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Bibliometric analysis of cross discipline education in higher education based on WoS database

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Abstract

Interdisciplinary education is a core direction in the reform of contemporary business higher education. This study aims to systematically map the development trajectory, global landscape, knowledge foundation, and emerging trends of interdisciplinary business education research through a bibliometric approach.

Based on the Web of Science Core Collection database, this study conducts a bibliometric analysis of literature on interdisciplinary business education from 1967 to 2024. Using tools such as CiteSpace, the analysis encompasses multiple dimensions, including temporal publication trends, contributions by countries/regions and institutions, journal co-citation, author collaboration and co-citation, and keyword co-occurrence and clustering, employing both quantitative and visualization methods. (1)Publication output has shown significant temporal growth, divided into three phases: low output (1967–1999), steady growth (2000–2009), and rapid expansion (2010–2024), indicating the field's transition from a niche to a mainstream focus. (2) Global research exhibits a multipolar pattern: the United States maintains a dominant position, European countries provide stable support, and the Asia-Pacific region emerges as a new growth pole; large public university systems stand out in academic output and collaboration networks. (3) The knowledge foundation is robust, rooted in theoretical cornerstones from journals like Academy of Management Review and Journal of Marketing, while also addressing cutting-edge topics such as technological innovation and sustainability. (4) Research themes have evolved from internal capability development to external network integration and from economic performance orientation to social value co-creation, forming an "umbrella" knowledge structure centered on "innovation and management" and radiating toward frontier areas such as "social media and gig economy" and "business ethics and sustainability."This study is the first to conduct a comprehensive bibliometric analysis of interdisciplinary business education research spanning nearly six decades, clearly delineating its developmental trajectory and knowledge structure. The findings provide scholars with a macro-level map to quickly grasp field dynamics, identify core literature, and explore collaboration opportunities, while offering educational institutions empirical evidence and decision-making references to optimize resource allocation and advance interdisciplinary education practices.

Keywords:
Business Education; Interdisciplinary Education; Bibliometrics; Scientometrics; Knowledge Mapping; Web of Science

1.Introduction

Interdisciplinary education has emerged as a cornerstone of modern higher education(Spelt et al., 2009),

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addressing complex global challenges by integrating knowledge, methodologies, and perspectives from diverse disciplines(Patel et al., 2024). This approach aims to cultivate talent with systemic thinking, innovation, and practical problem-solving skills(Arranz Garcia et al., 2025). In the field of business studies, this trend is particularly pronounced(Pittaway et al., 2004). The dynamic global market, disruptive technological advancements, and pressing issues such as sustainability and public health crises demand that business research and practice transcend traditional disciplinary boundaries, incorporating insights from economics, psychology, sociology, data science, and even engineering(Sovacool et al., 2025).

Despite the recognized importance of interdisciplinary business education, the academic community lacks a systematic, macro-level understanding of the field's development trajectory, knowledge structure, key contributors, and evolving trends(Pu et al., 2024). Existing studies often focus on case analyses or theoretical discussions, with limited large-scale, data-driven insights(Harjatanaya et al., 2025). Critical questions remain unanswered: What is the academic landscape of this field? Which countries, institutions, and scholars lead the charge(Ghoneim & Yousri, 2025)? How have the core knowledge base and research frontiers evolved(Romero-Sánchez et al., 2024)? Addressing these questions is vital for scholars to navigate the field, institutions to plan disciplinary development, and practitioners to advance interdisciplinary education.

To address this gap, this study employs a bibliometric approach to systematically analyze literature on interdisciplinary business education from the Web of Science Core Collection, spanning 1967 to 2024. Through descriptive statistics, country/region distribution analysis, journal co-citation analysis, author collaboration and co-citation analysis, and keyword co-occurrence and clustering analysis, this research pursues the following objectives: (1) map the temporal evolution of publication volume; (2) identify key contributing countries/regions and institutions, revealing their collaboration networks; (3) delineate the core knowledge base (highly co-cited journals and scholars); and (4) analyze the knowledge structure, clustering characteristics, and evolving trends. By providing a comprehensive bibliometric overview, this study offers a clear blueprint of the historical trajectory, current landscape, and future directions of interdisciplinary business education research.

2.Research Design

This study employs a bibliometric approach to systematically and objectively analyze the research landscape of interdisciplinary business education. The research design encompasses the data retrieval strategy, data cleaning process, and the analytical methods and tools utilized.

