

Unveiling Research Trends in Sustainable Digital Entrepreneurship: Insights from Bibliometric and Systematic Analysis

Puji Prabowo^{1*}, Wawan Dhewanto¹, Akbar Adhiutama¹

¹School of Business and Management, Bandung Institute of Technology
Jl. Ganesha No.10, Lb. Siliwangi, Bandung, West Java 40132 Indonesia

*Corresponding Email: pujiprabowo5@gmail.com

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ABSTRACT

Sustainable digital entrepreneurship has been a growing topic in recent years because, in realizing the SDGs, a lot of collective action is still needed from various stakeholders and different approaches in solving economic, social, and environmental problems. This study aims to explore the research trends, gaps, and future research opportunities in sustainable digital entrepreneurship. This study uses the SLR method through the PRISMA framework protocol. The data is processed based on Scopus data sources. Data processing begins with the discovery of 911 documents with pre-designed keywords; then, only 71 relevant articles are selected through a strict screening process and analyzed using bibliometric mapping. The study shows that there are six major categories in the research focus in the field of sustainable digital entrepreneurship, namely digital foundation & capability, entrepreneurial orientation & actor, sustainability strategy & practices, business model & opportunity creation, ecosystem & financial enablers, and performance & competitive outcomes. This study contributes theoretically by developing a comprehensive taxonomy of sustainable digital entrepreneurship and identifying research gaps. Practically, it provides a roadmap for policymakers, entrepreneurs, academics, and other stakeholders to promote sustainable digital entrepreneurship.

Keywords: Business Model Innovation; Digital Transformation; Sustainable Development Goals (SDGs); Sustainable Digital Entrepreneurship; Systematic Literature Review

INTRODUCTION

Sustainable development plays a key role in creating a better world in the future. The steps taken are to meet current needs without compromising the ability of future generations to meet their needs. In support of this grand vision, in 2015, leaders of UN member countries formulated the 2030 Agenda for Sustainable Development, which includes 17 Sustainable Development Goals (SDGs) that aim to achieve a balance between economic growth, social inclusion, and environmental protection. However, in the process of achieving the expected targets, there are many major challenges, such as the climate crisis, social inequality, and the impact of the pandemic. Therefore, action is needed by many parties to achieve the SDGs targets.

Currently, there is a phenomenon in venture capital that is increasingly directing towards channeling sustainable impact funds to help achieve and accelerate the SDGs. Current investments are already in sectors such as technology, health, clean energy, and others. This latest strategy helps mobilize sustainable development targets that are targeted to be achieved by 2030 (Driver & ElAlfy, 2023; Folqué et al., 2023). This is a good approach from financial institutions to spark companies, such as startups, to focus on businesses related to SDGs.

Currently, there has been an increase in the impact of funds provided to businesses that focus not only on the economy but also on the environment and society (Dhayal et al., 2023). Some examples are green venture capital (GVC), which channels funding to clean technology, sustainable entrepreneurship, and green innovation. In addition, social impact bonds (SIBs) have proven to be an effective tool for financing the SDGs by encouraging collaboration among multiple stakeholders (Folqué et al., 2023; Giri & Chaparro, 2023). Overall, these developments signal a transformative approach to leveraging capital markets for global sustainability goals.

Despite its development, the literature on sustainable digital entrepreneurship remains fragmented, with several issues yet to be fully addressed. First, this study explores several streams, including digitalization, sustainability, business model innovation, ecosystems, and entrepreneurship, each of which is currently operating independently. Second, the relationship between sustainable digital entrepreneurship and the achievement of the SDGs is still limited in its explicit discussion. Third, the existing literature focuses mostly on conceptual issues and limited empirical research, thus hindering understanding of how digital innovation capabilities, entrepreneurial skills, sustainability orientation, and ecosystem support can impact performance in creating sustainable values. This gap highlights the need for a more comprehensive framework to systematically examine the structure of sustainable digital entrepreneurship and serve as a roadmap for future research and policy directions.

To address this gap, this study aims to develop an understanding of sustainable digital entrepreneurship through a systematic literature review (SLR) that examines related literature. This research theoretically contributes to expanding knowledge by providing a more coherent and comprehensive taxonomy in the field of sustainable digital entrepreneurship. This relates to how digital factors, entrepreneurship, and sustainability form an ecosystem that collectively generates new business values. Practically, this research can provide a structured map for researchers, entrepreneurs, investors, academics, and policymakers to plan, monitor, and evaluate digital entrepreneurship that impacts sustainable goals.

