DIGITAL ENTREPRENEURSHIP ECOSYSTEMS, INFORMATION SYSTEM SUCCESS, AND SUSTAINABLE COMPETITIVE ADVANTAGE IN SMES: A BIBLIOMETRIC AND SYSTEMATIC LITERATURE REVIEW

Tri Indra Wijaksana[1]*, Ria Arifianti[2], R Anang Muftiadi[3], Mas Dadang Enjat Munajat[4]

Department of Business Administration, Universitas Padjadjaran, Indonesia.
Department of Business Administration, Telkom University, Indonesia.

ABSTRACT

Research has shown that digital entrepreneurship ecosystems foster sustainable competitive advantage for small and medium-sized businesses (SMEs) as they facilitate seamless integrations of primary and support processes. Although promising, the interplay of entrepreneurship, information systems, and strategic management remains largely under-theorized, and notably, the role of information systems success within this interplay is particularly under-explored. This study responds to this issue by employing the PRISMA technique to conduct construct and systematic literature review on digital entrepreneurship ecosystems, information systems success, and sustainable competitive advantage for SMEs. Using the Scopus databases, 25 peer-reviewed and published journal articles spanning the years 2014 to 2024 were selected for detailed systematic literature review. The study utilized bibliometric mapping and thematic analysis coupled with VOSviewer and RStudio to analyze the occurrences of keywords, bibliographic, and thematic associations within the body of selected literature. The findings of this study illuminate thr predictive and descriptive research lenses that frame and bound the literature: (i) digital entrepreneurship ecosystems and SME performance, (ii) the adoption of IS, digital capabilities, and the success of IS, and (iii) innovation, sustainability, and competitive advantage at the crossroads of digitally embedded businesses ecosystems and SMEs. The findings also position the success of information systems as one of the central mechanisms of digital entrepreneurship ecosystems that convert digital resources into sustainable competitive outcomes for SMEs. The scholarly attention has grown considerably, although a number of gaps still exist, especially within developing market settings, as well as the impact of the system quality, information quality, and system use on developing competitiveness over time. The current study attempts to fill the gaps by suggesting an integrative conceptual framework which connects ecosystem-level variables, information systems success criteria, and sustainable competitive advantage. This framework provides a basis for the theory consolidation and provides ample guidance for the empirical studies to be conducted in the area of digital entrepreneurship and sustainability with regard to SMEs.

KEYWORDS: Digital Entrepreneurship Ecosystem; Information System Success; Sustainable Competitive Advantage; SMEs; Bibliometric Review; Systematic Literature Review.

1. INTRODUCTION

The last few years have caused a considerable shift in the way organizations operate and how they create value as a result of the changes in technology. Digitalization, while expensive for organizations, brings resource-saving opportunities. Digital technologies create new market opportunities for small and medium-sized enterprises (SMEs), helping them to overcome challenges and improve their position in the market. As a result, SMEs have the potential to innovate within the Digital Entrepreneurship Ecosystems (DEE) as an entrepreneurial framework utilizing the available digital resources, support services, entrepreneurial value chain, and market access within an emerging ecosystem.

The effects of digital entrepreneurial frameworks, and the innovations they produce, have been explored in relation to small and medium-sized enterprises (SMEs) on several occasions. Current research points to how digitally mediated ecosystems experience economic opportunity, reduced transaction costs, and innovation as they expand ecosystem structures. While research in these areas has expanded substantially over the past several years, the intersection of these areas with entrepreneurship, information systems, and strategic management has been exceptionally limited. This absence of interdisciplinary research has been detrimental in understanding the digital entrepreneurship ecosystem, and in particular, the environments of small and medium-sized enterprises (SMEs) and their sustainable competitive advantage.

From the perspective of a management strategy, sustainable competitive advantage is defined as the firm's capability to build and sustain the generation of value that is consistently greater than that of the firm's competitors and is also hard to imitate. Based on the resource-based view and dynamic capabilities theories, sustainable competitive advantage is contingent on the firm's ability to create value through the effective allocation and consumption of its digital resources and capabilities. Here, digital resources and systems, for instance, e-commerce, enterprise systems, and digital decision-support systems, enable organizations to convert digital possibilities into strategic value. While there is a sufficient positive relationship between the level of value generated and the extent of digital resources and systems utilized, it must be noted that the mere utilization of digital systems does not automatically result in the attainment of higher value. More significantly, it is the information systems that create a competitive advantage. Competitive advantage, in

this regard, will emanate from the many facets of information systems: system quality, information quality, service quality, system use, user satisfaction, etc.

The literature, for the most part, centers on the Information Systems Success model as a means of evaluating the operational efficiency of the embedded information systems within the entrepreneurial digital ecosystem. While the success of the information system at the firm level is examined in the literature, ecosystem conditions, system effectiveness, and for SME(s) sustainable competitive advantage tends to be overlooked; the lack of, or poorly developed, resources, digital skills, infrastructure, and institutional support are the primary factors constraining digital adoption.

At the same time, new literature has identified the integration of sustainability and long-term competitiveness for SMEs as an emerging field. Digital entrepreneurship ecosystems are viewed as not only enabling short-term success but also providing sustained competitive advantage through sustainable innovation and organizational resilience. However, the information systems success of digital entrepreneurship ecosystems remains largely unclear. Much of the literature has focused on the developed world and largely overlooked the case of developing countries.

As a result, creating a systematic literature synthesis is vital for addressing the state of knowledge, dominant research trends, and noteworthy research gaps. The present study aims to fill this gap through a bibliometric and systematic literature review (B-SLR) on the intersections of digital entrepreneurship ecosystems, information systems success, and sustainable competitive advantage with SMEs. Using the PRISMA method, the study reviews 25 articles from the Scopus database from 2014-2024 to establish the field's intellectual structure and examine the evolution of the discipline.Accordingly, this study addresses the following research questions:

1. **RQ1:** In what ways have the fields of digital entrepreneurship ecosystems, information system success, and sustainable competitive advantage in SMEs developed over time?
2. **RQ2:** What are the principal thematic clusters and what is the prevailing intellectual architecture of this domain of research?
3. **RQ3:** What are the existing gaps in research and what potential avenues for future research are revealed from the literature?

This study makes three important contributions and frames the questions within these contributions.

First, it addresses the integration of the dispersed literature within entrepreneurship, information systems and strategic management into one comprehensive framework. Second, it explains the mediating role of information system success and how it aligns digital entrepreneurship ecosystems with sustainable competitive advantage in SMEs. Third, it delineates an integrative conceptual framework that associates ecosystem level digital entrepreneurship inputs, information system success, and sustainable competitive advantage and success outcomes. This framework is valuable for empirical research and for policymakers and practitioners in formulating digital entrepreneurship frameworks for SMEs.

2. MATERIALS AND METHODS

2.1. Research design and inclusion criteria

This study attempts to systematically identify, organize, and synthesize the studies at the intersection of the digital entrepreneurship ecosystems, information system success, and sustainable competitive advantage in the context of small and medium-sized enterprises (SMEs) using the bibliometric and systematic literature review (B-SLR) framework. Even though the B-SLR framework can help establish transparency, replicability, and theoretical scaffolding in the review of fragmented areas of literature, it has been criticized for the lack of bibliometric integration and systematic review consolidation (Marzi et al., 2024; Donthu et al., 2021).

