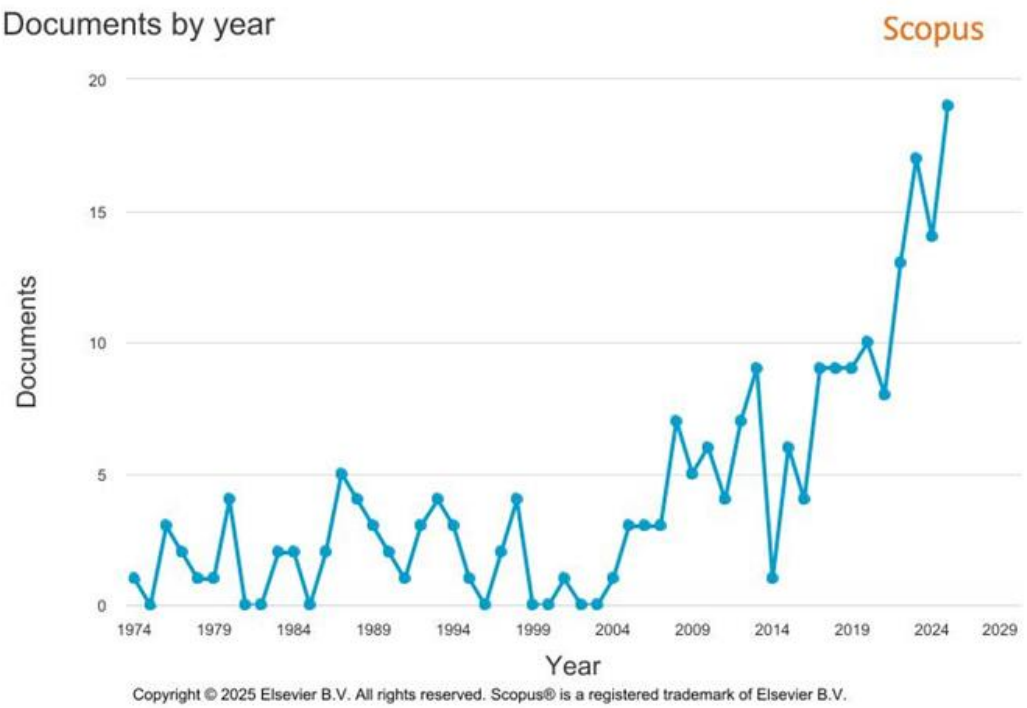

Figure 1: Documents by Year. Source: Scopus database.

The figure above shows the dynamics of publication growth related to higher education research in developing countries indexed in the Scopus database from 1974 to 2025. Overall, the publication trend shows fluctuations during the early period (1974–2005) with a relatively low and inconsistent number of documents. However, since the mid-2000s, a more stable increase can be observed, followed by a significant surge after

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2015. This sharp rise reflects the growing global attention to higher education issues in developing countries, coinciding with expanded access to education, international collaboration, and more supportive research policies in various nations. This trend indicates that, in the last decade, scientific productivity in this field has experienced substantial acceleration, marking a phase of maturation and strengthening of higher education research's position at the global level.

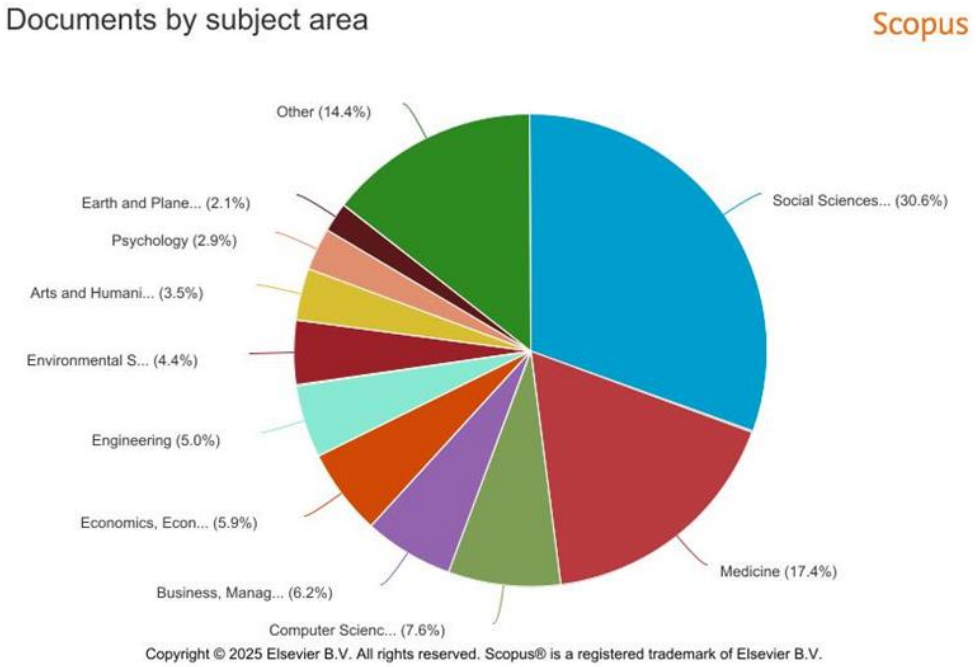

Figure 2: Documents by subject area. Source: Scopus database.

The figure above illustrates the distribution of higher education research publications in developing countries by academic field indexed in Scopus. In general, the largest contribution comes from the Social Sciences (30.6%), highlighting the dominance of research focused on the social aspects, policies, and institutional dynamics within the context of higher education. The field of Medicine (17.4%) ranks second, reflecting the connection between higher education and capacity development in the health sector. Meanwhile, the fields of Computer Science (7.6%), Business and Management (6.2%), and Economics (5.9%) also contribute significantly to the development of cross-disciplinary knowledge.