LITERATURE REVIEW

Sustainable Digital Entrepreneurship

Sustainable digital entrepreneurship is a combination of sustainable principles and digital technology that can encourage the birth of new innovations. This type of entrepreneurship uses digital technology to solve social and environmental problems and add economic value to its business. Dabbous et al. (2023) argue that the positive impact of digital entrepreneurship can increase the sustainable capabilities of a company. This can be done by integrating digital technology and sustainable business models (SBMs) (Gregori & Holzmann, 2020). He et al. (2024), in their research, also stated that sustainable orientation can increase innovation capabilities; in this case, it also has a role in digital innovation. The combination of sustainability and digitalization has been proven to provide a competitive advantage for companies (Isensee et al., 2023). With social and environmental activity steps and good integration with digital technology, companies will have good resilience (Awad & Martín-Rojas, 2024).

Dynamic Capability Theory (DCT) can serve as the theoretical foundation for sustainable digital entrepreneurship, given the company's ability to experience, utilize, and transform digital technology into sustainable values, thus impacting economic, social, and environmental aspects. These three aspects are key capabilities in enhancing innovation and developing new aspects within a company's business model (Xu et al., 2022). Therefore, the fundamental principle of sustainable digital entrepreneurship is how digital innovation can impact the creation of new values that influence and impact sustainability.

Sustainable Digital Entrepreneurship and Value Creation

Good digitalization can improve a company's ability to perform well, so that businesses can grow and be competitive. Its use in the field of sustainability can also create value, not only economic but also social and environmental (Dabbous et al., 2023; Gregori & Holzmann, 2020). Having digital capabilities can help innovations emerge (He et al., 2024; Xu et al., 2022). The integration of digital technology and social and environmental activities can provide advantages for companies and resilience in competition (Awad & Martín-Rojas, 2024; Isensee et al., 2023). Therefore, the combination of digital entrepreneurship and sustainability can be a good competitive advantage for companies. This research is still needed because there is still a gap in the topic of digital entrepreneurship and sustainability. With the framework, it is expected to support the digital capabilities of business owners and then support business development in terms of the economy, society, and environment.

From this perspective, it shows that not only the adoption of technology but also the creation of sustainable value integrated with digital technology with a sustainability orientation forms sustainable digital entrepreneurship.

Digital Sustainability Challenges

With the many studies that have focused on digital entrepreneurship and sustainability, there is still a need to understand and explore its various contexts. There is still a need for a comprehensive model to discuss sustainable digital entrepreneurship that is more structured and easier to use. As stated by He et al. (2024), digital and sustainable innovations need to have a strategy that is in line with their preparation.

The concept of digital sustainability is an evolving domain, but there is still no comprehensive methodology to assess the environmental impact of digital transformation (Rizzello & Kabli, 2020; Rosário & Dias, 2023). Furthermore, the relationship between digital transformation and the implementation of SBMs requires

more in-depth study to fully understand their synergies. This creates a need for more focused theory development, especially in the context of integrating sustainability and digitalization in the realm of sustainable digital entrepreneurship. On the other hand, there is a lack of practical tools such as self-assessments that fully integrate sustainability and digitalization perspectives, making it difficult for organizations to overcome their internal barriers (Alshdaifat et al., 2024). This problem becomes even more challenging for startups in developing countries, which face limited resources and regulations in their efforts to implement digital sustainability. In addition, structured monitoring and evaluation of research results are needed, especially to ensure their contribution to achieving the SDGs.

These challenges demonstrate that the interplay between digital transformation, sustainability strategies, and their implementation through business model innovation is not yet fully understood. Therefore, further conceptual development is needed to understand how these elements contribute to sustainable digital entrepreneurship.

Measurement and Implementation Challenges

Another barrier arises from the lack of uniform standards in measuring and assessing impact (Gucciardi, 2024; Vergallo et al., 2024). The wide variety of evaluation methods (Eisner et al., 2022) and the need to explore in-depth knowledge of material composition enhance the measurement process, making it difficult to apply universally across industries. On the empirical side, data supporting the success of startups in implementing sustainable digital entrepreneurship tools is also very limited, hampering efforts to verify the effectiveness of these tools in real business contexts.

Another obstacle is that there is also a psychological approach to how startups build their business models and operational strategies to support sustainable digital entrepreneurship. Currently, reporting outside of financial aspects, such as social and environmental, has not been applied consistently (Acciarini et al., 2022; Vergallo et al., 2024).