The first problem framing was done by scanning the literature to understand the conceptual boundaries of the review by collating the literature according to the standards of theory driven reviews (Caputo et al., 2021; Fan et al., 2022). Following this literature scan, the review was centered around three primary areas of literature to construct the boundaries: (1) digital entrepreneurship ecosystems and digital entrepreneurial contexts; (2) success of information systems which involves system quality, information, system use, digital capabilities, and (3) sustainable competitive advantage which includes innovation and the long-range performance of the SME (DeLone & McLean, 2003, 2016; Bharadwaj, 2000; Autio et al., 2018).

Only articles that mentioned at least two of the three central constructs of this study were considered for analysis. To maintain the integrity of the methodology and the focus of the study, the author applied an exclusion criterion that removed duplicate entries, papers not written in English, conferences, book chapters, and documents not subjected to a peer-review process. After following the PRISMA guidelines, the author retained for analysis only peer-reviewed articles published in the period 2014–2024 in the field of Business, Management, and Accounting.

The inclusion and exclusion criteria are detailed in Table 1, and a PRISMA 2020 flow diagram (Figure 1) depicts the process of the author's study of the articles in the database. After this meticulous process, the author arrived at a set of 25 journal articles from the Scopus database, which were used for bibliometric mapping and thematic analysis.

2.2. Search strategy and data collection

A Boolean search query was utilized to evaluate the Scopus database to construct the relevant literature at the intersection of three key concepts: digital entrepreneurship ecosystems; information system success; and sustainable competitive advantage pertaining to small and medium-sized enterprises (SMEs).

Table 1. Inclusion and exclusion criteria

| Criteria type	Inclusion	Exclusion
Timeframe	2014–2024	Before 2014
Document type	Peer-reviewed journal articles	Conference papers, editorials, book chapters
Language	English	Non-English
Subject area	Business, Management, Economics, and Social Sciences	STEM, Medicine, and Engineering (*unless directly related to information systems, digital entrepreneurship, or SME contexts*)
Content relevance	Must explicitly address at least two of the three key constructs (digital entrepreneurship ecosystems, information system success, sustainable competitive advantage)	Studies not addressing the core constructs or lacking relevance to SMEs
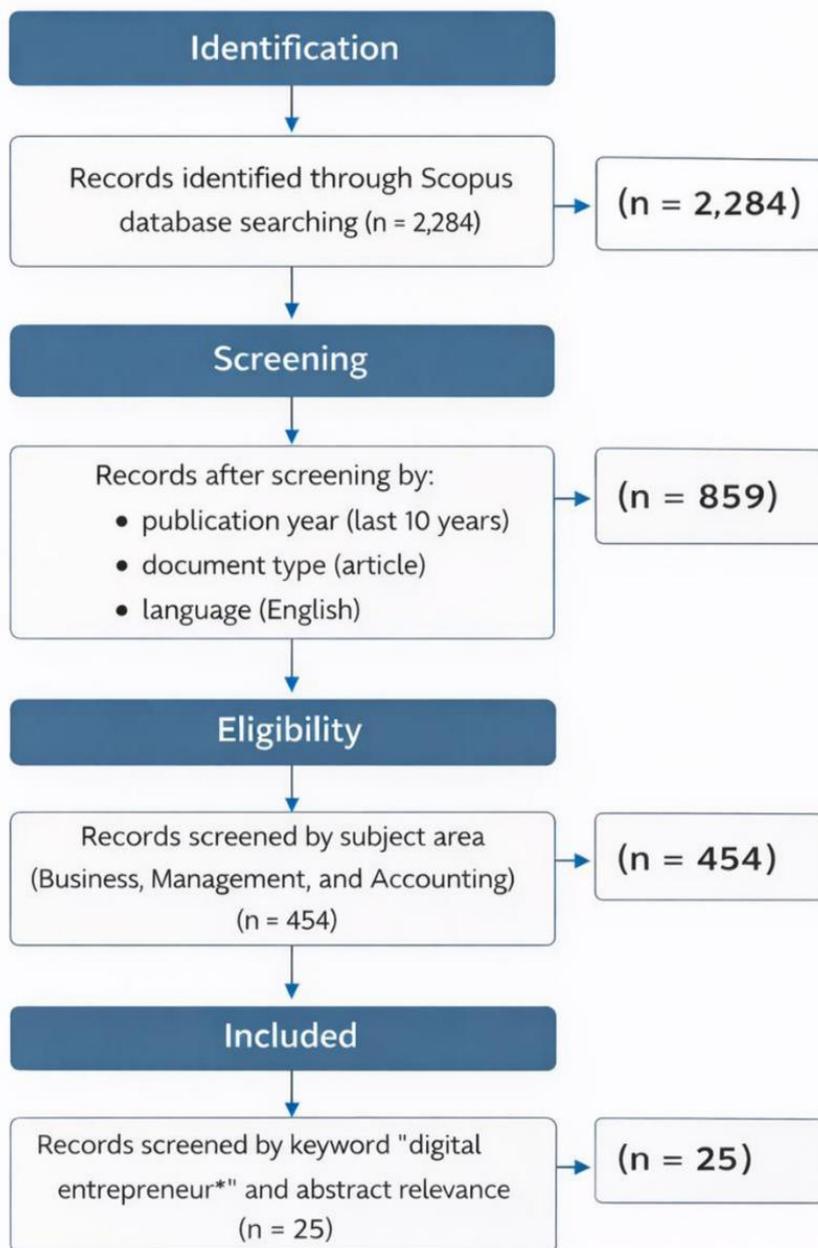
Figure 1: PRISMA flow diagram for study selection.

In order to assist the study to take into account what the cross-section of information systems, digital entrepreneurship, and competitive advantage in the context of SMEs has provided, a Boolean Query String was developed and used to search, in Scopus, for peer reviewed articles written in English and published within the last 10 years of the 2014-2024 time span. The search was limited to the title, abstract, and keywords of the articles.

An initial search yielded 2,284 documents that were further filtered by the described parameters, resulting in 859 documents. The results were filtered further, restricting the results to the Business, Management and Accounting subject area, resulting

in 454 documents. The final documents to be filtered were identified by the search term "digital entrepreneur*" coupled with a relevance check of the title and abstract for a final selection of 25 documents.

The final selection of documents was subject to analysis through bibliometric mapping and thematic clustering with the use of VOSviewer and RStudio. Figure 1 illustrates the PRISMA 2020 flow diagram that captures the process of entire identification, screening, and selection process.

2.3. Data cleaning and screening

In order to keep the processes as methodologically sound as possible, in a manner that documents

transparency and replicability, a screening and multisided data cleaning technique must be used. During this initial retrieval, partitions relating to duplicates, empty or incomplete entries and provisional publications were removed. The residual documents underwent a screening procedure, on the basis of certain pre-established inclusion and exclusion criteria, based on type of documents, their language, field of study and thematic relevance with the core constructs of the study.

An assessment of relevance based on title and abstract screening was conducted, to capture all possible studies with the greatest alignment to the research focus. This was scoping-based screening and in terms of literature and bibliometrics reviews, it followed best practices and used the Prisma 2020 methodology to document the process. According to these processes, a final selection of 25 journal articles indexed in Scopus was made for bibliometric mapping and thematic analysis.