The data for this study were sourced from the internationally recognized Web of Science Core Collection, an authoritative academic database. To ensure the comprehensiveness and relevance of the retrieved results, a structured search strategy was developed. The search was conducted within the Web of Science Core Collection, including sub-databases such as SCI-EXPANDED, SSCI, and A& HCI, covering all available years from the database's inception to the most recent data. The search was executed on August 26, 2025. A topic-based search strategy was employed, combining two sets of keywords representing "business education" and "interdisciplinary education." The business education-related terms included ("business education" OR "management education" OR "entrepreneurship education" OR "marketing education"

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OR "accounting education"), while interdisciplinary education-related terms included ("interdisciplinary education" OR "cross-disciplinary" OR "multidisciplinary" OR "transdisciplinary education" OR "integrated curriculum"). The final search query was formulated as: TS=(("business education" OR "management education" OR "entrepreneurship education") AND ("interdisciplinary education" OR "cross-disciplinary" OR "multidisciplinary")), yielding the initial set of literature records.

To ensure the accuracy and validity of the data, a rigorous cleaning and processing procedure was applied to the retrieved results. First, the full records and cited references were exported from the Web of Science platform in plain text format, with each record containing comprehensive information such as title, author, institution, country, abstract, keywords, source journal, publication year, and references. Duplicate records were removed using literature management tools to ensure each article was unique in the dataset. Additionally, a manual screening process was conducted by reviewing titles and abstracts to exclude clearly irrelevant studies, such as those mentioning “business” or “disciplines” but unrelated to education research. After this cleaning process, a final dataset of 435 valid academic articles was obtained for analysis.

The study primarily utilized CiteSpace, a widely adopted bibliometric software, for data visualization and analysis, supplemented by Excel for basic descriptive statistics. The analysis covered multiple dimensions: (1) Descriptive statistical analysis involved examining the annual distribution of publications, generating trend charts, and identifying developmental stages to reveal the historical evolution of the field. (2) Country/region and institutional collaboration network analysis constructed co-occurrence networks to analyze publication frequency and centrality metrics, identifying key research contributors and collaboration patterns. (3) Journal co-citation analysis examined frequently co-cited journals to uncover the core knowledge sources and disciplinary foundations of interdisciplinary business education research. (4) Author co-citation analysis identified highly influential and emergent scholars, exploring the intellectual foundations and emerging theoretical frontiers of the field. (5) Keyword co-occurrence and clustering analysis, the core analytical component, involved extracting keywords to generate co-occurrence networks, employing the LLR algorithm for clustering to identify major research themes, and using time-zone or timeline views to illustrate the evolution of these themes over time. This research design ensures a comprehensive analysis, spanning macro-level trends to micro-level structures and from static characteristics to dynamic evolution, providing a robust methodological foundation for systematically interpreting the research landscape of interdisciplinary business education.

3.Data Analysis

3.1Descriptive analysis

Based on the statistical analysis of articles published in the Web of Science (WoS) core database from 1967 to 2024, the number of publications in interdisciplinary higher education exhibits a clear upward trend over time. The data is divided into three distinct phases for a comprehensive summary, with the average annual number of publications calculated for each phase and possible interpretations provided. The phases are delineated based on key turning points in the data: the first phase (1967–1999, low-output period), the second phase (2000–2009, growth period), and the third phase (2010–2024, rapid growth period).

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In the first phase (1967–1999), the average annual number of publications was approximately 1.79 articles. This period, encompassing the early years, features sparse data points, with publication counts generally in the single digits and minimal fluctuations. A plausible interpretation is that interdisciplinary higher education was still in its nascent stage during the late 20th century, with limited research interest and policy support. The WoS database likely had a narrower scope of coverage, and interdisciplinary research was not yet mainstream in higher education systems, resulting in fewer published outputs. This reflects the slow progress of the field in its initial development.

In the second phase (2000–2009), the average annual publication count rose significantly to about 6.22 articles, marking a notable increase from the previous phase. Publication numbers began to exceed single digits, reaching a small peak of 16 articles in 2009. This growth can be attributed to the acceleration of globalization and higher education reforms in the early 21st century, which emphasized interdisciplinary research. For instance, policies in various countries encouraged innovation and disciplinary integration, while the WoS database likely expanded its indexing scope, making relevant studies more accessible. This increase indicates growing academic recognition of interdisciplinary higher education as an emerging research direction.