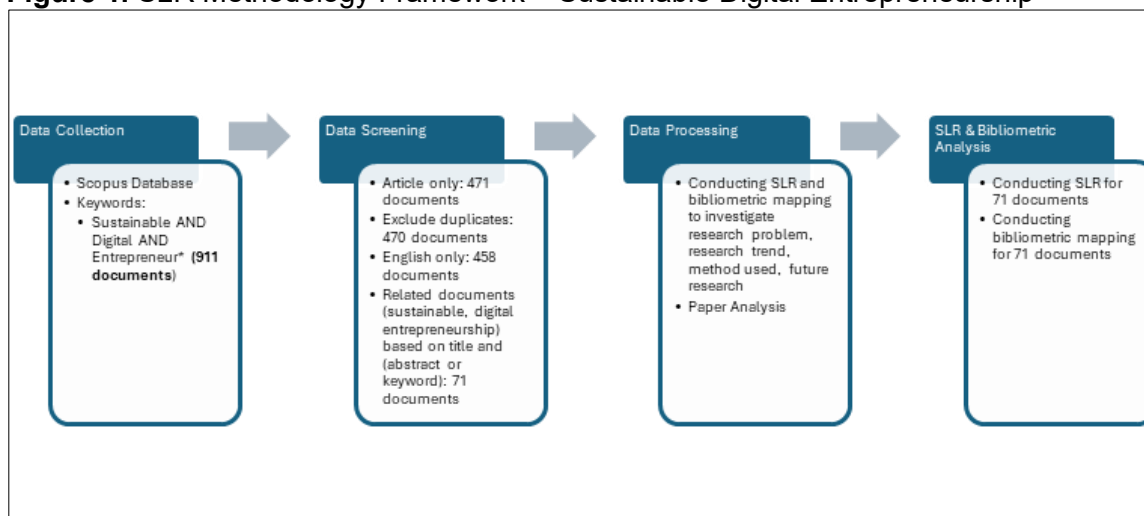
Overall, these challenges illustrate the need for a more systematic structure to identify the key factors influencing sustainable digital entrepreneurship. The resulting key dimensions can then serve as the basis for the development, implementation, and evaluation of digital entrepreneurship aimed at sustainability.

RESEARCH METHOD

Research Approach and Design

This study uses an SLR approach combined with bibliometric analysis to explore developments in sustainable digital entrepreneurship. This approach provides a systematic, transparent, and replicable overview of the synthesis of existing knowledge. Bibliometric analysis helps identify trends in previous research, structure themes, identify key influencers, and develop potential future research. The study employed the PRISMA method (Page et al., 2021) to conduct a systematic and structured literature review. The overall process can be seen in Figure 1.

Figure 1. SLR Methodology Framework – Sustainable Digital Entrepreneurship



Data Source and Search Strategy

This study uses the Scopus database because it is one of the largest and most comprehensive multidisciplinary academic databases, where high-quality research in peer-reviewed journals is found. The Scopus database is also used in many bibliometric and systematic reviews because of its very comprehensive coverage, high standards in its indexing quality, and its data extraction capabilities for use in VOS viewers. The data collection process used the search string: TITLE-ABS-KEY ("sustainable" AND "digital" AND entrepreneur*). These keywords are a combination of sustainable digital entrepreneurship. After the search was conducted, there were 911 documents filtered.

Inclusion and Exclusion Criteria

When selecting documents, it is important to consider the relevance and quality of the dataset. This study has several inclusion and exclusion criteria. The inclusion criteria include peer-reviewed journal articles, articles written in English, and research discussing sustainability and digital entrepreneurship, with relevant terms appearing in the title, abstract, or keywords. The exclusion criteria include conference articles, book chapters, editorials, notes, and reviews, removing duplicates, articles not written in English; and articles not discussing sustainable digital entrepreneurship.

Screening Process

The screening process was carried out in several stages. The first step, which yielded 911 documents, was the search results. Then, a dataset focused on journal articles yielded 471 documents. Duplicate articles resulted in a total of 470 documents. The next step was to remove articles not in English from the list, resulting in a total of 458 documents. Finally, the titles, abstracts, and keywords containing sustainable digital entrepreneurship were reviewed. Those not containing these three keywords were removed from the list. After the final process, 71 documents were collected for further analysis.