2.4. Bibliometric mapping procedure

A total of 25 Scopus-indexed journal articles were processed using RStudio (Bibliometrix package) and VOSviewer (version 1.6.20) in a configurative manner. The volume of published studies, the published studies per source journal, and the author(s) studies distribution were assessed in RStudio. Subsequently, bibliometric networks and visualisations of the keywords and the literature were constructed, and bibliometric maps were analysed using VOSviewer to illustrate the patterns and the structure of the literature and the themes.

Two bibliometric techniques will be explained in further detail. The first was keyword co-occurrence analysis, which is used for identifying the conceptual structure within a specific domain. The analysis was conducted using a threshold of three for the number of occurrences to derive a middle ground between the depth of interpretation and the scope of the themes. The second was bibliometric coupling, which serves to explain the relationships between the documents due to the references they share and, in turn, illustrates the research clusters and themes that exist in the data. A bibliometric coupling network was also created at the country level to assess the cross-country collaboration in the research relating to small and medium-sized enterprises (SMEs).

An iterative analytical framework that combined network visualisation and qualitative analysis of selected publications for each cluster was used to create, name, and describe the clusters. Clusters were named using representative keywords, dominant theories, and central concepts of the documents within each cluster, which aligns with the

methodology for bibliometric reviews and evidence synthesis (Zupic and Čater, 2015; Paul and Criado, 2020). To preserve the integrity and richness of the bibliometric dataset, all documents were kept to complete the bibliometric analysis.

2.5. Quality control and transparency

The entire process of reviewing the document was completed according to the guidelines of the appropriate review, structuring the review to achieve maximum methodological rigour and review transparency. The review employed multiple methods triangulation to enhance the analysis. The review utilised bibliometric methods such as analysis of publication, analysis of citation, and analysis of citation keywords. The review, therefore, achieved a bibliometric analysis of the results on management and information systems (Zupic and Cater, 2015; Paul et al., 2021).

To provide maximum transparency and the ability for others to replicate the work, the identification, screening, and reporting of citations were documented according to the PRISMA 2020 reporting guidelines, which provide a methodology to document the review process in a systematic manner (Page et al., 2021). The use of PRISMA may clarify the selection of a study; however, the review was not conducted with a formal assessment of the risk of selection bias because the intent of the review was to provide a map of the intellectual structure and the shifting themes of the field, and not to provide an assessment of empirical effect sizes. This was the secondary objective of the review; therefore, the design of the review was guided by contemporary approaches of evidence-based and theory-based literature reviews, providing a constructive synthesis illustrating the dominant streams of research, the themes/phases of that research, and the gaps in the research that were unresolved (Snyder, 2019; Torraco, 2016).

3. RESULTS

3.1. Bibliometric statistics (descriptive overview)

This research attempt outlines a descriptive bibliometric analysis of the literature regarding the intersections of the digital entrepreneurship ecosystems and the information system and sustainable competitive advantage within SME context prior to the thematic and network-based analyses. The analysis aims to describe the trends and structural characteristics of the publications within the given PRISMA selected 25 Scopus-indexed journal articles dataset. These publications

descriptive indicators help to assess the gaps of the intellect within the given stream research and help to assess the literature gaps within the thematic classifications and clusters. Such analysis is common practice within bibliometrics and for the purposes of systematically mapping the field's domain (Framework) (Zupic & Čater, 2015; Donthu et al., 2021).

3.1.1. Publication growth

The analysis of selected 25 peer-reviewed journal articles shows that there is a steady increase in recognition of the particular research area over time. The annual publication trend was constructed based on the results of the PRISMA process and the articles published during 2014 to 2024. Prior to 2014, there was an average of one publication that existed each year during the time interval of the analysis, but from 2014 to 2018 there was an obvious increase in the

number of publications per year. From 2018 onward there has been rapid growth in the number of publications, culminating in the year 2024, which is projected to have the highest number of total publications. This trend suggests that there is an increased interest in the research areas of digital transformation, information systems, and the sustainability of small and medium-sized enterprises (SMEs).

The various studies that fall within the categories of the various fields of digital entrepreneurship, information systems, and sustainable competitiveness of small and medium-sized enterprises have provided evidence of an increase in the interest of scholars within the field of digital entrepreneurship over the last decade. This is shown in the diverse and multi-disciplinary articles published in multiple fields of study and within multiple disciplines.
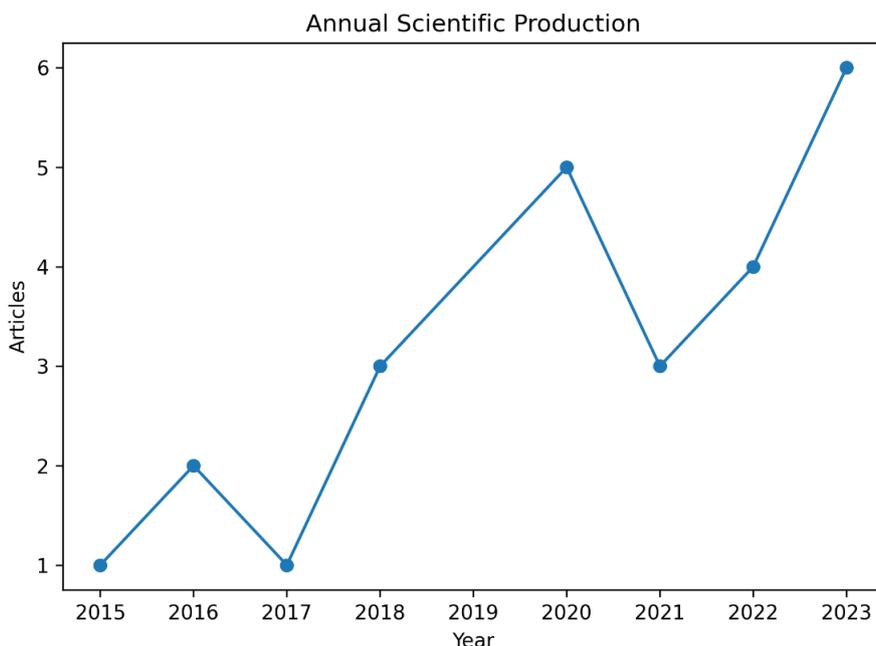
Figure 2: Publication growth

3.1.2. Average citations per article

The 25 journal articles selected for this dataset show a relatively uniform impact score, as visible in the distribution of the citation metrics among the studies reviewed. As in all bibliometric studies, the citation counts demonstrate a time-dependence correlation; older studies tend to receive more citations than their recent counterparts. This is often explained by the length of the citation window, whereas more recent studies, despite their increasing relevance, receive a lower citation count.