The fields of Engineering (5.0%), Environmental Science (4.4%), Humanities (3.5%), Psychology (2.9%), and Earth and Planetary Sciences (2.1%) show more limited involvement but remain important in expanding the multidisciplinary perspectives of

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higher education research. The "Other" category (14.4%) indicates the diversity of disciplines involved, reflecting the interdisciplinary nature of higher education research in developing countries. Overall, this distribution suggests that higher education studies are primarily explored from social and health perspectives, with an increasing trend of engagement from the fields of science and technology in the past decade.

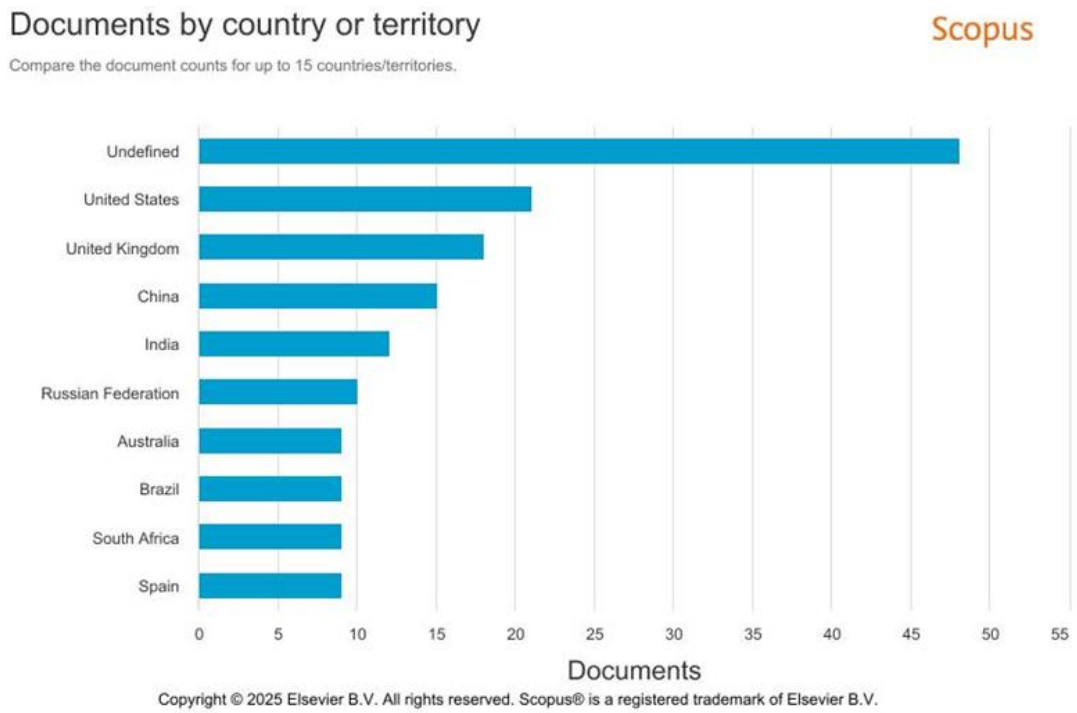

Figure 3: Documents by Country. Source: Scopus database.

The figure above shows the distribution of higher education research publications in developing countries based on the country or region of the authors indexed in Scopus. The data reveals that the "Undefined" category occupies the highest position, with approximately 50 publications. This is likely due to limitations in metadata or institutional affiliations that are not clearly identified in the database.

Among the defined countries, the United States ranks highest, followed by the United Kingdom, China, and India, which collectively represent a significant contribution to scholarly production in the field of higher education research in developing countries. The dominance of these countries indicates that research on higher education in developing countries is not only conducted by researchers from these regions but also

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heavily involves academics from developed countries through international collaborations.

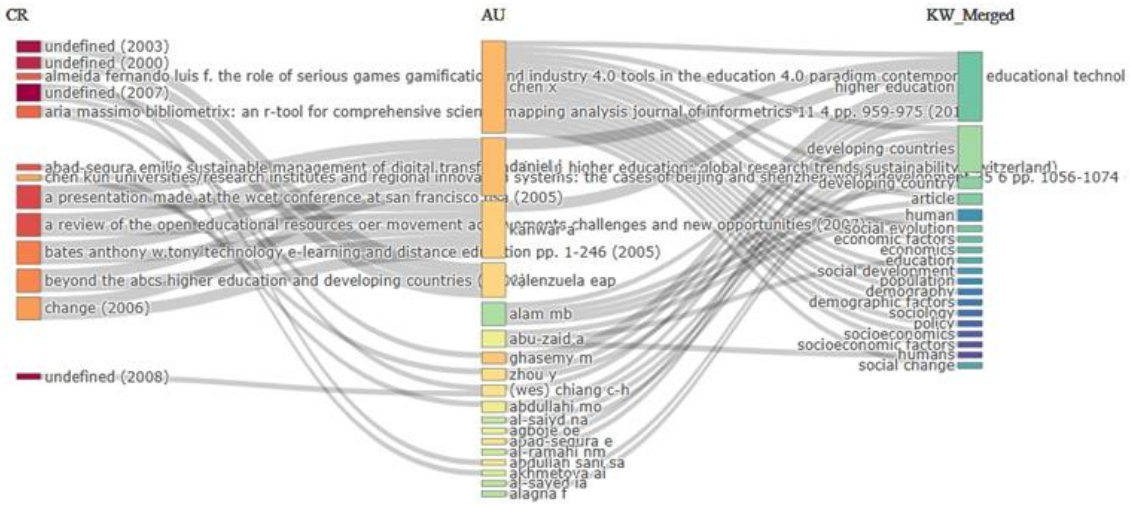

Figure 4: Collaboration Source: Scopus database.