Bibliometric and Literature Analysis

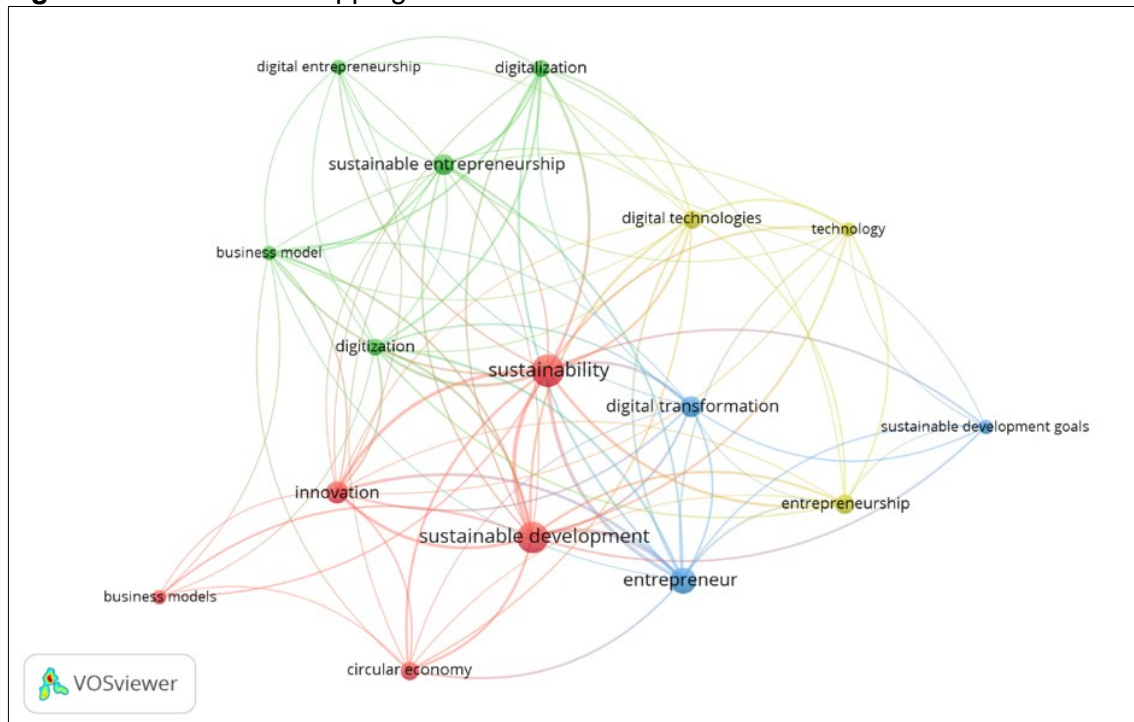
The 71 documents obtained were analyzed to explore sustainable digital entrepreneurship. Two analytical approaches were employed: bibliometric mapping using VOSviewer to identify thematic clusters, trends in previous research, and the relationships between concepts within sustainable digital entrepreneurship. Keyword co-occurrence analysis was also conducted to identify the underlying structure and interactions between themes. A SLR was then used to synthesize the findings, classify

research topics, identify methodological patterns used in previous research, and identify the orientation of previous research toward the SDGs. The combination of these two approaches made the research more comprehensive and easily replicable.

RESULTS

The data found were 911 documents; after the data curation process, there were 71 documents that were processed for in-depth analysis, and bibliometric mapping was carried out. The following is the data seen in the VOSviewer application.

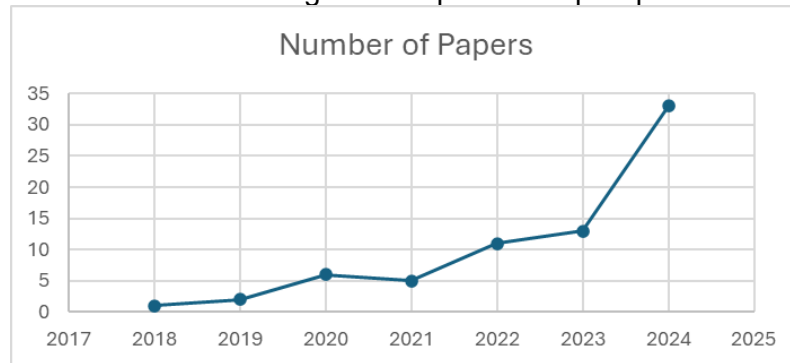
Figure 2. Bibliometric Mapping



According to Figure 2, there are 4 main trends in the topic of sustainable digital entrepreneurship, namely sustainability and digital transformation, business model innovation, circular economy and sustainable practices, and entrepreneurship and sustainability goals.

