MSW MANAGEMENT -Multidisciplinary, Scientific Work and Management Journal
ISSN: 1053-7899
Vol. 36 Issue 1, 2026, Pages: 3493-3499

Trends and Determinants of Youth-Led Digital Entrepreneurship: A Systematic Review

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Abstract

Digital entrepreneurship is a novel concept that adds insights to the traditional view of entrepreneurship. It changes entrepreneurial practices as businesses and people adopt digital technology daily. An attempt is made to explore the trend in literature in terms of digital entrepreneurship. This research aims to evaluate which authors, citations, and themes are most influential in the field of digital entrepreneurship research. It provides a comprehensive overview of the current trends and key contributions to the current research. It consolidates the literature at the intersection of the pivotal role of individual and institutional factors in shaping digital entrepreneurial intentions. The Scopus database was considered for bibliometric analysis to present a systematic literature review, using the keywords “digital entrepreneurs” and “entrepreneurs " as input. The VOSviewer software was adopted as a bibliometric analysis tool to visualize the networks of authors, countries, journals, and keywords. The analysis carried out on 9 July 2024 retrieved a total of 2,816 documents from 1999 to 2025. The results show that the number of publications about digital entrepreneurship has grown significantly over the past eleven years. The keyword analysis showed that the studies on digital entrepreneurship in the last two decades have focused on themes related to entrepreneurship, digital entrepreneurship, digital marketing, digital economy, e-commerce, and digital transformation issues. The bibliometric analysis presented provides relevant information on the main themes studied about digital entrepreneurship that play an important role in the digital entrepreneurship perspective. The theoretical contribution of the research is to enhance the understanding of how digital technology changes the broad assumptions on the sources, processes, and outcomes of entrepreneurial activities, while the practical contribution provides various contexts of technological impact.

1. Introduction

Digital entrepreneurship indeed signifies a transformative shift from traditional entrepreneurial practices, primarily driven by the widespread adoption of digital technologies. This shift is characterized by integrating digital tools and technologies in creating and discovering entrepreneurial opportunities, which fundamentally alters the processes and outcomes of entrepreneurship (Jovanović, Marković, and Berezljev, 2024). The rapid development of digital technologies such as mobile services, cloud computing, artificial intelligence, and the Internet of Things has revolutionized business operations, enabling enterprises to create value and meet modern consumer needs more effectively (Kumar, 2024). The educational aspect of digital entrepreneurship is also crucial, as it equips students with the necessary knowledge and skills to navigate and leverage emerging digital technologies, fostering an entrepreneurial spirit that is essential for thriving in the contemporary business environment (Sofian et al., 2023; Utomo & Cham, 2023). Furthermore, the creation of digital platforms for commercializing businesses and the transformative redefinition of business processes highlight the ongoing evolution and future trajectory of digital entrepreneurship, presenting new opportunities in the era of digitization (Cucerzan (Matieș), 2023). This transformation is driven by the adaptability of digital artifacts, which open up new horizons for entrepreneurial endeavors, making the entrepreneurial landscape less restrictive and more dynamic (Lukita et al., 2023). As digital transformation continues to permeate every aspect of life, the transition from traditional employment to entrepreneurship becomes more accessible, driven by innovative advertising, social media, and new business models (Dabbous et al., 2023). Thus, digital entrepreneurship represents a significant departure from traditional practices, driven by digital technologies' pervasive and transformative impact across various business domains.Despite its growing significance, there is still a limited understanding of how digital technologies reshape entrepreneurship, presenting a need for further exploration into the mechanisms and implications of this digital transformation in entrepreneurship. This gap in knowledge stems from several factors. First, the rapid pace of technological advancements continuously alters the entrepreneurial landscape, making it challenging to capture and analyze these changes comprehensively. Digital tools such as artificial intelligence, blockchain, and the Internet of Things are constantly evolving, introducing new dynamics and opportunities that require ongoing study (Kumar, 2024; Nambisan, 2017). Moreover, traditional research methods may not be fully equipped to address digital entrepreneurship's complexities and unique virtual environment. In contrast to traditional entrepreneurship, digital entrepreneurship navigates a virtual landscape with distinct business models, customer interactions, and value-creation processes that differ significantly (Sulistianingsih, 2023). This requires the development of new theoretical frameworks and analytical tools to understand the unique characteristics and impacts of digital entrepreneurship. Additionally, the implications of digital transformation in entrepreneurship extend beyond business operations. They encompass broader societal and economic changes, such as shifts in labor markets, the rise of the gig economy, and the increasing importance of digital skills (Brynjolfsson & McAfee, 2014). Understanding these wider implications is crucial for developing policies and educational programs supporting entrepreneurs navigating the digital age. Furthermore, there is a need to explore how digital technologies influence entrepreneurial mindset and behavior. Digital entrepreneurs often exhibit different traits and approaches than their traditional counterparts, such as greater reliance on data-driven decision-making and a higher degree of flexibility and adaptability (Yoo, Boland, Lyytinen, & Majchrzak, 2012). Investigating these behavioral aspects can provide deeper insights into the nature of digital entrepreneurship. The digital transformation has also highlighted the importance of co-creating value within online business communities, where diverse entrepreneurial behavior patterns can leverage business value and are influenced by the dynamic determinants of these communities (Xin & Ma, 2023). Despite the growing interest in digital entrepreneurship, there remains a lack of comprehensive understanding of its conceptual structure, with various terms used synonymously over time. Additionally, the concepts of flexibility and agility are critical in digital entrepreneurship, helping organizations gain a competitive edge and meet market demands. However, there is still ambiguity in distinguishing these traits, necessitating further exploration of their definitions and applications in digital contexts (Shalihah et al., 2024). The digital economy has significantly altered the entrepreneurial ecosystem, with a notable shift in research focus from innovation and ICT to digital entrepreneurship and new business models like the sharing and gig economies. This trend is evident from a bibliometric analysis of global research, which shows a significant increase in literature since 2018, particularly in the USA, and highlights the evolving focal points in entrepreneurship research (Samudra, 2023). Collectively, these insights underscore the importance of understanding behavioral aspects in digital entrepreneurship to navigate the complexities of the digital economy and foster organizational growth and innovation.