The figure above represents a bibliometric visualization in the form of a three-field plot, which connects three key elements in the analysis of scientific publications: Cited References (CR), Authors (AU), and Merged Keywords (KW_Merged). The main purpose of this representation is to map the conceptual relationships between cited references, contributing authors, and keywords that describe the thematic focus of the research.

Structurally, the field on the left (CR) displays the sources or literature that are frequently cited within the research corpus being analyzed. It can be observed that some references lack complete metadata (undefined), indicating limitations in bibliographic labeling or the use of non-formal journal sources, such as conference reports or grey literature. This suggests that certain references may not have been fully documented or categorized within the database, possibly due to the nature of the sources being cited.

The middle field (AU) visualizes the authors who play a central role in the scientific network. The connections flowing from CR to AU indicate which references serve as the primary theoretical foundation for each author. The more lines leading to an author, the greater their contribution to integrating those literatures into their scholarly work.

The rightmost field (KW_Merged) indicates the dominant thematic focus or research issues. Keywords such as higher education, developing countries, social change, and economic factors suggest that the major themes analyzed are related to the transformation of higher education, socio-economic dynamics, and development in developing countries. The direct relationship between authors and keywords emphasizes

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the conceptual link between the theoretical foundation (cited literature) and the thematic direction of contemporary research.

Overall, this visualization reflects an interdisciplinary knowledge network that connects the theoretical foundations (CR), scientific actors (AU), and thematic domains (KW_Merged). It illustrates how knowledge in the fields of education and socio-economic development is constructed through the complex interactions between cited literature, individual researcher contributions, and the key concepts explored in the research. This network highlights the collaborative and evolving nature of scholarly work, showing how different elements of the academic community contribute to the development of knowledge in these areas.

3.2. Authors, Journals, and Most Influential Articles

This section highlights the authors, journals, and articles that have had the greatest influence in the field of study being analyzed. Through the following graph, we can observe the most significant contributions from authors and publications that serve as central references in related research.

These key authors and influential publications are critical in shaping the direction of the field, serving as foundational works for future research and establishing important theoretical or methodological frameworks. The analysis aims to identify the leading voices and most highly regarded sources that contribute to the development of higher education research in developing countries.

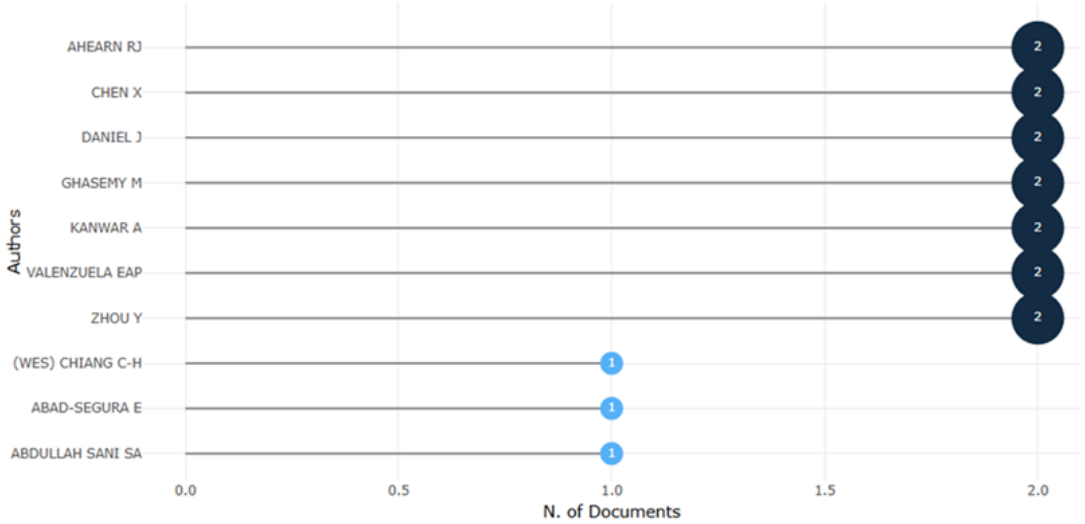

Figure 5: Most Influential Authors: Scopus database

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The figure above displays the distribution of publications based on the names of authors who have contributed to the field of study. It can be observed that seven authors Ahearn R.J., Chen X., Daniel J., Ghasemy M., Kanwar A., Valenzuela E.A.P., and Zhou Y. each have two published documents, indicating a relatively high level of productivity compared to other authors. Meanwhile, three other authors (Wes) Chiang C.-H., Abad-Segura E., and Abdullah Sani S.A. each have only one publication.

This finding suggests that scientific contributions in this research area are still dispersed, with a limited number of more active authors dominating the field. The concentration of publications among a few authors may also reflect the centrality of their work in shaping the direction of higher education research in developing countries, while the rest of the contributors have a more modest presence in the literature.