In the third phase (2010–2024), the average annual publication count surged to approximately 22.4 articles, reflecting a rapid growth trend, particularly after 2017, with a peak of 44 articles in 2021. This phase shows a marked rise in publication volume and increased research activity. Possible explanations include the growing demand for interdisciplinary solutions driven by global challenges, such as climate change and public health crises, coupled with increased investment in interdisciplinary projects by higher education institutions. Additionally, advancements in research methodologies and publication channels, along with improvements in the WOS database, likely facilitated greater article inclusion. This trend underscores the central role of interdisciplinary higher education in contemporary educational research, with expectations of further expansion in the future.

Overall, the data highlights the evolution of interdisciplinary higher education research from a marginal to a mainstream field, with each phase of growth closely tied to external policies, academic trends, and technological advancements. The field's robust momentum suggests continued development and influence in the years ahead.

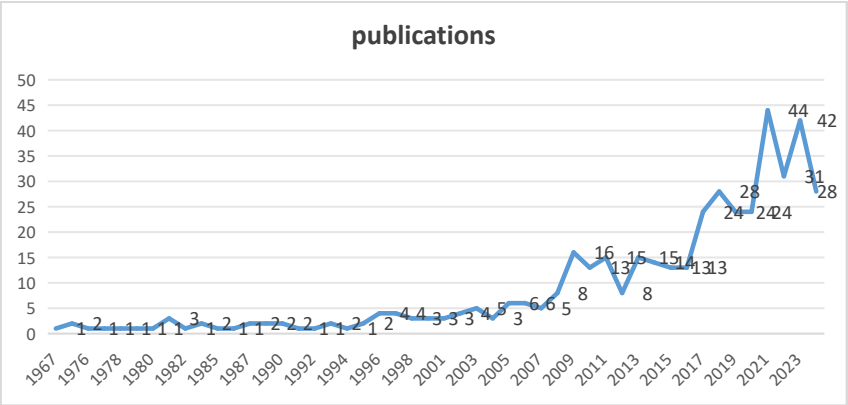


Figure 1 publication

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3.2Statistic results of public areas

The statistical data on interdisciplinary business scholars, based on publications in the Web of Science (WoS) core database from 1967 to 2024, reveals significant variations in research output across countries and regions, as measured by frequency, burst, degree, centrality, sigma, PageRank, and half-life. The United States and England emerge as dominant contributors, with the USA recording the highest frequency (167 publications) and a significant burst (15.34) from 1975 to 2010, alongside a high sigma (747.8), indicating substantial and sustained influence. England follows with 87 publications and a degree of 36, suggesting strong connectivity within the research network. Both countries likely benefit from established academic infrastructures, robust funding, and early adoption of interdisciplinary approaches in business studies. Other notable contributors include France (25 publications, degree 17), Australia (27 publications, degree 15), and Italy (32 publications, degree 15), reflecting moderate but consistent activity, with Australia and Italy showing longer half-lives (17.5 and 14.5 years, respectively), indicating sustained relevance of their outputs. Emerging contributors, such as China (18 publications, degree 9) and India (12 publications, degree 8), show growing engagement, particularly post-2010, likely driven by increasing academic investment and global integration. Smaller nations like Malaysia, Algeria, and Estonia, each with minimal publications (1–2), exhibit recent activity (post-2020) but limited network influence (centrality and PageRank near 0), suggesting nascent stages of interdisciplinary research. The data highlights a global shift toward interdisciplinary business scholarship, with established academic hubs maintaining dominance while emerging economies gradually increase their presence, potentially fueled by globalization and evolving educational priorities.

Based on the provided data regarding the national/regional distribution of interdisciplinary business scholars, the global landscape and its evolutionary trends in this research field can be clearly outlined. The analysis results are as follows:

The United States (USA) holds an indisputable leading position in this field, with its publication volume (Freq = 167) and academic influence (Degree = 35) far outpacing other countries. Of particular importance is the significant sustainability and explosive growth of research activity in the United States (Burst = 15.34, BurstBegin = 1975, BurstEnd = 2010). This indicates that the United States has been the core engine driving the development of this field for as long as 35 years, laying a solid academic foundation for it.