Figure 3 shows a clear example of the time-dependent citation pattern, as articles from recent

years have been cited much less than older articles, for the simple reason that those articles have had less time to be cited. For the later years of the review, a more pronounced citation count is visible. This is likely due to an increased focus of the research community on the subject of the review articles. For the period of research being reviewed, there is a distinct pattern of increasing citations for older research articles. This trend indicates that the researchers in this period have overlapping expertise. The research community in this field has broad coverage on previously published research, as well as a significant understanding of the area of research they are working on.
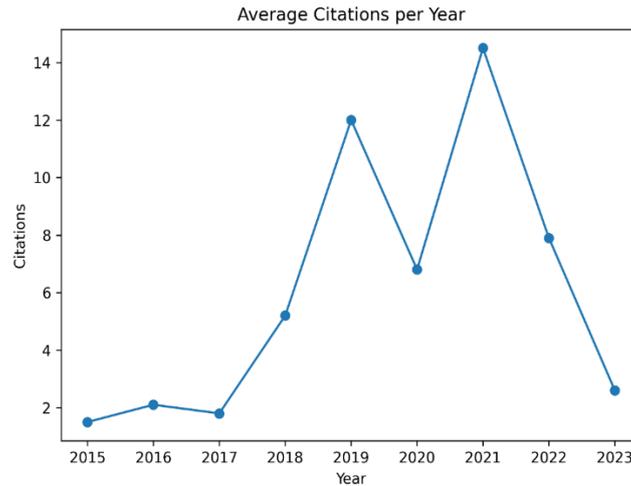
Figure 3: Average Citations per Year (RStudio style)

3.1.3. Source and journal distribution

The publications were obtained from Scopus, showing the cross-disciplinary nature of research pertaining to digital entrepreneurship ecosystems, success of information systems, and sustainable competitive advantage. As shown in Figure 4, the subject area distribution comes from the wider pool of articles obtained in the first Scopus search, prior to the last PRISMA-based screening. Result shows publications mostly in Business, Management and Accounting, then Computer Science, and Decision Sciences, areas. This shows the added emphasis of Management and Information Systems domain in the development of the discipline, and increasing the emphasis of the fields of Computing and Decision Sciences.
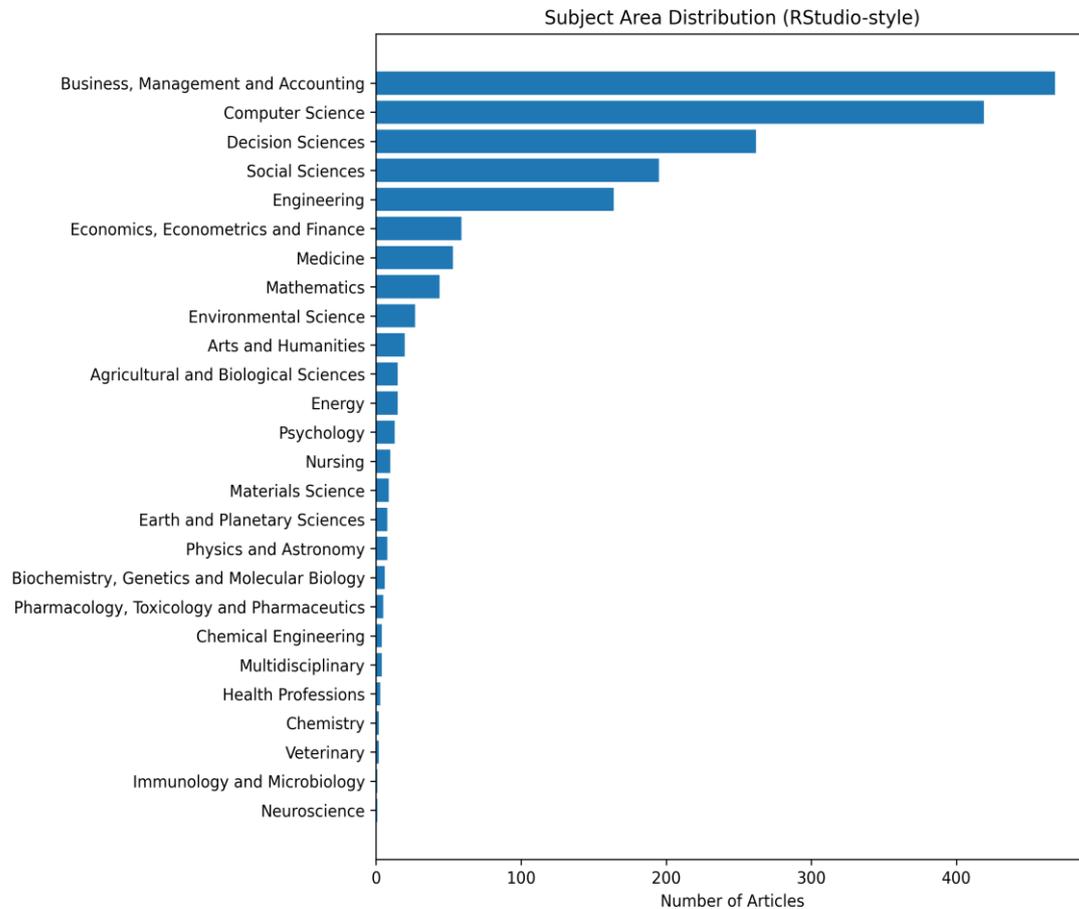

Figure 4: Article Classification Based on Subject Areas (RStudio style)

3.1.4. Author and collaboration patterns

The relationship between digital entrepreneurship ecosystems, information systems success, and sustainable competitive advantage of SMEs as predominantly collaborative across disciplines reveals a global scope of the study. Most of the published work being collaborative demonstrates a high degree of co-authorship cross integration within the domains of information systems, entrepreneurship, and strategic management.

Repeated analysis of Santoro and Wang, regarding the digital transformation, innovation capabilities, and information systems of SMEs, demonstrates cross-institutional and international co-authorship, suggesting a high dependence of collaborative research networks and cross-border knowledge flow on the emerging digital innovation and sustainable competitiveness in SMEs.

3.1.5. Geographical distribution

Research into the digital entrepreneurship ecosystem, information systems, and the sustainable competitive advantage in SMEs is exemplified from the global range of United States and other contributing European countries along with India and China as emerging economies from the researched figure.

The international reach of the pub's inadequate study is evident. In developing countries, there is an increasing frequency of study focused on the issues faced by SMEs within digitally adopted ecosystems, influenced by institutional support and pre-existing resource constraints.