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Understanding the behavioral aspects of digital entrepreneurship is crucial for navigating the complexities of the digital economy and fostering organizational growth and innovation. The role of entrepreneurship education is particularly significant in this context, as it equips individuals with the necessary skills and knowledge to thrive in a rapidly evolving digital landscape. Research indicates that entrepreneurship education when combined with the development of artificial intelligence solutions, can significantly enhance entrepreneurial intentions mediated by perceived behavioral control (Dabbous et al., 2023). This highlights the need for educational programs integrating traditional entrepreneurial skills and modern technological competencies. Furthermore, the importance of entrepreneurial self-efficacy and expectancy-value belief in achieving entrepreneurial success and contributing to the digital economy underscores the need for educational institutions to focus on these psychological constructs within their curricula (Wang et al., 2022).Moreover, digital technologies play a crucial role in shaping the educational needs for digital entrepreneurship, revolutionizing the process of cultivating and providing entrepreneurial skills and competencies. Incorporating digital tools into entrepreneurship education has significantly altered teaching approaches, facilitating seamless information access, virtual business scenarios, and worldwide cooperation, all vital in readying students for prosperous entrepreneurship in the digital era (Sulistianingsih, 2023). Consequently, the impact of digital technologies on the educational prerequisites for digital entrepreneurship is profound, calling for a holistic approach encompassing updated curricula, skilled educators, and innovative instructional models to empower students with the requisite skills for the digital economy. Digital entrepreneurship has experienced a notable increase in research focus in recent years. Nevertheless, there needs to be more meeting the educational needs essential for nurturing this evolving landscape. The accumulation of knowledge has progressed in a disorganized and disjointed manner without a structured exploration from an educational standpoint. This gap emphasizes the necessity for a more thorough comprehension of digital entrepreneurial perspectives, especially emphasizing the critical influence of individual and institutional elements on shaping digital entrepreneurial intentions.In order to investigate the current state of entrepreneurial activities with digital technology and to provide guidance on emerging trends in studies related to digital entrepreneurship, a search was carried out in the Scopus database, which is presented in this work. The goal is to assess sources of publications, articles, journals, authors, countries and institutions, research areas, and the most cited themes about digital entrepreneurship. This study provides essential information on emerging trends in research involving digital entrepreneurship. It also identifies hotspots that might be interesting as research areas. The rest of the paper is organized as follows: Section 2 presents the methodology applied to retrieve documents in the Scopus database and generate bibliometric networks. Section 3 presents the bibliometric analysis and results of the data retrieved in Scopus. Additionally, section 4 provides this study's implications and underscores specific features for future research. Section 5 provides the conclusions to help researchers understand the study in generic terms.

2. Literature review

2.1 Conceptual foundations of digital entrepreneurship:

Digital entrepreneurship represents a fundamental shift from traditional entrepreneurial practices through the pervasive integration of digital technologies into opportunity recognition, venture creation, and value capture. Unlike conventional entrepreneurship, which is often constrained by physical resources and geographic boundaries, digital entrepreneurship operates within a highly flexible and scalable digital environment enabled by digital artifacts and infrastructures (Nambisan, 2017; Lukita et al., 2023). Recent studies emphasize that digital technologies do not merely support entrepreneurial activities but actively reshape entrepreneurial processes, outcomes, and ecosystems (Jovanović, Marković, & Berezljev, 2024).

Technological advancements such as artificial intelligence (AI), cloud computing, mobile applications, blockchain, and the Internet of Things (IoT) have accelerated this transformation by lowering entry barriers, enhancing operational efficiency, and enabling data-driven decision-making (Kumar, 2024). These technologies facilitate rapid experimentation, personalization, and platform-based business models, which are now central to digital entrepreneurial success (Cucerzan, 2023). Consequently, digital entrepreneurship is increasingly viewed as a distinct domain requiring dedicated theoretical frameworks and methodological approaches.