European countries represented by England, Germany, France, Italy, and Sweden form the second tier. These countries not only have a substantial number of publications but also maintain high centrality, demonstrating their crucial hub role in the international collaboration network. Notably, the research outputs of some European countries such as Sweden (with a half-life of 21.5 years) and Canada (with a half-life of 33.5 years) possess long-term academic vitality, reflecting the high quality and enduring impact of their research.

Since the 21st century, the global research landscape has shown a distinct trend of diversification, with the Asia-Pacific region standing out prominently. As English-speaking countries, Australia and Canada engaged in this field at an early stage and have continued to produce research outputs consistently. Scholars from countries such as the People's Republic of China, India, and South Korea have become active since around 2010, with a rapid increase in publication volume, emerging as indispensable new forces. Brazil, as a

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representative of Latin America, has demonstrated considerable activity, indicating that research in this field is expanding to a broader range of regions.

From Concentration to Diffusion: In the early stage of the field's development, it was dominated by the United States. Later, the focus gradually spread to Europe, and in recent years, it has further expanded to the Asia-Pacific region and other parts of the world, presenting a globalized research pattern. Although many emerging countries (such as South Africa, the United Arab Emirates, and Iran) have only started publishing research results recently (with an average publication year after 2019), their participation has injected new vitality into the field, and their influence is expected to grow in the future.

In summary, interdisciplinary business research has formed a dynamic global landscape, with the United States as the long-term core, Europe as the stable backbone, and the Asia-Pacific region as a strong growth driver. This landscape reflects the close connection between academic research and the shifting focus of global economic and educational development.

3.3statistics of co-cited journals

Table 1 summary of co-cited journals

Rank	Frequency	Burst	Burst Begin	Burst End	Degree	Co-cited journal	Year	Half-life
1	192	5.22	1993	2010	160	Academy of Management Review	1981	36.5
2	182	4.33	2005	2012	68	Journal of Marketing	1976	41.5
3	126	4.83	2010	2015	78	Harvard Business Review	1984	32.5
4	113	4.63	2005	2012	57	Journal of Marketing Research	1976	41.5
5	70	4.45	1989	2011	161	American Journal of Sociology	1981	35.5
6	51	5.36	2022	2024	44	Technological Forecasting & Social Change	2013	8.5
7	48	4.58	2002	2009	42	Journal of Personality and Social Psychology	1976	41.5
8	43	6.46	1967	2006	92	American Economic Review	1967	48.5
9	43	4.48	2021	2024	33	International Business Review	2017	4.5
10	39	6.27	2017	2022	32	Science	2001	18.5
11	36	5.39	2012	2018	35	Marketing Science	2009	8.5
12	35	4.67	2015	2018	37	Journal of Consumer Psychology	2012	5.5
13	34	4.72	2021	2024	29	Journal of World Business	2010	11.5
14	31	5.68	2020	2024	36	Journal of Retailing and Consumer Services	2016	5.5
15	31	6.99	2022	2024	19	Sustainability	2020	2.5
16	25	4.53	2007	2012	36	Journal of Public Policy & Marketing	2007	10.5
17	22	4.72	2009	2015	32	MIT Sloan Management Review	2009	5.5
18	21	5.67	2004	2010	38	Academy of Management Executive	2004	5.5
19	21	4.31	2016	2018	31	Service Industries Journal	2016	1.5

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20	20	4.66	2005	2014	48	Journal of Advertising Research	1976	35.5
21	20	4.95	2019	2024	28	International Entrepreneurship Management Journal	2019	1.5
22	18	4.31	2020	2022	29	Journal of Economic Perspectives	2011	9.5
23	16	5.29	1987	2013	41	Research in Organizational Behavior	1987	21.5
24	15	5.77	2019	2022	26	Strategic Entrepreneurship Journal	2019	0.5
25	15	4.59	2016	2021	10	Human Resource Management Review	2016	4.5
26	14	4.78	2006	2018	21	Journal of Marketing Management	2006	7.5
27	14	4.96	2021	2024	9	Asia Pacific Journal of Management	2021	0.5
28	12	4.25	2021	2024	16	Management International Review	2021	0.5
29	7	4.56	2003	2006	19	European Journal of Marketing	2003	1.5

3.4Scholarly contribution

The analysis of author collaboration in the field of interdisciplinary business education reveals a distinct distribution pattern. Certain author groups, such as those involving "Bowen, Daniel H" and "Brannen, Mary Yoko," form relatively tight-knit collaboration networks, indicating concentrated cooperative efforts. Meanwhile, there are also more dispersed author nodes, reflecting individual or less connected contributions. This suggests that interdisciplinary business education research is characterized by both stable, core-led collaboration teams that drive in-depth advancements and a broader set of scholars engaging in relatively independent explorations. The overall collaboration landscape thus exhibits a blend of clustering and dispersion, highlighting both the cohesion of key research groups and the diversity of individual contributions in the field.