To attain a more cohesive comprehension of sustainable competitive advantage in SMEs, it is essential to undertake additional cross-country and comparative research that investigate the contextual variations inside the digitally adopted entrepreneurship ecosystem and information system.
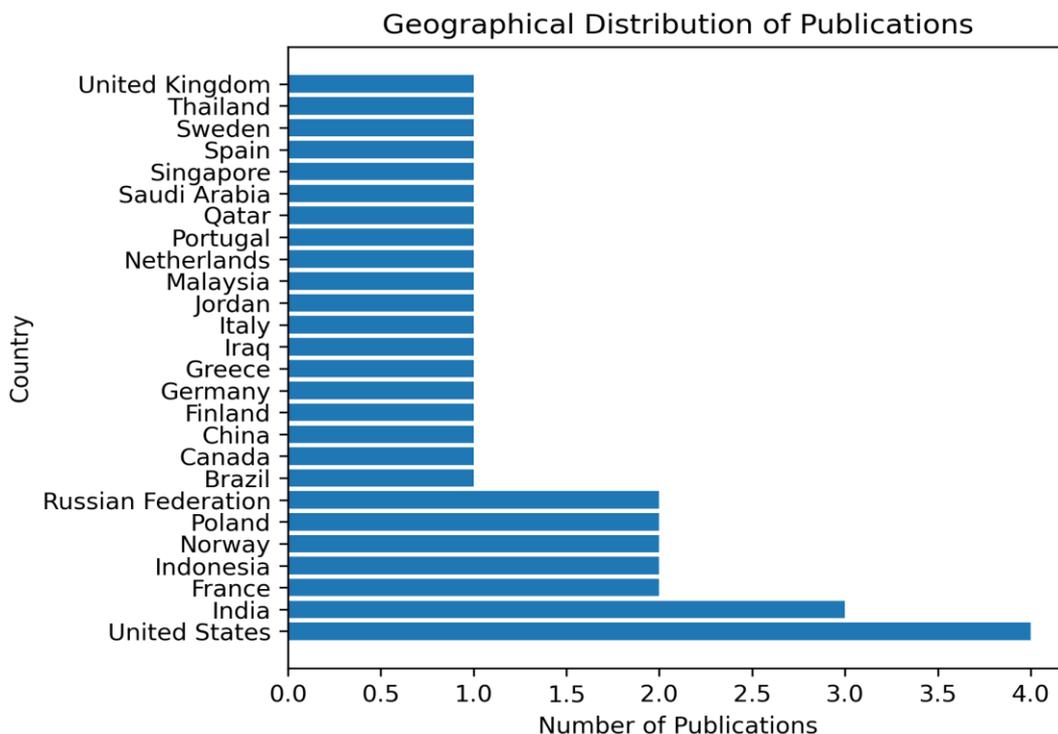
Figure 5: Trends in Publication Development by Country

Figure 6 shows the bibliographic coupling network for the publications from each individual country on the digital entrepreneurship ecosystems, information systems, and the sustainable competitive advantage in SMEs. In the network, each country is represented as a node and the links between them are the references in common between the publications which reflects the similarity of intellectual basis of the national

output. A node's size signifies the influential position of the country's research output and the strength of the links indicates the degree of bibliographic coupling. The network shows strong coupling among the dominant contributor countries, which indicates the occurrence of research communities on a global scale and the flow of research in the cross-border networks in this specific field.
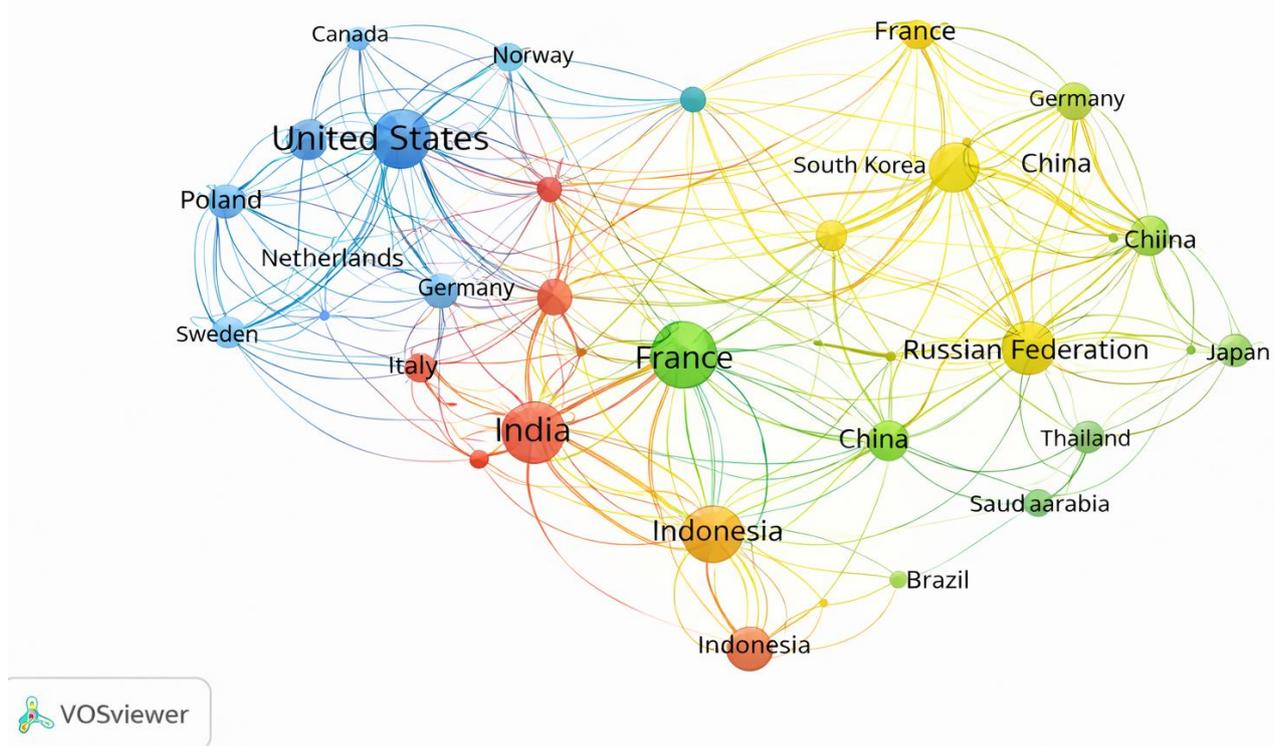
Figure 6: Country-level bibliographic coupling network (VOSviewer).

3.2. Keyword Landscape and Thematic Anchoring

Doing a co-occurrence analysis using the authors' keywords from the selected articles facilitates the analysis of the conceptual structure of a particular research domain. These keywords point to the dominant themes and issues and the associated theories underpinning the literature on the digital entrepreneurship ecosystems, information systems, and the sustainable competitive advantage of small and medium-sized enterprises (SMEs).

The literature on co-occurrence of keywords is used to demonstrate the interrelatedness and the clustering of some dominant themes, which provide an articulation of the intellectual structure and focus, and also the thematic delineation of a particular research domain. This approach is also applicable in cluster analysis and in identifying the prevailing research patterns and the emerging themes.

The author keywords indicate the existence of several thematic clusters, which articulate the intellectual structure that spans across information systems, digital entrepreneurship ecosystems, and sustainable competitive advantage in SMEs. Within this structure, one of the most prominent thematic clusters for information systems is centered around innovation, knowledge management, and business analytics. This configuration reveals that the most primary and strategic role of information systems is an enabling function for learning, innovation, and data-driven decision-making.