The emergence of these four themes illustrates that sustainable digital entrepreneurship is evolving across multiple disciplines, extending beyond entrepreneurship. Many academics consider digitalization and sustainability orientation to be inseparable domains. Digital transformation and sustainability are the core foundations of technology within the sustainable digital entrepreneurship realm. Furthermore, business model innovation demonstrates a company's ability to transform digital capabilities into new values. The circular economy and sustainable practices focus on resource efficiency and environmental management, while entrepreneurship and sustainability goals focus on the impact of business activities. Overall, these four topics summarize how digital entrepreneurship now focuses on social, economic, and environmental impacts.

Figure 3. Number of Sustainable Digital Entrepreneurship Papers



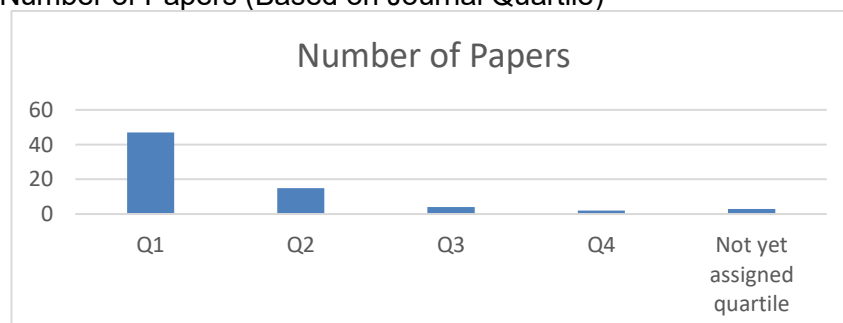
From Figure 3, the number of publications has increased significantly on the topic of “Sustainable Digital Entrepreneurship”, especially in 2022, and peaked in 2024 with 35 publications. This topic is a special discussion for researchers because it integrates sustainable entrepreneurship and digital entrepreneurship. This increase is due to research that focuses on the development of technology aimed at supporting sustainability needs.

Figure 4. Trending Topics



Figure 4 shows that the topic of "Sustainability and Digital Transformation" dominates the trend, especially after 2022. This is followed by "Circular Economy and Sustainable Practices," which shows significant growth in 2024. From this data, sustainability in the context of digital entrepreneurship is an increasingly important area. In addition, business model innovation & entrepreneurship and sustainability goals also show a growing focus on research, especially in relation to application in more specific units of analysis: companies, SMEs, and individuals.

Figure 5. Number of Papers (Based on Journal Quartile)



According to Figure 5, most publications on the topic of “Sustainable Digital Entrepreneurship” are in Q1 journals, indicating the high quality of published articles. The number of articles in Q2 to Q4 is less than in Q1. This shows that this research is absorbed by high-quality journals.

Figure 6. Topics vs. Journal Quartile

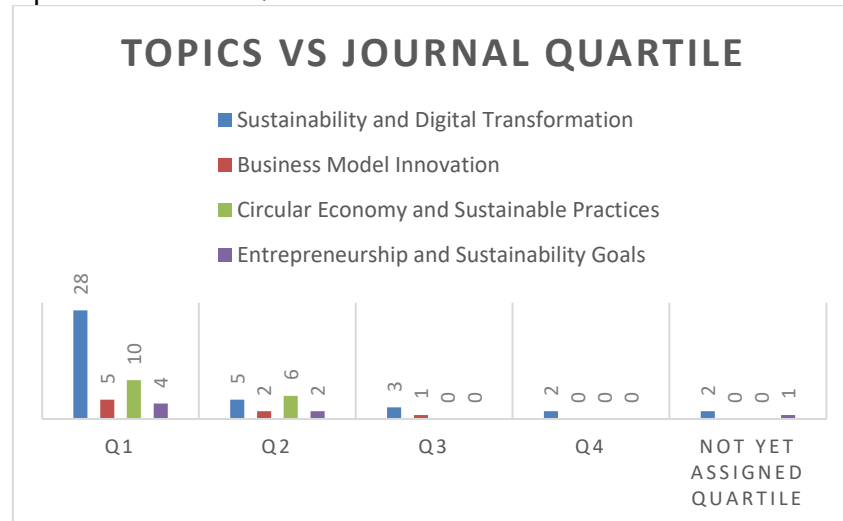


Figure 6 shows that the topic of “Sustainability and Digital Transformation” has the highest number of publications in Q1 journals, indicating a strong focus on integrating the two. Meanwhile, other topics such as “Circular Economy” and “Entrepreneurship and Sustainability Goals” are scattered in several spots.