Based on the provided data on the distribution of business interdisciplinary scholars' institutions, the contribution pattern and core characteristics of institutions in this research field can be clearly outlined. Data shows that the large public university systems in the United States play an absolutely dominant role in this research field. Arizona State University (including its Tempe campus) has become a global core institution with its remarkable publication volume (Freq = 7 + 6) and the highest academic network centrality (Degree = 20 + 17). This indicates that the university is not only a high-yield publishing center but also a key hub in the academic cooperation network. Other subsequent U.S. state university systems, such as the State University System of Florida, the University System of Ohio, and the California State University System, also demonstrate strong influence (Degree values are all greater than or equal to 15). Relying on their large scale, rich disciplinary settings, and resource integration capabilities, these systems provide an ideal environment for interdisciplinary research and form a strong collective influence. The achievements of many institutions have a long academic half-life (for example, the University of California system reaches 41.5 years), which proves the lasting value of their research.

British universities are an important force second only to the United States. The University of London and

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its subordinate London Business School have outstanding publication volumes (Freq = 11 + 3), showing strong overall strength. In particular, the University of Birmingham, although the half-life of its recently published articles is short (0.5 years), has a relatively high centrality (Degree = 12), indicating that it is an emerging and highly connected active node. Members of the Russell Group such as the University of Warwick also rank among the top, jointly forming an academic hub in Europe.

In addition to the United States and the United Kingdom, Canada (such as the University of Alberta, Queen's University), Australia (such as the University of Sydney), Denmark (Copenhagen Business School), and other top business schools in Europe and the Asia-Pacific region (such as BI Norwegian Business School, National University of Singapore) have all made stable contributions. This reflects that interdisciplinary research in business has formed a multi-polar global cooperation network. A notable trend is that the overall influence of a university system is often greater than that of its subordinate individual campuses. This indicates that interdisciplinary research particularly relies on resource coordination and integration within the system. At the same time, some non-U.S. and non-U.K. institutions, such as the IIM System, although the average publication year is very new (2023), have begun to emerge, indicating the further diversification of global research forces in the future.

The complexity of interdisciplinary research requires institutions to have the ability to integrate multidisciplinary resources. Therefore, large-scale and well-organized public university systems show significant advantages. Institutions with high centrality (such as Arizona State University, State University System of Florida) are not only producers of knowledge but also bridges for global academic cooperation, and their network status is crucial. A number of institutions that have become active in the past five years (such as the Nevada Higher Education System, the University of Birmingham) have quickly established a connection network although they do not have a long historical accumulation, and they are emerging forces worthy of attention in the field.

Interdisciplinary research in business has formed a collaborative network with large public university systems in the United States as the core engine, top universities in the United Kingdom as an important pillar, and extensive participation of elite institutions from many countries around the world. There is a strong positive correlation between the "system-level" integration capability of institutions and their influence in interdisciplinary research.

Analysis of author co-citation data in interdisciplinary business education research reveals key patterns and trends within the literature network. First, highly cited authors such as EISENHARDT KM (frequency 40), BELK RW (frequency 28), and BARNEY J (frequency 22) occupy central positions in the network, indicating their enduring influence in foundational business domains like strategic management and consumer behavior, which provide theoretical cornerstones for interdisciplinary research. Second, burst detection highlights recently active authors, including TEECE DJ (burst value 4.13, 2022–2024), ZAHRA SA (burst value 5.72, 2017–2022), and VAN ECK NJ (burst value 5.08, 2021–2024), who demonstrate prominence in emerging topics such as dynamic capabilities, entrepreneurial innovation, and service-dominant logic, reflecting the emphasis on timeliness and applicability in interdisciplinary education. Cluster analysis further groups authors into thematic clusters: for instance, Cluster 4 (including TEECE DJ and VARGO SL) is associated with service science and innovation management, Cluster 7 (including EISENHARDT

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KM and ZAHRA SA) focuses on the intersection of strategy and entrepreneurship, while Clusters 0 and 1 encompass traditional disciplines like marketing and organizational behavior. Overall, the data underscore the diversity of interdisciplinary business research, characterized by both the continuation of classic theories and the emergence of new integrations driven by burst authors, highlighting the importance of incorporating multidisciplinary perspectives in educational practice.