Another significant cluster focuses on competition and competitive advantage with respect to decision-making and management of the relevant information. This cluster, as shown in Figure 7, depicts how information and analytics function to convert digital resources into sustainable competitive advantages. The multiple interconnections between the clusters indicates that the information systems are not merely operational, but are also integrative; they link the digital entrepreneurship ecosystems to innovation and competitiveness.
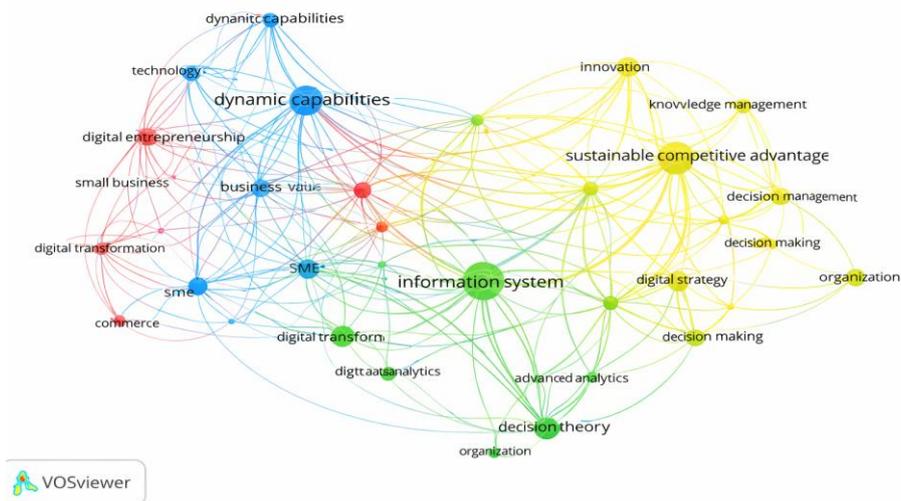
Figure 7: Keyword co-occurrence network (Vosviewer).

The figure illustrating the Occurrence of Keyword Co-Occurrence (Figure 7) shows a thematic analysis of the literature where each of the dominant thematic clusters and their interrelatedness is examined to answer RQ2, and this was done utilizing the VOSviewer tool. When viewed, the most central theme of the occurrence of keyword co-occurrence is information systems, seeing that the network is intertwined with other themes like innovation, knowledge management, and business analytics. This implies that at the very least, information systems serve as one of the primary core foundational capabilities within the digital entrepreneurship ecosystems.

Furthermore, the interrelation of the themes, competition, competitive advantage, and information management, illustrates the strategic and competitive worth of the systems of and the value to be gained from the decision-making processes. The findings in Figure 7 position information systems as the bridge across the digital competencies, innovation, and sustained competitive advantage in relation to SMEs, thus clarifying the primary conceptual framework of this field of study.

3.3. Cluster analysis

The bibliographic coupling analysis via VOSviewer presents a well-defined intellectual configuration with a high level of granularity comprising three thematic clusters that in total articulate the interrelationship of digital entrepreneurship ecosystems, the success of information systems, and sustainable competitive advantage within the ecosystem of SMEs. The clusters form because of the commonality in the reference patterns of the documents, which suggests proximity of concepts and alignment of theories vis-a-vis the studies.
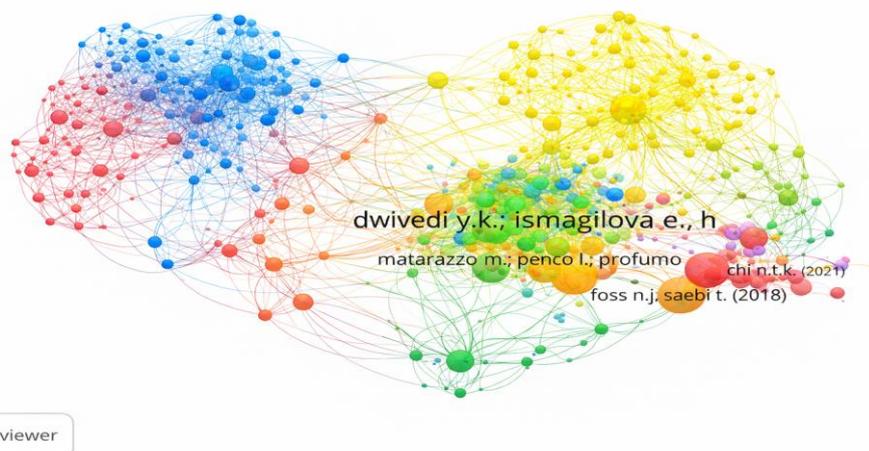

Figure 8: Bibliographic coupling map of documents (Vosviewer).

Table 2: Summary of thematic clusters and key concepts

Cluster	Thematic focus	Key concepts	Representative contributions
Cluster 1	Information Systems and Digital Capabilities (Central Cluster)	Information systems, digital capabilities, system quality, information quality, business analytics, big data, data-driven decision making	DeLone & McLean (2003, 2016); Bharadwaj (2000); Dwivedi et al. (2021); Ismagilova et al. (2019); Wamba et al. (2017)
Cluster 2	Digital Entrepreneurship Ecosystems	Digital entrepreneurship, digital platforms, ecosystems, SMEs, technology infrastructure, institutional support, collaboration networks	Nambisan (2017); Autio et al. (2018); Matarazzo et al. (2021); Penço et al. (2022); Sussan & Acs (2017)
Cluster 3	Innovation and Sustainable Competitive Advantage	Innovation, competitive advantage, sustainability, dynamic capabilities, firm performance, strategic renewal	Porter (1985); Teece (2018); Foss & Saebi (2018); Wang & Esperança (2023); Barney (1991)

3.3.1. Cluster 1: Information Systems and Digital Capabilities (Central Cluster)

Organisational innovation and competitive outcomes through the supporting core cluster exemplify the contribution of the foundational cluster. Key elements consist of; information systems, digital capacity, business analytics, big data, system and information quality. The merging of all elements describes the integration of information systems and the capacity to develop defining strategic objectives and steering the business to improve data based organizational learning and decision making.

The integration of effective Information Systems has helped shape organizations to improve on the collection, processing, and the analysis of data in `volumes` operationally and strategically (DeLone and McLean, 2003; Dwivedi et al., 2021). The reported digital capabilities have empowered organizations to improve on the innovation through the various functions of the enterprise.

Organisantional agility and strategic flexibility has been improved through the advanced analytics on big data (Wamba et al., 2017). Overall, the core enabler of the digital entrepreneurship ecosystems, information systems, have proved to be instrumental in increasing positive improvements to innovation and sustainable competitive advantage.

3.3.2. Cluster 2: Digital Entrepreneurship Ecosystems

The second cluster involves the digital entrepreneurship ecosystems, as well as the role of digital technologies, entrepreneurial actors, and entrepreneurial institutions. Important concepts in this cluster are digital entrepreneurship, digital platforms, ecosystems, SMEs, and entrepreneurial/technology infrastructure. This field of research studies digital platforms and their interlinked networks, as facilitators of entrepreneurship and value creation.

According to the literature, digital entrepreneurship ecosystems provide SMEs information on markets and collaboration opportunities, as well as access to shared resources which otherwise would be restricted due to limited insufficient resources (Nambisan, 2017; Autio et al. 2018). Ecosystem Information systems are essential, as in these ecosystems, systems that support platforms, share and exchange data, and coordinate amongst themselves.

Numerous studies note that engagement within digital ecosystems strengthens and broadens SMEs' market access and scalability, whilst also fostering innovation via collaboration and co-creation (Matarazzo et al. 2021; Penço et al. 2022). Moreover, digital ecosystems stimulate inclusive and effective entrepreneurial activities, whilst also simplifying and sustaining entrepreneurial processes. This cluster highlights the impact of digital infrastructure at the ecosystem level in enhancing entrepreneurial resilience and sustained competitive advantage.