2.2 Digital transformation and entrepreneurial behavior

A growing body of literature highlights that digital transformation fundamentally alters entrepreneurial behavior and mindset. Digital entrepreneurs tend to exhibit higher levels of adaptability, agility, and reliance on real-time data compared to traditional entrepreneurs (Yoo et al., 2012). The virtual nature of digital ventures introduces new patterns of opportunity discovery, customer engagement, and value co-creation, particularly within online platforms and communities (Xin & Ma, 2023).

However, despite increasing scholarly attention, the conceptual structure of digital entrepreneurship remains fragmented. Terms such as e-entrepreneurship, digital business, and platform entrepreneurship are often used interchangeably, leading to theoretical ambiguity (Sulistianingsih, 2023). Additionally, critical constructs such as flexibility and agility, frequently cited as key competitive advantages, lack clear differentiation and operationalization in digital contexts (Shalihah et al., 2024). These gaps underscore the need for more integrative and behavior-oriented research models.

2.3 Young entrepreneurs in the digital economy

The digital economy has significantly lowered the threshold for entrepreneurial entry, making entrepreneurship more accessible to young individuals. Digital natives, in particular, possess inherent familiarity with digital tools, social media platforms, and online communities, positioning them advantageously within digital entrepreneurial ecosystems (Dabbous et al., 2023). This accessibility has contributed to a shift from traditional employment pathways toward self-employment, freelancing, and gig-based entrepreneurship.

Nevertheless, participation in digital entrepreneurship requires more than technological fluency. Studies emphasize the importance of entrepreneurial self-efficacy, perceived behavioral control, and expectancy-value beliefs in shaping digital entrepreneurial intentions among young people (Wang et al., 2022). These psychological and behavioral factors interact with institutional support systems, educational environments, and digital infrastructure, highlighting the multi-level nature of digital entrepreneurship development.

2.4 Role of social media marketing in digital entrepreneurship

Social media marketing has emerged as a core strategic mechanism within digital entrepreneurship, particularly for young entrepreneurs with limited financial resources. Social media platforms enable cost-effective branding, direct customer interaction, market testing, and community building, which are critical for early-stage digital ventures (Dabbous et al., 2023). Innovative advertising strategies, influencer collaborations, and user-generated content further enhance visibility and legitimacy in competitive digital markets.

Importantly, social media also facilitates value co-creation within online business communities, where entrepreneurial behavior is shaped by dynamic social interactions, feedback loops, and collective learning (Xin & Ma, 2023). These environments amplify the role of digital competencies and reinforce the need for entrepreneurs to balance creativity with analytical and data-driven marketing approaches.

2.5 Entrepreneurship education and digital competencies

Entrepreneurship education plays a pivotal role in equipping individuals with the skills and mindset required for digital entrepreneurship. Recent research demonstrates that integrating AI applications and digital tools into entrepreneurship education significantly strengthens entrepreneurial intentions, particularly when mediated by perceived behavioral control (Dabbous et al., 2023). This finding reinforces calls for curricula that combine traditional entrepreneurial competencies with advanced digital and technological skills.

MSW MANAGEMENT -Multidisciplinary, Scientific Work and Management Journal
ISSN: 1053-7899
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Moreover, digital technologies have transformed pedagogical approaches by enabling virtual simulations, global collaboration, and experiential learning opportunities that mirror real-world digital business environments (Sulistianingsih, 2023). Despite this progress, the literature indicates that knowledge development in digital entrepreneurship education remains fragmented and insufficiently theorized, particularly regarding the interaction between individual traits and institutional factors (Utomo & Cham, 2023; Hussin et al., 2019).

2.6 Research trends and gaps in digital entrepreneurship

Bibliometric analyses reveal a sharp increase in digital entrepreneurship research since 2018, with a strong concentration in developed economies, particularly the United States (Samudra, 2023). Research focus has gradually shifted from innovation and ICT toward digital entrepreneurship, platform-based models, and the sharing and gig economies. Despite this growth, significant gaps remain in understanding the behavioral mechanisms, educational pathways, and long-term societal implications of digital entrepreneurship.

The broader impacts of digital transformation, including labor market shifts, the rise of non-standard employment, and increasing demand for digital skills, further emphasize the need for interdisciplinary and policy-relevant research (Brynjolfsson & McAfee, 2014). Addressing these gaps requires longitudinal studies, novel theoretical frameworks, and methodological approaches capable of capturing the dynamic and evolving nature of digital entrepreneurial ecosystems.