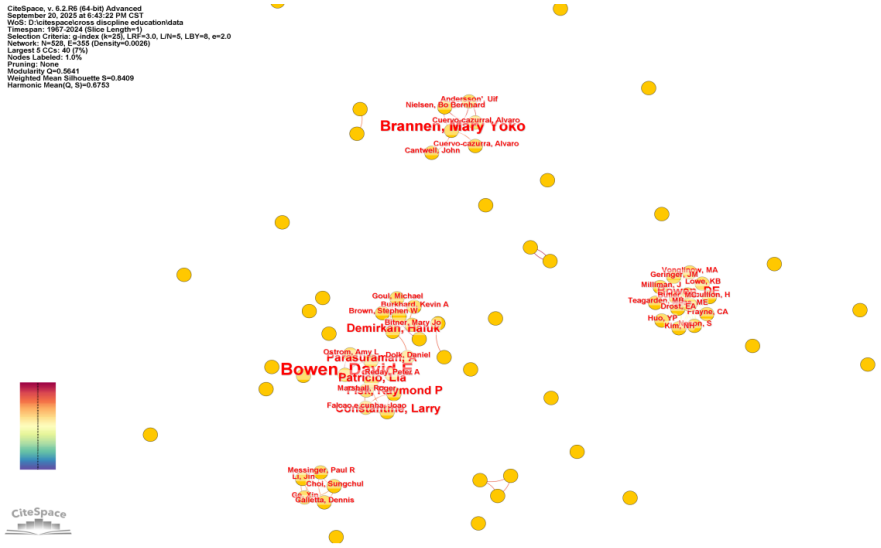


Figure 2 network of scholars collaboration

3.5Keyword Analysis

Analysis of keyword co-occurrence data in interdisciplinary business education research clearly reveals the core themes, knowledge structure, and evolutionary trends of the field. First, high-frequency keywords form the stable foundation of the discipline, with “performance,” “management,” “innovation,” and “impact” appearing most frequently, indicating that the ultimate focus of research lies in understanding and enhancing the efficacy and outcomes of organizational activities. The prominence of “model” and “framework” further underscores the field’s emphasis on developing systematic theories and analytical tools. Second, the keyword network exhibits distinct interdisciplinary knowledge clusters. For instance, “knowledge,” “absorptive capacity,” “dynamic capability,” and “innovation” are closely linked, forming a cluster centered on “strategy and organizational learning.” Meanwhile, “corporate social responsibility,” “sustainable development,” and “sustainable development goals” constitute a significant frontier in “business ethics and sustainability.” Additionally, keywords such as “consumer behavior,” “decision making,” “social media,” and “attitudes” reflect deep integration with psychology, behavioral science, and information technology, forming a research cluster on “consumer insights and marketing.” Notably, emerging keywords such as “artificial intelligence,” “big data,” and “sharing economy” highlight the disruptive impact of digital technologies on business practices and theoretical research. Furthermore, the high frequency of “bibliometric analysis” and “systematic literature review” as keywords indicates the field’s growing maturity, with scholars actively employing methodological innovations to integrate and evaluate an increasingly complex knowledge system. In summary, interdisciplinary business research is a dynamic field centered on performance enhancement, deeply integrating perspectives from strategic management, organizational theory, psychology, sociology,

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environmental science, and information technology. Its knowledge structure encompasses both classic management propositions and rapidly evolving topics driven by global challenges and technological transformations.