3.3.3. Cluster 3: Innovation and Sustainable Competitive Advantage

The third cluster examines innovation as a means to secure a sustainable competitive advantage. Key terms are innovation, competitive advantage, sustainability, dynamic capabilities, and firm performance. This research cluster analyses the most effective means for firms to utilize their innovation capabilities to achieve firm differentiation and sustained competitiveness within rapidly changing markets.

Scholars argue that the most sustainable competitive advantage will result from a firm's ability to combine the use of digital systems and an innovation strategy (Porter, 1985; Teece, 2018). Information systems and innovation allow firms to reengineer their business activities, create new offerings, and act anticipatorily to changes in the business and social environments (Foss & Saebi, 2018).

Wang and Esperança (2023) refer to sustainability-oriented innovation as one of the most important outcomes of digital transformation, particularly

concerning SMEs and the focus on creating value over time. The high degree of bibliographic coupling of this cluster with the central information systems cluster shows that digital skills and analytics are cornerstones of innovation-based competitive advantage. This whole cluster points to a stream of research that is more or less focused on the interrelation of innovation and sustainability as strategic objectives within the digital and information systems context.

4. DISCUSSION

The insights gained from the three bibliometric clusters show that digital capability and information systems have transformed from being operational supportive tools to strategic enablers of digital entrepreneurship as well as sustainable competitive advantage for SMEs. Previous literature regarding information systems and strategic management have pointed out that the value of digital technologies derive from being incorporated within the systems and processes, as well as within the capability of organizations (Bharadwaj, 2000; DeLone & McLean, 2003, 2016; Dwivedi et al., 2021). The clusters indicate that, there is an interrelated knowledge structure whereby information systems function as a key value enabler, integrating digital entrepreneurship ecosystems to the innovation driven competitive advantages. This validates that the scope of digital transformation in SMEs is beyond technology; it is integrated within the broader entrepreneurial and innovation ecosystems (Nambisan, 2017; Autio et al., 2018).

The bibliometric evidence further shows that the success of an information system evidences the role of mediation in the conversion of digital resources at the ecosystem level to innovation and sustainable performance at the firm level. This is consistent with other studies in the literature that indicate system quality, information quality, and system use as the predominant mechanisms through which digital investments enhance organizational performance (DeLone & McLean, 2016; Wamba et al., 2017). The intersection of digital capabilities, ecosystem involvement, and innovation results further confirms the role of organizational data and the learning thereof in the improving sustained competitiveness in the context of resource-scarce SMEs (Bharadwaj et al., 2013; Foss & Saebi, 2018).

4.1. Theoretical convergence

Within all three clusters, information systems remain a given foundational building block of digital entrepreneurship and sustainable competitive advantage. This also helps explain the centrality of the Information Systems and Digital Capabilities cluster, which illustrates a synthesis of information systems success theory, dynamic capabilities theory, and digital entrepreneurship scholarship. Systems information as a strategic resource for innovation and adaptation, as the ability to sense, seize, and reconfigure (Teece, 2007, 2018; Bharadwaj et al., 2013).

Alongside digital systems, ecosystems of digital entrepreneurship highlight the importance of digital platforms, digital analytics, and digital shared services infrastructure in entrepreneurial venture experimentation and collaboration, as well as opportunity (Nambisan, 2017; Sussan & Acs, 2017). For example, in digital ecosystems, SMEs' firm-level competencies get enhanced through the ecosystem-wide integration of data, knowledge, and technology (Autio et al., 2018). The strong coupling with the Innovation and Sustainable Competitive Advantage cluster reinforces how digital capabilities transform the innovation to sustained competitive advantage continuum, consistent with the resource-based view and dynamic capabilities perspectives (Barney, 1991; Teece, 2018).

The intersection of information system success and digital entrepreneurship ecosystems provides coherent theoretical articulation for the sustainable competitive advantage in SMEs, sustaining the RQ2 findings. Also, the results indicate possibilities of constructing mid-range theories, especially those connecting strategic theories in the abstract with empirical mechanisms on the ''analytics'' system use and organizational learning (Paul & Criado, 2020; Zupic & Čater, 2015).

4.2. Knowledge gaps and underexplored areas

Some gaps in literature arise. One of the most important gaps is the lack of integrated frameworks that explain the role of successful information systems as bridges to the digital entrepreneurship ecosystem and sustainable competitive advantage in small and medium-sized enterprises (SMEs) in developing economies. While ecosystem studies highlight the importance of digitally accessible means (Autio et al., 2018; Nambisan, 2017), very few address the role of systems, the use of systems, and information in the role of innovation outcomes over time (DeLone & McLean, 2016).

Additionally, literature appears to lack the aspect of time in developing digital capabilities. Most literature, as it stands, is cross-sectional, and thus loses the ability to illustrate how SMEs' digital capabilities are layered, reconfigured, and renewed, especially in turbulent environments. Most studies on how operational information systems are

transformed into tools of sustained competitive advantage (Teece, 2018; Wamba et al., 2017) tend to be longitudinal.

Moreover, there has been very little research on the behavioural and cognitive dimensions of digital transformation. Most papers ignore the role of managerial cognition, digital mindset, resistance to change, and learning orientation, if any, in determining the success of information systems and the impact of innovation (Foss & Saebi, 2018; Warner & Wäger, 2019). Addressing these micro-level phenomena would enhance the discussion on the agency of the individual, in particular, the individual's role in the interactions between technological and ecosystem components for RQ3.

4.3. *Contributions to research and practice*

While there are many ways to theorize the streams of research in Information Systems, Digital Entrepreneurship, and Strategic management, most literature tends to remain fragmented. This research assimilates literature to construct thematic maps across diverse research streams in the fields of Digital Entrepreneurship and System Management. Considering Information Systems as the primary conduit, an effort is made to enhance the theorizing of digital capabilities in fostering innovation and sustainable competitive advantage in small and medium-sized enterprises (SMEs) (Bharadwaj et al. 2013; Dwivedi et al. 2020).

Declining industries and their respective ecosystems, resource-based view (RBV) of the firm, and factor market failure theories are most commonly used to answer the research questions. This perspective is more definitive in asserting the role of analytics, data integration, and information use as sustaining factors of competitive advantage (Wamba 2017, Teece 2018).

Practically, the findings indicate that SMEs should engage not only in digital entrepreneurship ecosystems, but also in the effective use and management of information systems. With the implementation of strategies that enhance analytics, systems integration, and the usability of information systems, SMEs will be able to improve their innovative capacity and, consequently, their sustainable competitive advantage. These findings are also useful for policy makers and ecosystem orchestrators in developing digital frameworks that enhance the resilience and competitiveness of SMEs.

4.4. *Future research agenda*

Several pathways can be suggested for future research based on bibliometric and systematic reviews. To begin with, cross-national studies are essential to assess the varying impact of diverse institutional contexts on the digital entrepreneurship ecosystems, information systems, and sustainable competitive advantage (Autio et al., 2018; Paul et al., 2021). This is especially true for emerging economies and institutional voids which define the contours of digital adoption. Second, there is rich ground for future research within the micro-foundations of the development of digital capabilities such as the leadership mindset, ethics, and organizational learning (Foss & Saebi, 2018; Warner & Wäger, 2019). A behavioral lens could help understand use and leverage information systems for innovation.