3 Materials and methods

The data sources are from the Scopus database (https://www.scopus.com/sources), accessed on 2 February 2026. This database was selected because of its importance as an essential information resource for the global scholarly community. Furthermore, the Scopus database provides more comprehensive data and spans a longer timeframe, rendering it ideal for scientific research. Moreover, Scopus covers over 40,000 leading academic journals in all subject areas. It contains high-quality articles recognized by peers (Smith & Lee, 2023), ensuring high-quality literature and making the results more convincing.Unlike a full-length piece, the current paper delves into an extensive bibliometric examination that aligns with the pragmatism paradigm (Creswell, 2007). It aims to address a practical issue as outlined in the objectives. Omitting a dedicated ‘literature review’ section, this paper prioritizes practical problem-solving over theory. Embracing the pragmatic worldview empowers researchers to select research methods that best suit their needs. The primary goal is to resolve a practical problem following the pragmatism paradigm (De Sordi, 2024). Adhering strictly to the pragmatic paradigm (Kaushik & Walsh, 2019), an in-depth bibliometric analysis is conducted, and the findings are presented. Practical implications are provided for each aspect of the analysis, aligning with the core objective of the paper. Bibliometric analysis is a powerful method used in systematic literature reviews to map out and synthesize existing research across various domains. This method involves the quantitative analysis of scientific publications to identify patterns, trends, and relationships within a specific field (Bejjani et al., 2023; Sari et al., 2024). For bibliometric exploration, this paper opted for the renowned Scopus repository, recognized as the preeminent database worldwide for scrutinizing peer-reviewed publications (Maral, 2024). While collecting the literature, this paper excluded irrelevant studies and set specific criteria to filter out less relevant ones. The most used search scope uses a topic search formula to search titles, abstracts, and keywords (42). The Scopus database was considered for bibliometric analysis using the search terms “digital entrepreneurs” and “entrepreneurs " as input. The search period was from 1998 to 2025 for several compelling reasons related to digital entrepreneurs' emergence, growth, and maturation as a field of study. Overall, we obtained 2,816 documents. Initially, the term "digital entrepreneurship" might seem like a recent phenomenon. However, its roots trace back to earlier concepts of electronic entrepreneurship, indicating that the fundamentals have remained consistent over time. The digitization and digitalization of economies, particularly in developed nations, have created digital economies where entrepreneurs leverage digital platforms to produce and trade digital artifacts, significantly reducing economic costs and fostering network effects (Naudé & Liebregts, 2023). By analyzing this period, we can understand how early concepts have evolved and adapted to market needs and technological advances

For search accuracy and precise analysis results, this study excluded abstract papers, editorial materials, early access papers, and letters, only retaining articles, review articles, and conference proceedings as they typically undergo rigorous peer review, which ensures their quality and credibility. Additionally, this study chose English as the language of publication as it is widely used in academia. If the documents are in the same language, it is easier to analyze and highlight a large amount of key information. Then, the documents screening the titles, this study excluded papers not related to the subject’s disciplines, such as medicine and chemistry. This study selected 2,731 articles for the deduplication analysis, subsequent bibliometric review, and in-depth analysis.Many bibliometric visualization software tools exist, such as VOSviewer, CiteSpace, Histcite, and BioBERT. VOSviewer is indeed a highly regarded bibliometric visualization tool known for its user-friendly interface and robust capabilities in creating knowledge graphs across various research fields. It excels in multivariate, temporal, and dynamic literature visualization and analysis, making it suitable for various applications (Nurlaila et al., 2023). Similarly, in the field of edible insects, VOSviewer facilitated a comprehensive bibliometric and graphical analysis, revealing significant patterns and clusters related (Padwiansyah et al., 2023).

4 Results

The bibliometric analysis of the Scopus database provides a comprehensive overview of the research landscape in digital entrepreneurship, highlighting trends, influential publications, and emerging thematic areas. By examining publication outputs, authorship patterns, research domains, and keyword co-occurrences, this study identifies the key drivers, focal points, and gaps within the field. The analysis also sheds light on the evolving nature of digital entrepreneurship, particularly regarding the integration of digital technologies, social media marketing, and the role of young entrepreneurs. The following sections present detailed insights derived from this bibliometric exploration.

4.1 Publication by year

The analysis of publications over time provides a clear view of the development and evolving focus of digital entrepreneurship research. A total of 2,731 studies published between 1998 and 2025 were examined, showing fluctuating trends across the years. As illustrated in Figure 1, research activity remained minimal during the early period (1998–2011), with some years recording only 0–2 publications, reflecting the nascent stage of the field.

From 2012 onwards, the number of publications began to grow steadily, accelerating significantly after 2015. This upward trend indicates increased academic attention, likely driven by advances in digital technologies, social media marketing, and the emergence of new business models. The period between 2019 and 2023 shows a particularly sharp increase, peaking in 2023 with 254 publications, highlighting intensified research activity and interest in contemporary digital entrepreneurship topics. In 2024, publications slightly declined to 150, followed by a projected increase to 170 in 2025, suggesting continued scholarly engagement and the establishment of digital entrepreneurship as a mature research domain.

The early gaps in research, particularly between 1999 and 2011, suggest limited academic emphasis on the subject during its formative years. However, the dramatic growth in recent years demonstrates the field’s dynamism and responsiveness to technological innovations, digital business practices, and evolving entrepreneurial behaviors. Observing this publication trajectory provides valuable insights for researchers and policymakers, indicating emerging trends, potential gaps, and the future directions of digital entrepreneurship scholarship.