Table 1. Influential Authors

Name	Title	Order
Gao S.	Entrepreneurship, Digital Capabilities, and Sustainable Business Model Innovation: A Case Study	1st
	The Sustainable Rural Industrial Development under Entrepreneurship and Deep Learning from Digital Empowerment	1st
Pigola A.	Sustainable business value model in the ICT4D research agenda	1st
	Impacts of Digital Entrepreneurial Ecosystems on Sustainable Development: Insights from Latin America	1st
Ip C.Y.	Effect of digital literacy on social entrepreneurial intentions and nascent behaviours among students and practitioners in mass communication	1st
	Fostering social entrepreneurship in university students: the moderating role of entrepreneurial creativity	1st
Gregori P.	Sustainable entrepreneurship on digital platforms and the enactment of digital connectivity through business models	1st
	Digital sustainable entrepreneurship: A business model perspective on embedding digital technologies for social and environmental value creation	1st
Gupta B.B.	New paradigms of sustainable entrepreneurship in metaverse: a micro-level perspective	1st

	Interlinkages Between Digital-Social Entrepreneurship and Technological Capabilities for Sustainable Value Creation	3rd
Bianchini M.	Exploring Circularity Toolkits for SMEs Learning Ecosystems	1st
	Shifting Design Thinking to a Circular Design Perspective: Reframing the Process of Circular Innovation	2nd
Sedini C.	Shifting Design Thinking to a Circular Design Perspective: Reframing the Process of Circular Innovation	1st
	Exploring Circularity Toolkits for SMEs Learning Ecosystems	3rd
Gaurav A.	New paradigms of sustainable entrepreneurship in metaverse: a micro-level perspective	2nd
	Fintech advancements in the digital economy: Leveraging social media and personal computing for sustainable entrepreneurship	2nd
Holzman P.	Digital sustainable entrepreneurship: A business model perspective on embedding digital technologies for social and environmental value creation	2nd
	Sustainable entrepreneurship on digital platforms and the enactment of digital connectivity through business models	2nd
Maffei S.	Exploring Circularity Toolkits for SMEs Learning Ecosystems	2nd
	Shifting Design Thinking to a Circular Design Perspective: Reframing the Process of Circular Innovation	3rd
Kraus S.	The impact of digitalization on entrepreneurial activity and sustainable competitiveness: A panel data analysis	3rd
	The role of strategic orientations for digital innovation: When entrepreneurship meets sustainability	4th
Kumar A.	Circular economy startups and digital entrepreneurial ecosystems	4th
	Interlinkages Between Digital-Social Entrepreneurship and Technological Capabilities for Sustainable Value Creation	6th

Based on Table 1, the publications cover a wide range of topics such as SBMs, digital literacy, and circular design. The pattern observed is that sustainable digital entrepreneurship development is influenced by several research streams, such as sustainable entrepreneurship, innovation management, and digital transformation. This diversity of topics also demonstrates that sustainable digital entrepreneurship is a constantly evolving field, opening up opportunities for interdisciplinary collaboration.

Table 2. Most Cited

Authors	Title	Year	Source title	Cited by
George G.; Merrill R.K.; Schillebeeckx S.J.D.	Digital Sustainability and Entrepreneurship: How Digital Innovations Are Helping Tackle Climate Change and Sustainable Development	2021	Entrepreneurship : Theory and Practice	354
Bican P.M.; Brem A.	Digital Business Model, Digital Transformation, Digital Entrepreneurship: Is there a sustainable "digital"?	2020	Sustainability (Switzerland)	206
Gössling S.; Michael Hall C.	Sharing versus collaborative economy: how to align ICT developments and the SDGs in tourism?	2019	Journal of Sustainable Tourism	185

Gregori P.; Holzmann P.	Digital sustainable entrepreneurship: A business model perspective on embedding digital technologies for social and environmental value creation	2020	Journal of Cleaner Production	156
Quaye D.; Mensah I.	Marketing innovation and sustainable competitive advantage of manufacturing SMEs in Ghana	2019	Management Decision	118
Dana L.-P.; Salamzadeh A.; Hadizadeh M.; Heydari G.; Shamsoddin S.	Urban entrepreneurship and sustainable businesses in smart cities: Exploring the role of digital technologies	2022	Sustainable Technology and Entrepreneurship	76
Dabbous A.; Barakat K.A.; Kraus S.	The impact of digitalization on entrepreneurial activity and sustainable competitiveness: A panel data analysis	2023	Technology in Society	46
Tohănean D.; Buzatu A.I.; Baba C.-A.; Georgescu B.	Business model innovation through the use of digital technologies: Managing risks and creating sustainability	2020	Amfiteatru Economic	35
Pizzi S.; Leopizzi R.; Caputo A.	The enablers in the relationship between entrepreneurial ecosystems and the circular economy: the case of circularity.com	2022	Management of Environmental Quality: An International Journal	35
Davies F.T.; Garrett B.	Technology for Sustainable Urban Food Ecosystems in the Developing World: Strengthening the Nexus of Food–Water–Energy–Nutrition	2018	Frontiers in Sustainable Food Systems	34
Muhammad Muneeb F.; Karbassi Yazdi A.; Wanke P.; Yiyin C.; Chughtai M.	Critical success factors for sustainable entrepreneurship in Pakistani Telecommunications industry: a hybrid grey systems theory/ best-worst method approach	2020	Management Decision	31
Xu G.; Hou G.; Zhang J.	Digital Sustainable Entrepreneurship: A Digital Capability Perspective through Digital Innovation Orientation for Social and Environmental Value Creation	2022	Sustainability (Switzerland)	31