The cluster analysis of interdisciplinary business education research vividly delineates a multifaceted landscape composed of interconnected yet distinct knowledge clusters, revealing both the breadth and evolutionary trajectory of the field. The largest clusters form the core of the discipline: Cluster 0 (Innovation, Management, and Knowledge) serves as the cornerstone, focusing on classical management theories, innovation diffusion, and market orientation; Cluster 1 (Networks and Entrepreneurship) and Cluster 2 (Contingency Theory and Customer Relationships) deepen these core themes from the perspectives of inter-organizational relationships and marketing strategies, emphasizing contextual dependency and customer value management. The field's cutting-edge and contemporary nature is evident in newer clusters (with an average publication year post-2010), which reflect current research hotspots. For instance, Cluster 4 (Social Media and Gig Economy) addresses the disruptive impact of digital technologies on business and societal structures, while Cluster 5 (Systematic Literature Reviews and Text Analysis) highlights the evolution of research methodologies toward data-driven and systematic integration. Cluster 7 (Interdisciplinary Research and Collaboration) directly underscores the field's defining characteristic, focusing on university-industry collaboration and innovation ecosystems that facilitate cross-boundary knowledge flows. Further analysis reveals a clear knowledge evolution pathway. Early clusters, such as Cluster 10 (Core Competencies) and Cluster 11 (R&D and Technology-Driven Enterprises), reflect strategic management thinking from the late 1990s to early 2000s, centered on internal capabilities and technological innovation. In contrast, recent clusters demonstrate deeper integration with psychology (e.g., Cluster 8 focusing on trust and commitment), sociology (e.g., Cluster 12 addressing immigrant entrepreneurship), ethics (e.g., Cluster 9 exploring algorithmic ethics), and information systems. This shift from internal capability development to external network embeddedness, and from a focus on economic value to an emphasis on social responsibility and ethics, vividly illustrates the dynamic process by which business research continuously broadens and deepens its interdisciplinary perspective to address complex real-world challenges.

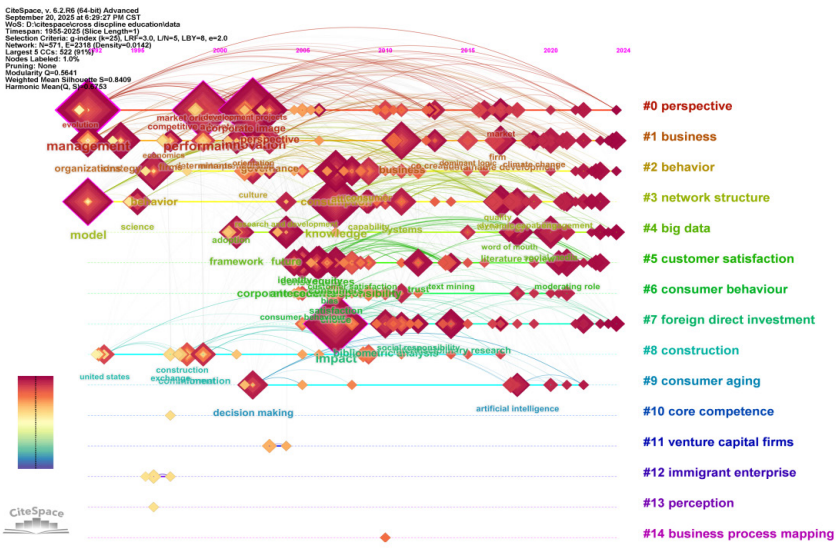


Figure 3 timeline of keywords

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4.Discussion and conclusion

4.1Discussion

This study's bibliometric analysis of nearly six decades of literature reveals the clear trajectory of interdisciplinary business education research, evolving from a marginal field to a mainstream paradigm. Several key findings warrant discussion:

First, the exponential growth in publication volume closely aligns with global higher education policies, economic demands, and technological advancements. The low output in the early period (1967–1999) reflects the marginal status of interdisciplinary approaches within rigid disciplinary silos. The steady growth from 2000 to 2009 corresponds to globalization and the rising demand for innovative talent. The explosive growth over the past fifteen years (2010–2024) underscores how complex global challenges—such as climate change, digital transformation, and the COVID-19 pandemic—have compelled business education to adopt interdisciplinary solutions. This suggests that the field's development is not an isolated academic phenomenon but a direct response to socioeconomic shifts.

Second, the global research landscape exhibits a dynamic "core-periphery" structure. The United States, leveraging its robust academic resources, funding, and early adoption, has long maintained a dominant position, establishing strong academic influence and networks. European countries, particularly the United Kingdom, form a stable second tier, serving as critical academic hubs. A notable trend since 2010 is the rising prominence of the Asia-Pacific region (e.g., China, Australia) and emerging economies (e.g., Brazil, India), signaling a shift from a Euro-American-centric model toward a more multipolar, globalized research landscape. This aligns with global economic power shifts and highlights the growing importance of international collaboration.