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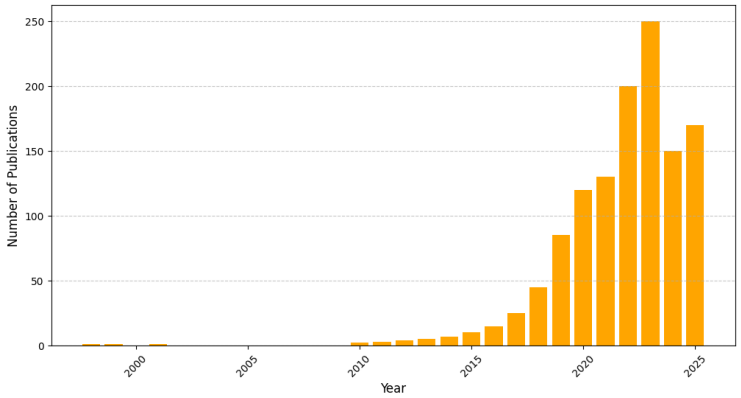

Figure 1: Annual Publications in Digital Entrepreneurship (1998–2025)

4.2 Document per year by source

Figure 2 shows that examining the leading journals and conferences showcases the main platforms for essential research contributions. Sustainability (Switzerland), containing 42 publications, concentrates on sustainability, environmental science, and interdisciplinary research, establishing itself as a high-impact journal that promotes extensive coverage of sustainability issues. With 34 publications, Technological Forecasting and Social Change focuses on technology forecasting, social change, and innovation, significantly shaping future-oriented studies. International Journal of Entrepreneurial Behavior & Research (26 publications) focuses on entrepreneurship and small business management. The Proceedings of the European Conference on Innovation and Entrepreneurship (21 publications) stand out as a crucial platform for research in innovation and entrepreneurship, encouraging collaboration between academia and industry. Releasing top-notch papers on network and system innovations, Lecture Notes in Networks and Systems (21 publications) attract attention. Recognized in business research, the Journal of Business Research (15 publications) is esteemed for its comprehensive coverage and rigorous articles. Renowned for its open-access approach and interdisciplinary research in psychology, Frontiers in Psychology (12 publications) garners popularity. Small Business Economics (12 publications) offers valuable insights into small business management and its economic effects. Bridging the gap between technology management and commercialization, Technovation (11 publications) makes its mark, while Technology in Society (11 publications) delves into the broader societal impacts of technological advancements. These journals and conferences hold sway in their respective fields, making substantial contributions to the progress of knowledge and interdisciplinary discussions.

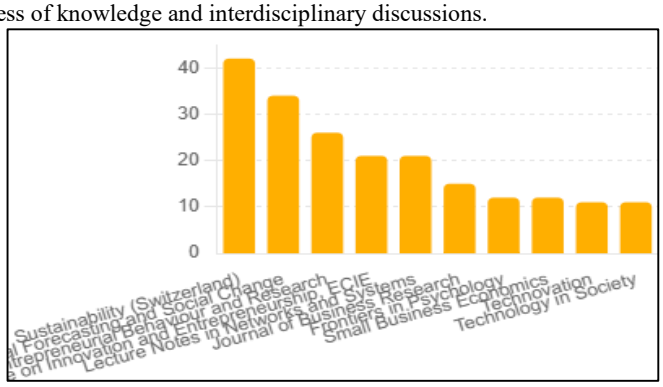

Figure 2: Top 10 publications based on the most sources related to the topic.

4.3 Document by author and country

Figure 3 shows the top 10 authors who wrote on the topic of digital entrepreneurship. Analyzing the most prolific authors reveals critical insights into their countries of affiliation, fields of study, and primary research interests. Notably, China is a leading contributor with the most prolific authors, underscoring its strong research focus on entrepreneurship and innovation. Other significant contributors include Germany, Italy, Australia, and Brazil, reflecting a global interest in these areas. These authors' primary fields of study are entrepreneurship, innovation, and digital transformation, highlighting the growing importance of these topics in academia and business. The most frequently published journals are the Journal of Business Research, Technological Forecasting and Social Change, and Sustainability (Switzerland), which serves as a key platform for disseminating research in business, innovation, and sustainability. Many authors concentrate on the impact of digital transformation and innovation on entrepreneurship and business management, indicating a contemporary trend toward understanding how digital technologies reshaping business landscapes are.

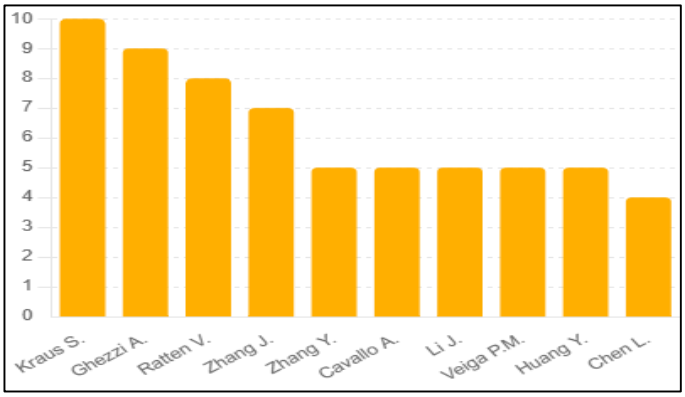

Figure 3: Top 10 authors with the most publications related to the topic.