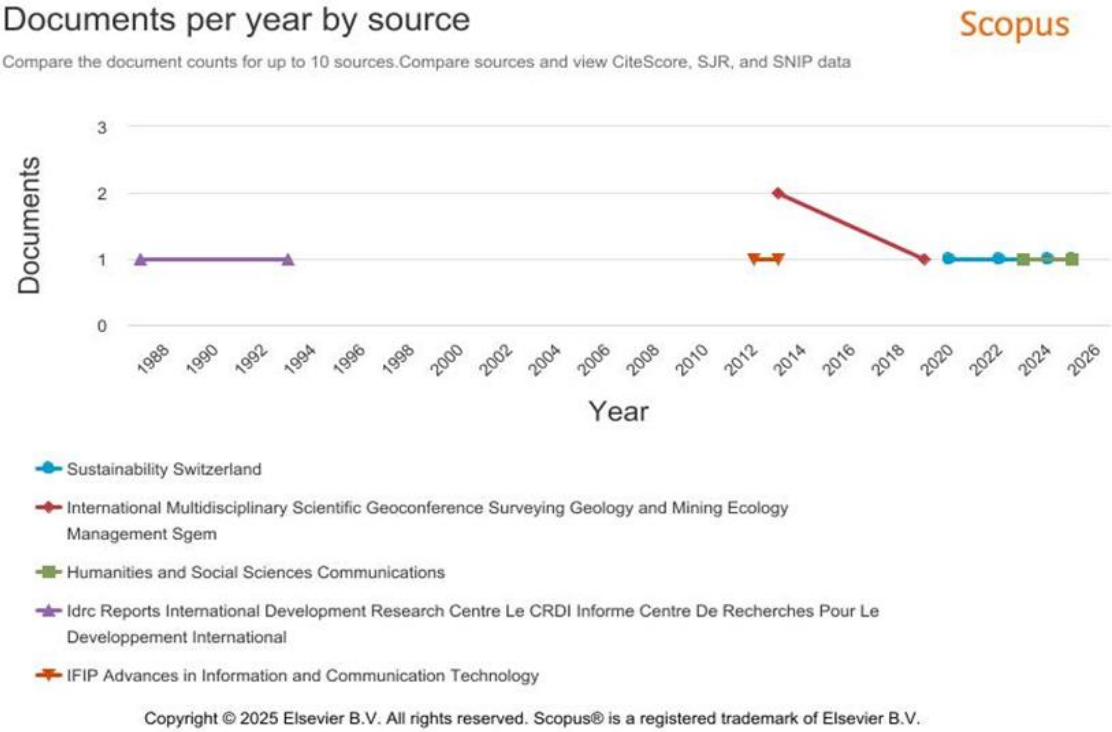

Figure 6: Documents per Year by Source: Scopus database

The figure above shows the distribution of scientific publications per year based on sources or journals indexed in the Scopus database. In general, the number of documents published by each source demonstrates an inconsistent pattern year by year, with a tendency for relatively low publishing activity (1 document per year).

The journal *International Multidisciplinary Scientific Geoconference Surveying Geology and Mining Ecology Management (SGEM)* recorded two publications between 2014 and

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2016, indicating a peak in contributions during this period before experiencing a decline. Meanwhile, sources like *Sustainability (Switzerland)*, *Humanities and Social Sciences Communications*, and *IFIP Advances in Information and Communication Technology* began to show stable publication output between 2019 and 2024. The *IDRC Reports International Development Research Centre* displayed early contributions in the 1988–1990 period, reflecting a historical foundation for the development of research in the related field.

Overall, this graph shows that while there is diversity in publication sources, the intensity of research in this area remains sporadic, with contributions scattered across various international journals and without a significant growth pattern over time. This suggests that while research is being conducted, it lacks consistent and sustained momentum across the years.

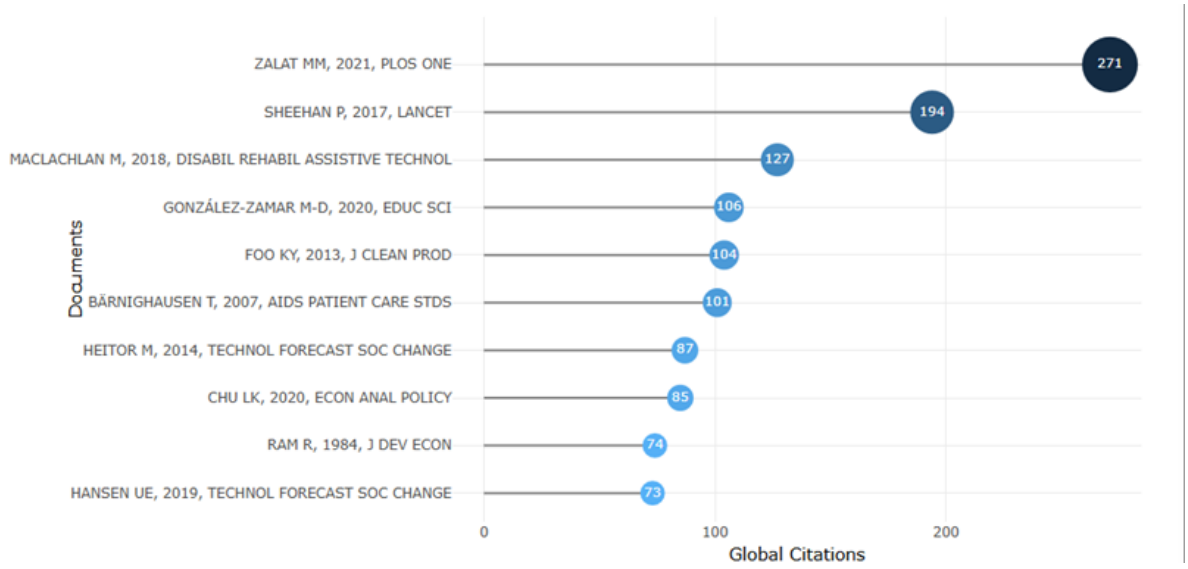

Figure 7: Most Global Cited Documents by Source: Scopus database

The image above illustrates the distribution of global citations from the ten most influential documents based on scientific publication data. The chart shows that the article written by Zalat M.M. (2021), published in *PLOS ONE*, ranks highest with 271 citations, indicating a significant scientific impact in the academic literature. In second place, the article by Sheehan P. (2017), published in The Lancet, received 194 citations, highlighting a substantial contribution to the related research field.