Third, further innovation is needed in the mechanisms of causation describing and capturing. More refined understanding of the innovation triad, information systems, and digital ecosystems could be enhanced via detailed case studies and bibliometric mapping (Donthu et al., 2021)
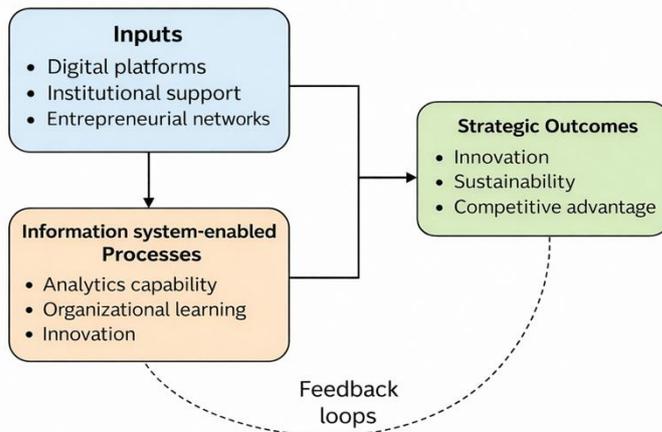
4.5. *Proposed conceptual framework*

Integrating the findings, the study elaborates on a conceptual framework on the possible outcomes of digital entrepreneurship ecosystems and information system success flowing towards sustained competitive advantage. It integrates past literature into three interrelated components- ecosystem-level inputs, information system processes, and strategic outcomes.

Ecosystem-level inputs here refers to digital resources critical for small and medium enterprises created by entrepreneurial networks, institutional support structures, and digital platforms (Nambisan, 2017; Autio et al., 2018). These resources get transformed through information system processes such as organizational learning, innovation, and analytics (Bharadwaj et al., 2013; DeLone & McLean, 2016). Process alignment captures strategic outcomes of innovation, sustainability, and sustained competitive advantage over time (Teece, 2018).

The framework differs from other models because it positions information system success uniquely as a mediating and strengthening role in the competitive outcomes of digital entrepreneurship ecosystems and the competitive outcomes. The feedback loops in the framework shows how strategic outcomes successfully accomplished reinforce additional digital investments and capability development. The framework thus balances theory and practice for empirical research in the future and offers practical insight for evidence-based decision making for digitally transformed small and medium enterprises.

Figure 9: Integrative framework linking digital entrepreneurship ecosystems to sustainable competitive advantage in SMEs

Table 3: Theoretical Contributions of the Study

Theoretical Domain	Contribution
Information System Success	Conceptualized as a mediating mechanism that translates ecosystem-level digital resources into sustained SME competitiveness
Digital Entrepreneurship Ecosystems	Positioned as enabling contexts that provide platforms, networks, and institutional support for SME digital innovation
Sustainable Competitive Advantage	Explained as an outcome of the alignment between digital ecosystems, information system success, and innovation capabilities
Review Methodology (B-SLR)	Applied an integrated bibliometric–systematic review to synthesize fragmented interdisciplinary literature

5. CONCLUSIONS

This research utilized bibliometric methodologies alongside systematic literature reviews to examine studies focusing on digital entrepreneurship ecosystems, success of information systems, and sustainable competitive advantages pertaining to small and medium-sized enterprises (SMEs). Based on 25 journal articles from Scopus peer-reviewed journals from 2014 and 2024, and using VOSviewer and RStudio, this research constructed the intellectual structure and thematic progression of this cross-disciplinary field of study. Considering information systems, entrepreneurship, and strategic management, this review attempts to address the incoherence and fragmentation of previous studies.

The results of this study present three interrelated thematic clusters. The first cluster is located within information systems and digital capabilities. The second cluster focuses on digital entrepreneurship ecosystems. The third cluster includes innovation and sustainable competitive advantage. The results indicate that within SMEs, information systems have a central and mediating role in the transformation of digital resources at the ecosystem level into innovation and sustained competitive advantage. Although digital entrepreneurship ecosystems

present SMEs with the means to access platforms, networks, and resources, the role of information systems and the analytical capability of the SME enables the transformation of these resources through data driven decision making, organizational learning, and innovation.

The success of an information system is placed in the role of a primary mechanism explaining the relationship between the ecosystems of digital entrepreneurship and the sustainable competitive advantage of SMEs. The conceptual framework demonstrates the role of digital capabilities as more than technological assets and as strategic enablers within entrepreneurial ecosystems. However, such contributions come with a few limitations, such as the use of a single database and the constantly changing digital lexicon. The use of more than one database, longitudinal designs, and empirical analyses in various institutional settings, especially in developing countries, is highly recommended to understand the relationship between digital transformation and sustainable competitiveness in SMEs better.

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Not applicable. This study does not involve human participants or animals.

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AUTHOR CONTRIBUTIONS

credit: Tri Indra Wijaksana: conceptualization, Data curation, Formal analysis, investigation, Methodology, resources, Software, visualization, writing – original draft; Ria Arifianti: Methodology, Project administration, Supervision, validation, writing – review & editing; R. R Anang Muftiadi: Supervision, validation, writing – review & editing; Mas Dadang Enjat Munajat: Supervision, validation, writing – review & editing.

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ABOUT THE AUTHORS

Tri Indra Wijaksana is a students of Doctoral Program in Administrative Sciences at Graduate School Universitas Padjadjaran, Indonesia. He is also a lecturer at the Business Administration Study Program of Telkom University. His main research interests are in the area of digital entrepreneurship, business administration, information systems and strategic management, particularly in relation to the development of SMEs and sustainable competitive advantage. He is advancing the field of digital entrepreneurship by examining the role of digital transformation and innovation in entrepreneurial ecosystems.

Ria Arifianty is a Professor in the Department of Business Administration, Universitas Padjadjaran, Indonesia. She has a Doctor in Business Administration also from Universitas Padjadjaran. Operations management and retail studies, particularly in the areas of retail operations, service efficiency, and the coordination of supply chains, are among her main research interests. She is a researcher and is published in a number of domestic as well as international peer-reviewed journals.

Anang Muftiadi is an associate professor and head of the Business Administration undergraduate program at Universitas Padjajaran, Indonesia. He teaches and conducts research on business strategies, organizational behaviors, and human resource policies. Much of his research has been published in reputable, nationally and internationally recognized journals. His interest in strategic policy of the business and organizational dynamics aids in furthering the development and policy setting in the Faculty of Social and Political Sciences.

Mas Dadang Enjat Munajat is a faculty member at the Department of Public Administration at Universitas Padjajaran in Indonesia. His current research centers on the cross-section of entrepreneurship and entrepreneurial ecosystems, particularly in the fields of digital entrepreneurship and the creative industries, as well as the use of digital technology in innovation within the public sector and in business. He has conducted research on the digital technology transformation, technology-driven entrepreneurship, public administration, and innovative economic development, and he has published within these fields.

ORCID

Tri Indra Wijaksana http://orcid.org/0000-0002-8119-6011

Ria Arifianti http://orcid.org/0000-0001-8572-2309

R. Anang Muftiadi http://orcid.org/0000-0003-4305-8061

Mas Dadang Enjat Munajat http://orcid.org/0000-0002-6962-6269

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