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ISSN: 1053-7899
Vol. 36 Issue 1, 2026, Pages: 3493-3499

4.4 Citation trends by year

Based on Table 1, it can be seen that the trends in citations offer valuable insights into how research has been acknowledged and valued over time, reflecting the development and influence of the field. Starting from the early years (1998-2005), there was a relatively low number of citations. However, a significant peak was observed in 2005, likely due to the publication of a few highly impactful papers. This period signifies the foundational phase of the research field, characterized by fewer publications and initial recognition. Between 2008 and 2014, there was a noticeable rise in citations, indicating an increasing recognition and broader dissemination of research findings. The period spanning from 2015 to 2019 represented the pinnacle of research impact, with a substantial surge in citations, reaching its peak in 2019. This surge can be attributed to the accumulation of influential publications and groundbreaking studies that attracted widespread attention. Despite a slight decrease in citations from 2020 onwards, the numbers remained relatively high compared to earlier periods, illustrating recent research's ongoing relevance and impact despite the lag effect, where newer publications require time to accumulate citations.

These patterns demonstrate the maturity of the research field, with the growing number of citations signaling broader recognition and an expanding knowledge base. The peak phase aligns with the increasing interest in digital transformation and entrepreneurship, two critical themes significantly contribute to the field. The impact of crucial publications is evident during peak periods, as seminal studies often pave the way for further research and become pivotal references. The recent drop in citation counts emphasizes the lag effect in academic research, where newly published papers need time to gain recognition and citations. The citation trends generally accentuate the dynamic nature of research impact and the evolving appreciation of scholarly contributions.

Table 1: Trend of data of publications by year

Year	Cited by	Year	Cited by	Year	Cited by
2024	187	2017	1131	2010	181
2023	1450	2016	982	2009	41
2022	1932	2015	783	2008	6
2021	2336	2014	142	2005	254
2020	2903	2013	169	2003	2
2019	3181	2012	175	1999	0
2018	1796	2011	94	1998	2

4.5 Co-occurrence of keywords

Based on the results of the analysis using the VOSviewer software, the results of the network visualization of co- occurrence based on keywords in Figure 4, 37 items are divided into 6 clusters marked with different colors. Cluster 1, which covers themes like digital technology, education, and entrepreneurship, illuminates the convergence of challenges induced by the pandemic and the increasing trend toward digital solutions in education and entrepreneurial endeavors. This cluster accentuates the necessity for adaptive approaches in higher education and entrepreneurial creativity to uphold growth and significance in a post-pandemic era. Cluster 2, focusing on artificial intelligence, crowdfunding, digital entrepreneurship, and digital literacy, indicates the rising significance of technological progressions and their influence on encouraging entrepreneurial aspirations and educational processes. This indicates that integrating AI and digital platforms in entrepreneurial education could enrich digital literacy and capabilities for innovation.Cluster 3, concentrating on business models, digital marketing, digitalization, and small and medium-sized enterprises (SMEs), reveals a solid correlation between digital strategies and the triumph of SMEs in the market. This cluster proposes that SMEs adopt digital marketing and innovate their business models to sustain competitiveness in a swiftly digitalizing market. Cluster 4, which shines a light on the digital economy, digital skills, and digitization, accentuates the extensive economic repercussions of digital transformation and the imperative for entrepreneurs to cultivate resilient digital skills to prosper in a digital economy. Cluster 5, which showcases case studies, China, e-commerce, and entrepreneurial ecosystems, grants insight into digital entrepreneurship's regional and sector-specific dynamics. The spotlight on China implies curiosity about how digital entrepreneurship materializes in a swiftly expanding and technologically sophisticated market. Lastly, Cluster 6, encompassing digital technology, digital transformation, and sustainable development, mirrors the fusion of digital progressions with sustainable methodologies. This cluster emphasizes the potential for digital transformation to propel sustainable development within entrepreneurial ecosystems.