Table 2 shows that some articles have very high citation rates, such as digital sustainability and entrepreneurship, which confirms the impact and relevance of research in this area. In recent years, research in this area has seen an increase in focus, with the combination of digital entrepreneurship and sustainability leading other researchers to develop this topic, examining it in various contexts. Digital entrepreneurship is geared toward supporting global sustainability goals. Prominent

articles show that sustainable research can focus on exploring digital innovation that influences operations that have social and environmental impacts.

Table 3. Q1 Journals

Journal	Q	H-Index	Number of Papers
Sustainability (Switzerland)	Q1	169	15
Management Decision	Q1	126	4
Business Strategy and the Environment	Q1	147	2
Technological Forecasting and Social Change	Q1	179	2
Heliyon	Q1	88	2
Journal of Cleaner Production	Q1	309	1
Entrepreneurship: Theory and Practice	Q1	198	1
Journal of Sustainable Tourism	Q1	140	1
Studies in Higher Education	Q1	129	1
Corporate Social Responsibility and Environmental Management	Q1	113	1
Technology in Society	Q1	88	1
European Journal of Innovation Management	Q1	80	1
International Entrepreneurship and Management Journal	Q1	79	1
Sustainable Production and Consumption	Q1	76	1
Management of Environmental Quality: An International Journal	Q1	55	1
Frontiers in Sustainable Food Systems	Q1	54	1
Journal of Innovation and Knowledge	Q1	54	1
Information Technology for Development	Q1	52	1
Journal of Global Information Management	Q1	46	1
International Journal of Sustainable Engineering	Q1	42	1
Journal of Social Entrepreneurship	Q1	41	1
Humanities and Social Sciences Communications	Q1	35	1
Journal of Asia Business Studies	Q1	33	1
Bottom Line	Q1	25	1
Resources, Conservation and Recycling Advances	Q1	21	1
Innovation and Development	Q1	18	1
Sustainable Technology and Entrepreneurship	Q1	15	1

It can be seen in Table 3 that previous research has appeared in reputable journals such as Sustainability (Switzerland) and the Journal of Cleaner Production. This illustrates that this topic is of interest on a global scale. This topic is also published in journals from various fields such as tourism, higher education, sustainable food systems, sustainable engineering, and even in journals that focus on environmental conservation. This diversity demonstrates that sustainability challenges continue to be developed within the realms of entrepreneurship and digital solutions.

Table 4. Q2 Journals

Journal	Q	H-Index	Number of Papers
Frontiers in Environmental Science	Q2	77	1
Cogent Business and Management	Q2	44	1
Journal of Enterprising Communities	Q2	40	1
Chinese Management Studies	Q2	35	1

Economies	Q2	34	1
Systems	Q2	33	1
Amfiteatru Economic	Q2	30	1
International Review on Public and Nonprofit Marketing	Q2	25	1
Journal of Teacher Education for Sustainability	Q2	23	1
Academia Revista Latinoamericana de Administracion	Q2	22	1
Africa Journal of Management	Q2	22	1
Interaction Design and Architecture(s)	Q2	19	1
HighTech and Innovation Journal	Q2	18	1
Journal of Advanced Research in Applied Sciences and Engineering Technology	Q2	11	1
International Journal of Design Management and Professional Practice	Q2	4	1

Table 4 shows that several articles are also seen in Q2 journals, such as Frontiers in Environmental Science. This shows that the topic of sustainable digital entrepreneurship has become an important topic in recent years. This topic is also published in several other fields, such as non-profit, teacher education, high tech innovation, and interaction design and architecture. This clearly demonstrates that sustainable digital entrepreneurship is not confined to a single discipline but has broadly developed into a research agenda that connects many disciplines related to digital use for sustainability goals.