Next, the article by MacLachlan M. (2018) in Disability and Rehabilitation: Assistive Technology recorded 127 citations, followed by works by González-Zamar M.-D. (2020) in *Education Sciences* and Foo K.Y. (2013) in *Journal of Cleaner Production*, with 106 and

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104 citations, respectively. Other articles, such as those by Bärnighausen T. (2007), Heitor M. (2014), Chu L.K. (2020), Ram R. (1984), and Hansen U.E. (2019), also show relevant contributions, with citation counts ranging from 73 to 101.

Overall, this visualization indicates that academic impact is not solely dependent on the publication timeline, but also on the relevance of the topic and the reputation of the journal where the article is published. Articles published in high-impact journals like *PLOS ONE* and *The Lancet* tend to receive broader scientific recognition and have a significant influence on the development of the related academic discipline.

3.3. Mapping and Interconnections of Higher Education Research Topics

Mapping and interconnections of research topics in the field of higher education provide a comprehensive overview of the direction, focus, and relationships between various areas of study evolving within the academic literature. Through graphical visualization, key themes that overlap can be identified, revealing collaboration patterns and dominant research trends in the realm of higher education.

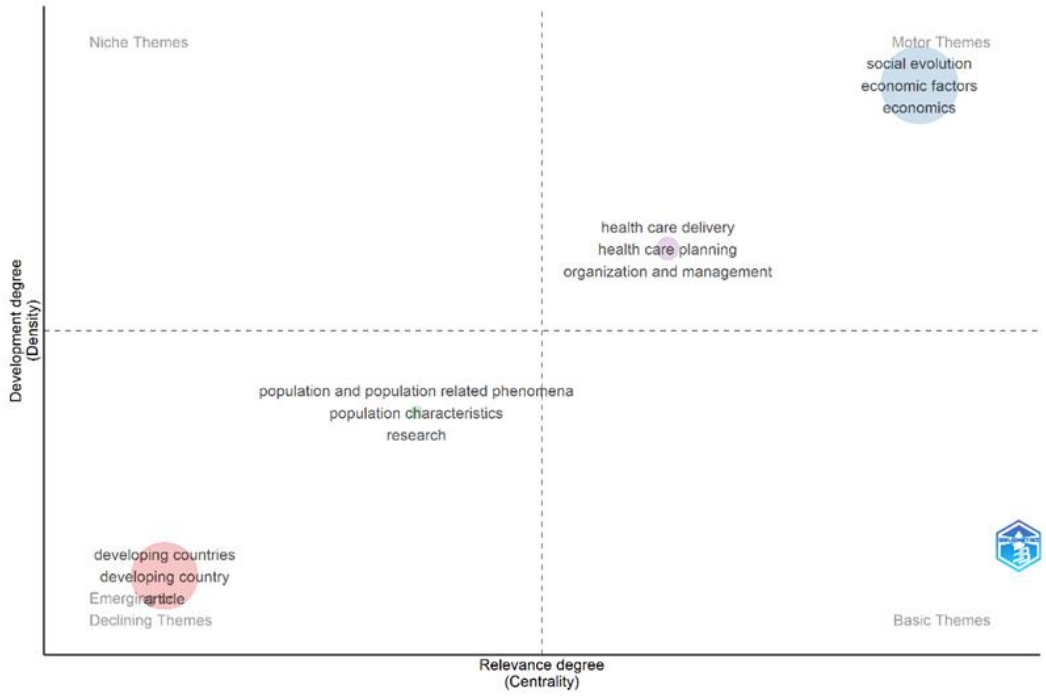

Figure 8 : Mapping of Main Topics. Source: Scopus database.

The image above presents a thematic map visualizing the interconnections and development levels of research topics in the field of higher education, based on two main

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parameters: relevance (centrality) and development (density). This map is divided into four quadrants, each representing research themes categorized by their function and maturity level.

In the upper right quadrant (Motor Themes), topics such as social evolution, economic factors, and economics emerge as strong and central themes, signaling their role as key drivers in the direction of higher education research. These themes exhibit high relevance and development, reflecting well-established and broadly influential research focuses.

Meanwhile, the lower right quadrant (Basic Themes) contains topics like health care delivery, health care planning, and organization and management. These serve as conceptual foundations in the study of higher education but are still in the process of strengthening their developmental structure.

In the lower left quadrant (Emerging or Declining Themes), topics such as developing countries and developing country reflect areas that are either emerging or experiencing a decline in interest, indicating shifts in the global research focus. Meanwhile, the upper left quadrant (Niche Themes) is relatively empty, highlighting the limited presence of highly specialized themes that, while developing, remain narrow in scope.

Overall, this map indicates that higher education research is predominantly focused on socio-economic factors and institutional management, while issues related to developing countries are still in the early stages of academic exploration.