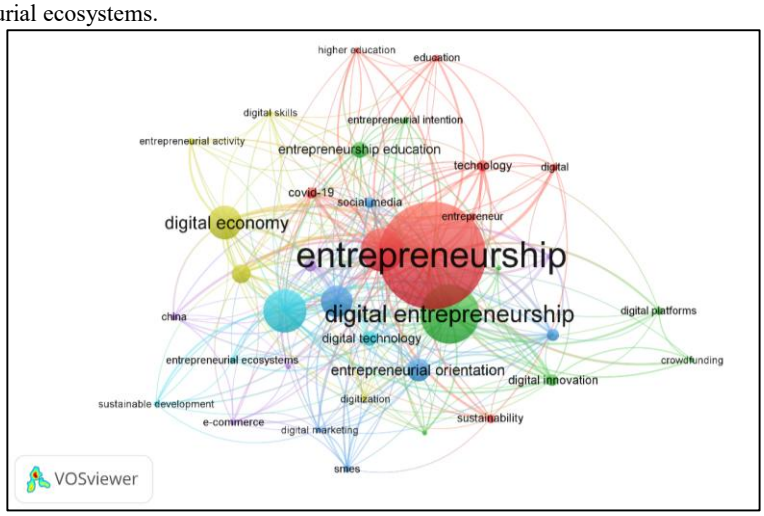

Figure 4: Network visualization of co-occurrence based on keywords

The comprehensive literature analysis from these clusters underscores the multifaceted essence of digital entrepreneurship, where technological advancements, education, and regional contexts assume pivotal roles. The suggestion stemming from this analysis is to embrace a comprehensive approach that merges digital skills training, technological innovation, and sustainable methodologies within entrepreneurial education and policy frameworks. Entrepreneurs can adeptly navigate the challenges and prospects in the evolving digital terrain by cultivating an atmosphere that advocates for digital literacy and technology adoption. Moreover, as demonstrated by the concentration on China, region-specific examinations and strategies should be encouraged to tailor approaches that account for local dynamics and market conditions.

Item density visualization depicting the emphasis and distribution of research within clusters can be observed in Figure 5. The item density visualization of digital entrepreneurship generated by VOSviewer highlights several key themes and concepts associated with the field. Central to the visualization is "digital entrepreneurship," which appears prominently and is closely linked to related concepts such as "innovation,"

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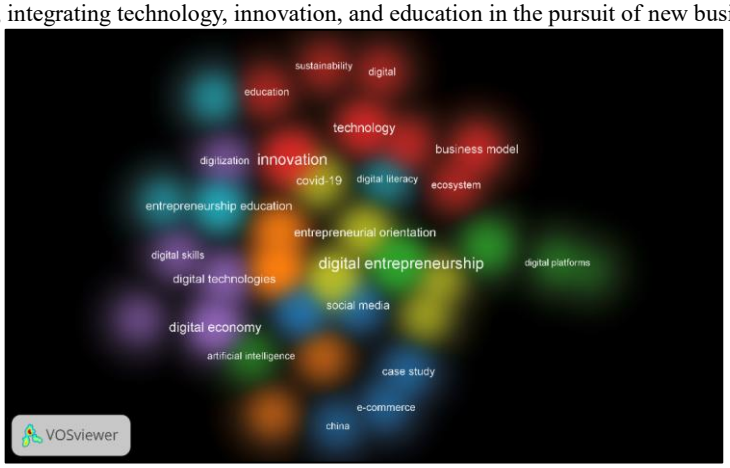
"entrepreneurial orientation," and "digital economy." Surrounding these core themes, we observe clusters of terms like "technology," "business model," and "ecosystem," indicating the integral role of these elements in digital entrepreneurship. The visualization also emphasizes the impact of "COVID-19," "digital literacy," and "digitization," reflecting the recent shifts and adaptations in the digital landscape. Other notable terms include "social media," "e-commerce," "digital platforms," and "artificial intelligence," suggesting their significance in driving digital entrepreneurial activities. Additionally, the presence of "education," "entrepreneurship education," and "digital skills" highlights the importance of developing competencies and knowledge to succeed in this evolving field. The interconnectedness of these terms underscores the multifaceted nature of digital entrepreneurship, integrating technology, innovation, and education in the pursuit of new business opportunities and models.



4.6 Item density visualization of digital entrepreneurship

5. Discussion

Digital entrepreneurial activities are significantly driven by integrating technology, innovation, and education, which collectively foster the development of competencies and knowledge essential for success in this evolving field. Academics can significantly advance entrepreneurship, innovation, and digital transformation by utilizing knowledge from the provided research. The influence of emerging technologies is altering entrepreneurial initiatives by stimulating motivations such as economic rewards, societal effects, and environmental sustainability alongside presenting obstacles like uncertain regulations and limited resources. Integrating digital solutions is essential for newly established businesses to uphold competitiveness and stimulate innovation despite financial limitations and technical knowledge challenges (Kassim et al., 2024).