Third, the knowledge base of interdisciplinary business research is rooted in established theories from management, sociology, and economics. Highly co-cited journals such as Academy of Management Review, Journal of Marketing, and American Journal of Sociology indicate a theoretical foundation grounded in organizational behavior, marketing, social mechanisms, and economic principles. Meanwhile, burst detection reveals a rapid shift toward technology and sustainability, with journals like Technological Forecasting & Social Change and Sustainability gaining prominence. This reflects the field's dual nature: it builds on a robust theoretical foundation while actively embracing emerging issues.

Finally, keyword clustering analysis vividly illustrates the "umbrella-shaped" knowledge structure of interdisciplinary business research. This structure is anchored by a stable core (e.g., Cluster 0: innovation, management, and knowledge) and extends into vibrant frontier branches. The evolution of research themes shows a clear shift from internal efficiency and competitive strategies (e.g., Cluster 10: core competitiveness) to external networks, ecosystems (e.g., Clusters #1, #7), and societal value (e.g., ethics, sustainability). Notably, recent clusters related to digital technologies (e.g., Cluster 4: social media and gig economy) and behavioral sciences (e.g., Cluster 8: trust and commitment) highlight deeper integration with data science, psychology, and ethics. This structural evolution signals a paradigm shift in business education from "profit creation for firms" to "holistic value creation for society."

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4.2Conclusions

This study, through a comprehensive bibliometric analysis, systematically examines the development, global landscape, knowledge base, and structural evolution of interdisciplinary business education research. The key conclusions are as follows:

1. A Mature and Thriving Field: Interdisciplinary business education research has transitioned from slow early growth to a mature, rapidly expanding domain, becoming a pivotal area in higher education research. Its trajectory mirrors global socioeconomic changes, demonstrating robust vitality.

2. A Multipolar Global Landscape with Critical Networks: The field features a multipolar global structure, with the United States as the core, Europe as a strong supporter, and the Asia-Pacific region as an emerging growth pole. Large public university systems excel in resource integration and academic collaboration, underscoring the importance of cross-regional and cross-institutional partnerships for future innovation.

3.A Robust Knowledge Base with Dynamic Frontiers: The field is grounded in established management, sociology, and economics theories while actively incorporating cutting-edge agendas like digital technologies (e.g., AI, big data) and sustainability (e.g., SDGs), blending tradition with innovation.

4. Evolving Themes and Paradigm Shifts: Research themes have evolved from a focus on internal capabilities and economic performance to emphasizing external networks, social responsibility, and diverse value co-creation. This reflects a broader transformation in business education toward a more open, interconnected, and responsible model.

In summary, interdisciplinary business education research is a dynamic, complex, and increasingly vital academic field. It successfully integrates classical business theories with cutting-edge interdisciplinary perspectives to address contemporary global challenges. The macro-level insights provided here offer valuable guidance for scholars, educators, and policymakers to understand the field's past, navigate its present, and plan its future.

5.Future agenda and limitation

Building on the findings of this study, future research could explore several promising directions to advance the field of interdisciplinary business education. One key area involves deepening the understanding of integration mechanisms by investigating specific pedagogical models, such as the design of effective interdisciplinary curricula, projects, and evaluation systems, to seamlessly blend diverse disciplinary knowledge. Another critical direction is examining the impact of emerging technologies, such as artificial intelligence and the metaverse, on reshaping the content, delivery methods, and ethical boundaries of interdisciplinary business education. Additionally, fostering localized research from regions like the Asia-Pacific, Latin America, and Africa could enrich the global knowledge system and challenge Western-centric paradigms, promoting a more inclusive academic discourse. Furthermore, conducting longitudinal studies to assess the long-term effects of interdisciplinary business education on graduates' career trajectories, innovation capabilities, and social responsibility could provide valuable insights into its sustained impact. However, this study has certain limitations that should be acknowledged. Its reliance on the Web of Science

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database as a single data source may exclude significant literature published on other platforms or in non-English journals, potentially limiting the scope of the analysis. Additionally, while bibliometric methods excel at mapping macro-level trends, they offer limited insights into deeper theoretical contributions or qualitative aspects, such as teaching quality. Lastly, the search strategy employed may not fully capture all synonyms or peripheral studies related to interdisciplinary business education, introducing potential terminology coverage bias.

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