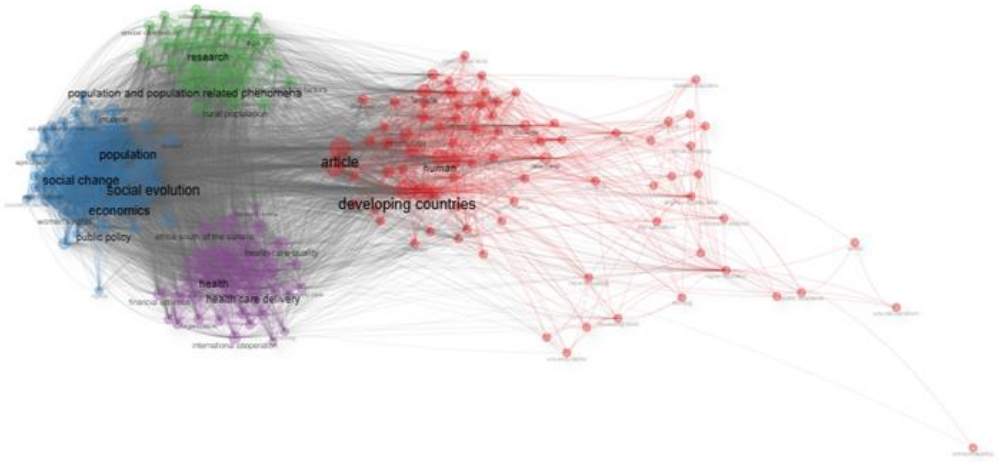

Figure 9 : Interrelationship between topics. Source: Scopus database.

The image above displays a co-word network visualization that illustrates the relationships between research topics in the field of higher education based on the

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frequency of co-occurring keywords in the academic literature. Each node represents a research keyword, while the connecting lines (edges) indicate the level of conceptual interconnection between topics. The size of each node reflects the importance or dominance of that particular theme within the overall body of research.

From the visualization, it is clear that there are three main clusters that interact with each other. The red cluster dominates with central themes such as *developing countries*, *article*, and *human*, indicating a research focus on development contexts and scientific contributions in developing countries. The blue cluster centers around themes like *population*, *social evolution*, and *economics*, highlighting the close relationship between social dynamics, economics, and public policy in the development of higher education. Meanwhile, the green and purple clusters emphasize areas such as *health care delivery*, international *cooperation*, and *research*, indicating the interconnections between higher education systems, public health, and global collaboration.

Overall, this network shows that higher education research has a complex and interconnected thematic structure, with a primary focus on socio-economic issues and human development in developing countries, as well as cross-disciplinary connections between education, policy, and health.

3.4. Direction and Potential of Future Research Topics

The two visualizations above illustrate the direction and research opportunities for the future in the context of social, economic, and public policy development in developing countries. The first thematic network map highlights the strong interconnections between concepts such as *developing countries*, *social change*, *economics*, and *population*, indicating that current global research is largely focused on the impacts of population dynamics and social change on economic development and public policy. The strong relationships between themes such as *health care*, *public policy*, and *social evolution* also signal the emergence of a multidisciplinary approach that combines health, economics, and social sciences to address development challenges in the developing world.

Meanwhile, the second thematic graph clarifies the conceptual direction of this research. Themes such as *social evolution*, *economic factors*, and *economics* occupy the position of motor themes, meaning these areas are highly relevant and serve as primary drivers for future research directions. This highlights the significant potential for research exploring the relationship between social transformation and economic development, including the roles of education, innovation, and governance in enhancing societal well-being in developing countries. Themes such as *health care delivery*, *planning*, and organization and management are situated in a transitional space toward central themes, indicating the growing importance of research on efficient and inclusive public service systems, particularly in health and education sectors.

The theme "developing countries", located in the emerging or declining themes quadrant, indicates that although this concept has long been a focus of academic

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attention, there is still significant potential to update research approaches by integrating contemporary issues such as sustainable development, economic digitalization, and global social justice. Thus, the direction of future research will move toward a more holistic approach to development, one that not only emphasizes economic growth but also social transformation, equitable welfare, and human capacity building in developing countries.

Overall, both graphs illustrate the significant potential for developing knowledge-based, socially ethical, and inclusive development models, which can enrich the discourse on public policy, including in the context of Islamic education and social peace. These models would place justice, well-being, and humanity as core foundations, guiding efforts toward more equitable and sustainable development.

4. Discussion

4.1. Trends in Higher Education Research Publications and Collaboration in Developing Countries

The bibliometric analysis reveals that digital transformation in higher education is not only focused on the application of technology but also on structural changes and the strengthening of human capacity. The surge in publications over the past decade indicates an increased interest in this issue, particularly post-pandemic, when universities were forced to adapt to digital learning systems and data-driven management (Alzahmi et al., 2025) (Narong, 2025; Reyes et al., 2022; Zainal Abidin et al., 2023).

This conceptual discussion utilizes Socio-Technical Systems Theory (Trist & Emery, 1960) and Institutional Theory (Scott, 2004) as the most relevant grand theories. Socio-Technical Systems Theory explains that the success of digital transformation depends on the balance between social systems (human resources, organizational culture) and technical systems (digital infrastructure, learning technologies). Institutional Theory complements this by explaining how normative, coercive, and mimetic pressures from the global environment drive higher education institutions to adopt digital innovations in order to remain relevant and competitive (Roman et al., 2025; van Coller et al., 2021).

The combination of these two theories creates an integrative model that shows that Digital Transformation in Higher Education is driven by three main dimensions: (1) Organizational Change (Structural Adaptation), which includes organizational restructuring and governance, (2) Technological Innovation, such as the implementation of AI and Learning Management Systems, and (3) Human Capital & Pedagogy, which emphasizes the enhancement of digital literacy and pedagogical competencies. The interaction between these dimensions results in two main outcomes: Equitable Access and Inclusion and Sustainable Institutional Competitiveness, which strengthen the position of universities in the global context (González-Zamar & Abad-Segura, 2020)(Dai & Li, 2025; Li et al., 2022).