The emergence of e-commerce as a transformative power emphasizes the significance of technology, innovation, education, information, and investment in navigating the digital revolution, shedding light on areas such as digital trade and blockchain as promising avenues for research. Digital transformation encompasses the profound effects of novel technologies on business frameworks, products, services, and customer focus, prompting established enterprises to undergo substantial changes to prosper in the digital age. Additionally, digital entrepreneurship introduces fresh aspects of vulnerability and unpredictability, influenced by advancements in mobile technology, cloud computing, social networking, and 3D printing. It necessitates a nuanced comprehension of digital advancements and their distinct attributes to oversee business operations effectively. By amalgamating these observations, scholars can comprehensively comprehend the intricate dynamics at play, cultivating an atmosphere that fosters innovation and entrepreneurship, ultimately contributing to economic advancement and societal development. This comprehensive methodology will empower stakeholders to adeptly navigate the digital landscape, minimize risks, and capitalize on the transformative possibilities presented by emerging technologies.Key findings from the analysis of top journals and conferences highlight the significance of interdisciplinary research, innovation, technology, entrepreneurship, business management, and sustainability. Numerous reputable journals stress the importance of interdisciplinary methods, showcasing the interconnectedness of modern scientific investigations. Publications like Technological Forecasting and Social Change, Technovation, and Technology in Society underscore the crucial role of innovation and technology in present-day research. Journals such as the International Journal of Entrepreneurial Behavior & Research and Business Research concentrate on entrepreneurship and business management, which are vital for crafting effective business strategies and comprehending market dynamics. Furthermore, journals like Sustainability (Switzerland) and Technology in Society emphasize a significant research interest in sustainability and the societal impacts of technology, which is fundamental for developing sustainable solutions and grasping the broader implications of technological progress. Examining the most commonly used keywords reveals notable patterns in current research themes. Entrepreneurship is the most frequently cited keyword, indicating its central position within the research community. This covers studies on entrepreneurial behavior, economic influence, and entrepreneurs' obstacles. Digital entrepreneurship emerges as a nascent field that mirrors the fusion of digital technologies into entrepreneurial endeavors, exploring how digital tools elevate business ventures and shape new market dynamics. Innovation emerges as another pivotal theme, closely intertwined with entrepreneurship and economic advancement, with research delving into various forms of innovation, catalysts, management approaches, and the effects on competitiveness. Digital transformation epitomizes a significant shift in business operations powered by big data, AI, IoT, and blockchain technologies, necessitating organizational adjustments and showcasing exemplary practices.These patterns indicate a sturdy and burgeoning realm of study, steered by the transformative capacity of digital technologies and the escalating significance of entrepreneurship and innovation in the global economic landscape. The emphasis on digital technologies and transformation mirrors their critical role in contemporary business methodologies, with scholars eager to grasp their influence on generating opportunities, propelling innovation, and enhancing competitiveness. The convergence of these themes proposes a multidisciplinary stance, amalgamating insights from business administration, technology, economics, and social sciences, imperative for tackling intricate challenges and harnessing the complete potential of digital and entrepreneurial pursuits.

6. Conclusion, implications, and future research

Analyzing primary research themes based on keyword trends provides a clear view of the current research landscape. It highlights the growing interest in digital transformation and entrepreneurship, underscoring their significance in driving innovation and economic growth. This expanding field offers numerous opportunities for future research, contributing to a deeper understanding of how digital technologies and entrepreneurial activities can shape the future of businesses and societies. The analysis of top journals and conferences reveals the critical role of interdisciplinary research in advancing fields such as technology, entrepreneurship, and sustainability. Leading publications emphasize the interconnected nature of contemporary scientific inquiries, highlighting how innovation and technology are central to modern research. Journals focus on sustainability and societal impacts, which are crucial for creating sustainable solutions and understanding the broader implications of technological advancements. A review of prevalent keywords also shows that entrepreneurship, digital entrepreneurship, innovation, and digital transformation are key themes in current research. These trends indicate a rapidly expanding field driven by the transformative power of digital technologies and the growing importance of entrepreneurship and innovation in the global economy. This underscores the necessity for a multidisciplinary approach to effectively address complex challenges and leverage the full potential of these advancements.

To promote research in entrepreneurship, innovation, and digital transformation, it is crucial to prioritize several vital areas. Initially, there is a requirement to intensify the focus on emerging technologies by examining their implications and potential through specialized platforms for technological forecasting and innovation. Encouraging interdisciplinary cooperation is crucial to fostering holistic and influential research results

MSW MANAGEMENT -Multidisciplinary, Scientific Work and Management Journal
ISSN: 1053-7899
Vol. 36 Issue 1, 2026, Pages: 3493-3499

by incorporating insights from diverse fields. Additionally, research should strive to offer practical insights and policy suggestions, especially in publications that tackle the economic and societal effects of technology and entrepreneurship.Moreover, broadening research to encompass global and regional studies can aid in comprehending the distinct challenges and opportunities in various contexts, contributing to a thorough global outlook on innovation and sustainability. Rectifying deficiencies from previous periods through interdisciplinary research can yield a more comprehensive understanding of the evolution of research while enhancing collaboration and networking among prominent authors, which can stimulate innovation and in-depth studies. Revisiting neglected subjects from the early 2000s presents an opportunity to rejuvenate and acquire fresh perspectives in these domains.Conducting longitudinal studies is imperative for monitoring changes over prolonged periods, offering valuable insights into research subjects' lasting impact and development. Researchers should also concentrate on impactful studies that address crucial challenges, encouraging collaboration and utilizing emerging technologies to steer future research impact. Effectively disseminating research findings through various mediums, such as open-access journals, conferences, and social media, can boost visibility and citations. Furthermore, comprehending novel and emerging digital business models, investigating the role of policy and regulation in bolstering digital entrepreneurship and innovation, nurturing international partnerships, and performing longitudinal studies on the enduring effects of digital transformation on businesses and economies are vital for upcoming research. By concentrating on these areas and capitalizing on the strengths of reputable journals and conferences, researchers can significantly contribute to advancing knowledge and tackling the urgent challenges of today's swiftly evolving world.

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