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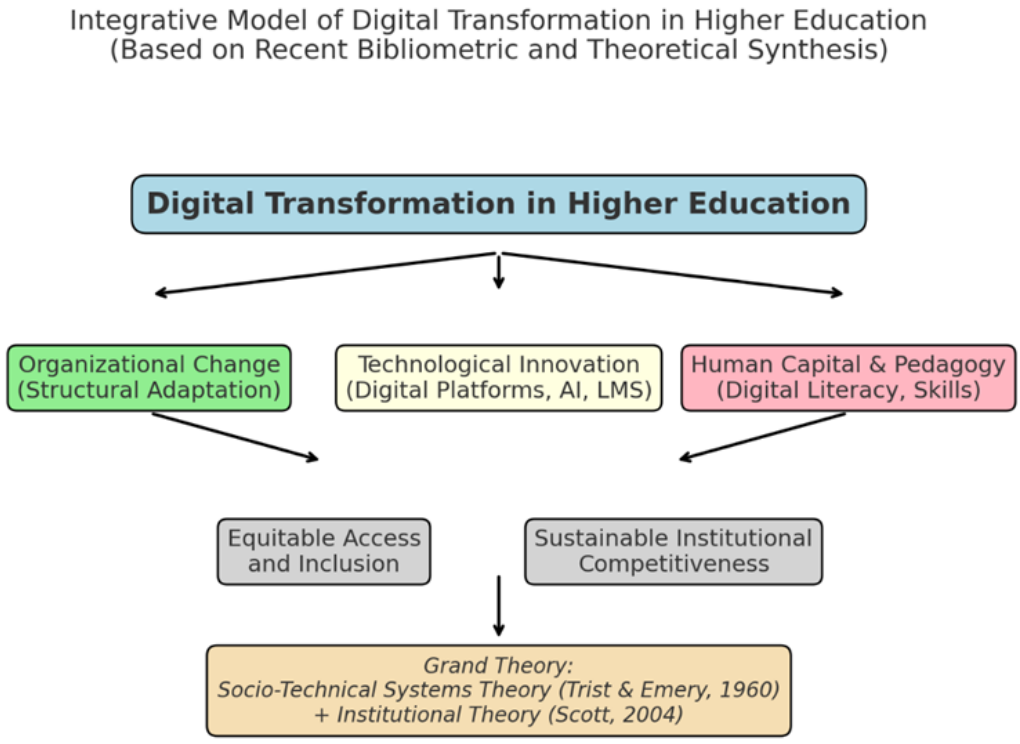
The visualization model above illustrates the causal relationships between components based on bibliometric synthesis and theory. Digital innovation does not exist in isolation; rather, it is the result of the coevolution between humans, technology, and institutions. Thus, this socio-technical-institutional approach provides a more comprehensive conceptual framework for understanding the dynamics of higher education transformation on a global scale (Ferhataj et al., 2025; Roman et al., 2025).



4.2. Authors, Journals, and Most Influential Articles

Recent bibliometric results reveal significant dynamics in the research landscape concerning digital transformation and higher education innovation globally, with dominance from authors such as Ahearn RJ, Chen X, Daniel J, and Abad-Segura E. who have contributed to strengthening both the theoretical and empirical dimensions in this field. The increased scholarly productivity of these authors reinforces the academic legitimacy of themes like *organizational change* and *digital learning ecosystems*. In the context of theory, these findings align with Institutional Theory (Scott, 2004), which explains that academic organizations undergo transformation due to coercive pressures (national policies), mimetic pressures (global competition), and normative pressures

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(international professional standards). Publications by (Zou et al., 2024) emphasize that institutional adaptation to digitalization has become part of efforts to maintain academic legitimacy in the post-pandemic era, marking an epistemological evolution from mere digital adoption to institutional digital maturity.

Furthermore, the analysis of publication sources (such as Sustainability Switzerland and Humanities and Social Sciences Communications) shows that multidisciplinary journals play a crucial role as platforms for integrating technology, social factors, and education management. This reflects a paradigm shift toward a socio-technical integration approach, where technology is not merely seen as a tool, but as a structural element in the creation of sustainable learning systems (Alzahmi et al., 2025). This approach reinforces the relevance of Socio-Technical Systems Theory (Trist & Emery, 1960), which posits that the success of digital transformation depends on the alignment between social systems (humans, organizational culture) and technical systems (digital infrastructure, AI, LMS). Similar findings are also highlighted by (Ferhataj et al., 2025), who note that the socio-technical is more effective in creating adaptive learning ecosystems compared to technology-centric models.

From the perspective of scientific impact (citations impact), publications by (Zalat et al., 2021) and (González-Zamar & Abad-Segura, 2020) show the highest global influence, focusing on topics such as digital readiness of educators and the social impact of online learning. Both studies have become landmarks in building a new discourse on digital capability frameworks in the higher education sector. The research by (Omar & Abdullahi, 2024; Qi et al., 2025) adds an important dimension regarding digital sustainability, emphasizing the sustainability of digital transformation through data-driven policies and human-centered design. This connection expands the application of Institutional Theory toward a new, adaptive institutional theory that responds to the context of social digitalization.

The key novelty arising from this synthesis is the emergence of an integrative socio-technical–institutional model that explains how the collaboration between technological innovation, organizational change, and human capital development can result in sustainable digital transformation in higher education. This model goes beyond previous sectoral research by proposing a systemic approach that integrates institutional pressures (normative and coercive) with socio-technical dynamics. Therefore, the bibliometric findings not only depict trends but also conceptualize a new theoretical direction that can be empirically tested in the future (Wang et al., 2023).

Novelty Statement: The socio-technical–institutional approach to digital transformation in higher education is a novel contribution that systematically integrates the dimensions of technology, organization, and human factors. This model emphasizes that the success of digital transformation is not solely determined by technology but also by institutional digital capability and socio-cultural adaptability, which shape the sustainability of academic innovation at the global level.

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4.3. Mapping and Interconnections of Higher Education Research Topics

The thematic and bibliometric network analysis in the fields of health care, economics, and social development highlights the shift in research themes toward the integration of digitalization, economic innovation, and disparities among developing countries. The analysis shows that themes such as developing countries and developing country are positioned in the "emerging or declining themes" quadrant, suggesting they are either in the early stages of exploration or experiencing a decline in research interest. On the other hand, themes like health care delivery and health care planning occupy central positions with high relevance but moderate development. Meanwhile, themes such as social evolution and economics emerge as motor themes, indicating they are central conceptual drivers in this field(Akhmetova et al., 2025; Arnold, 2023; Brunckhorst et al., 2024).

Recent research reinforces these findings. A global bibliometric study by (Nguyen et al., 2025; Verdugo Arcos et al., 2025) shows that the focus of health care research is now shifting toward patient outcomes and digital service models. Meanwhile, (Hu et al., 2024; Jasti et al., 2022) highlight the importance of knowledge management and digital innovation as key factors in the efficiency of health systems. This trend aligns with social evolution theory (Comte, Spencer), which emphasizes that social systems, including healthcare, evolve in tandem with technological and economic developments. Thus, the emergence of themes such as digitalization and knowledge management marks a new phase in the social evolution of global health systems.

Furthermore, the dynamics within the developing countries cluster, which appears as a "declining" theme, can be explained through world-systems theory (Wallerstein) and dependency theory. Recent literature, such as (Akhmetova et al., 2025; de Carvalho-Filho & Hafferty, 2025), indicates that health research in developing countries remains structurally disadvantaged due to global economic and social inequalities. Another study by (Wu et al., 2023)(Qi et al., 2025; Wang et al., 2023) emphasizes that developing countries face social and environmental pressures resulting from uneven economic growth, which makes topics related to social and health policy still relevant but lacking innovative momentum in global publications.

Meanwhile, the emergence of economics and social evolution themes in the motor themes quadrant reflects the strengthening connections between health and global political economy. An analysis by (Akhmetova et al., 2025; Brunckhorst et al., 2024) finds that modern health care systems are inseparable from macroeconomic factors and hospital financing models, which are now influenced by Industry 4.0/5.0 technologies (Piramanayagam et al., 2023). This phenomenon confirms the relevance of institutional economics theory (North, 1990), which explains that technological innovation and economic policies together shape the efficiency and fairness of global health systems.

Conceptually, the main novelty of the findings from this visualization lies in the transformation of the roles of digital innovation and social evolution in driving health

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systems across national economies(Alzahmi et al., 2025; Ponce & Escuadra, 2024). While previous research focused on the gap between developed and developing countries, the current research shift is toward understanding how digitalization and evolutionary economics can bridge this divide. As such, the latest focus in this field is on the integration of technological, economic, and social dimensions as a single adaptive ecosystem, representing a new paradigm in global health development theory.

4.4. Direction and Potential of Future Research Topics

Based on data from relevant articles in Scopus, higher education research in developing countries has shown a significant focus on the fields of health, economics, and technological innovation. For instance, the article by Zalat et al. (2021), published in *PLOS ONE*, highlights the importance of assistive technologies for individuals with disabilities in developing countries, emphasizing how technological innovations in health care and higher education can improve inclusivity and accessibility (Zalat et al., 2021). In a similar context, Sheehan et al. (2017) in The Lancet suggest that higher education in developing countries plays a crucial role in building the foundation for sustainable development, proposing a more integrated educational approach that aligns with the social and economic needs of society (Sheehan et al., 2017).

In addition, research by Maclachlan et al. (2018), published in Disability and Rehabilitation: Assistive Technology, discusses how higher education policies can support individuals with disabilities through the integration of rehabilitation technologies, highlighting the close relationship between education policy and the enhancement of quality of life through higher education (MacLachlan et al., 2018). Another study by González-Zamar and Abad-Segura (2020) reveals the impact of new technologies, such as virtual reality, on arts education and social development, reflecting how technology can drive social evolution through higher education (González-Zamar & Abad-Segura, 2020).

Furthermore, the article by Bärnighausen (2007) in AIDS Patient Care and STDs emphasizes the importance of health care systems in developing countries, which are closely linked to higher education in providing professionals capable of managing global health challenges. It also highlights the role of educational capacity in the development of health care systems (Bärnighausen et al., 2007). Overall, these articles demonstrate how higher education, through various disciplines, functions not only as a center of learning but also as an agent of social and economic change, playing a crucial role in the development of developing countries in terms of health, social policy, and global economics.

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5. Conclusion

Research publication trends indicate that digital transformation in higher education in developing countries has significantly increased over the past decade, especially following the pandemic. The focus has expanded beyond just adopting technology, to also include organizational restructuring and human capacity development. The synergy between technological innovation, institutional adaptation, and the strengthening of digital literacy is explained through a combined theoretical approach using Socio-Technical Systems Theory and Institutional Theory, which together form a conceptual model for sustainable digital transformation. Authors and multidisciplinary journals play a key role in shaping a new paradigm based on the integration of technology, organization, and human resources, with a strong contribution to enhancing adaptive learning ecosystems and increasing academic legitimacy. Thematic mapping reveals a shift in research focus towards the digitalization of healthcare systems, political economy, and social inequality, where social evolution theory and institutional economics serve as foundations for understanding the evolution of more just and efficient public service systems. Looking ahead, higher education research in developing countries emphasizes technology integration to promote inclusivity, sustainability, and social innovation, strengthening the role of higher education as an agent of change in global development, especially in health, economy, and social policy.

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