Table 5. Research Focus and SDGs Orientation

Research Focus	SDGs Orientation	
	No	Yes
Circular Economy	7	
DE Ecosystem	3	1
Digital Critical Succes Factors	2	
Digital Innovation	2	
Digital Platform	1	
Digital Technology	2	
Digital Transformation	3	
Green Entrepreneurship	3	
SDGs		4
Social Entrepreneurship Education	1	
Social Entrepreneurship Intention	2	
Sustainable Behavior	1	
Sustainable Business Development	1	
Sustainable Business Model Innovation	3	
Sustainable Business Opportunities	2	
Sustainable Business Performance	6	
Sustainable Business Practices	4	
Sustainable Competitive Advantage	5	
Sustainable Development	6	
Sustainable Digital Entrepreneurship Characteristics	2	
Sustainable Entrepreneurship CSF	1	
Sustainable Female Entrepreneur	1	
Sustainable Fintech	2	
Sustainable Metaverse	1	
Sustainable Resilience Strategy		1
Sustainable Value Creation	4	

Table 5 shows that the phenomenon emerged from the need to fulfill SDGs through the impact made by startups. Global venture capital is currently focused on sustainable development. From the data, there is still a gap in research conducted related to sustainable digital entrepreneurship, namely the gap in orientation to SDGs. Currently, most studies focus only on sustainable development, but not specifically on the SDGs. So, there is an opportunity to link sustainable digital entrepreneurship factors to SDGs. The data demonstrates that further research must go beyond the general sustainability narrative and develop deeper and more specific mechanisms linking entrepreneurial activity and digital innovation to measurable SDG outcomes.

Table 6. Matrix of Research Focus and Methodology

Research Focus	Methodology		
	Mixed-Method	Qualitative	Quantitative
Circular Economy		4	3
DE Ecosystem	2	2	
Digital Critical Succes Factors			2
Digital Innovation	1	1	
Digital Platform	1		
Digital Technology		2	
Digital Transformation		2	1
Green Entrepreneurship			3
SDGs	2	1	1
Social Entrepreneurship Education		1	
Social Entrepreneurship Intention			2
Sustainable Behavior		1	
Sustainable Business Development		1	
Sustainable Business Model Innovation		2	1
Sustainable Business Opportunities		1	1
Sustainable Business Performance		1	5
Sustainable Business Practices	1	1	2
Sustainable Competitive Advantage	1	1	3
Sustainable Development	1	3	2
Sustainable Digital Entrepreneurship Characteristics		1	1
Sustainable Entrepreneurship CSF			1
Sustainable Female Entrepreneur	1		
Sustainable Fintech		1	1
Sustainable Metaverse		1	
Sustainable Resilience Strategy	1		
Sustainable Value Creation		2	2

According to Table 6, there are gaps in research focus and methodology. Several areas in mixed methods can still be explored, where previous research has mostly used qualitative or quantitative methods only. Especially in this study, starting from sustainable value creation, behavior, business model innovation, and sustainable business performance. The combination of qualitative and quantitative research focuses will help to explore related topics. The limitations of using mixed methods show that many studies have not combined qualitative and quantitative data, so that they can see opportunities for more comprehensive, in-depth research on the findings.

Table 7. Matrix of Selected Research Focus

Research Focus	Methodology		
	Mixed-Method	Qualitative	Quantitative
SDGs	2	1	1
1 Descriptive Analysis, Case Study	1		
2 Interview, PLS-SEM	1		
3 Logistic Regression			1
4 SLR		1	
Sustainable Behavior		1	
1 Case Study		1	
Sustainable Business Development		1	
1 Case Study		1	
Sustainable Business Model Innovation		2	1
1 Case Study		1	
2 Grounded Theory		1	
3 Survey			1
Sustainable Business Opportunities		1	1
1 Case Study		1	
2 CFA, SEM			1
Sustainable Business Performance		1	5
1 PLS-SEM			2
2 SEM			3
3 SLR		1	
Sustainable Business Practices	1	1	2
1 Bibliometric Analysis		1	
2 Regression			1
3 SEM			1
4 Survey, Interview	1		
Sustainable Competitive Advantage	1	1	3
1 fsQCA	1		
2 Regression			1
3 SEM			2
4 Theoretical Framework		1	
Sustainable Development	1	3	2
1 Case Study		2	
2 Interview, Interpretive Structural Modelling (ISM)	1		
3 Neural Network			1
4 SLR		1	
5 TOPSIS			1
Sustainable Digital Entrepreneurship Characteristics		1	1
1 Grounded Theory		1	
2 Tobit Regression Model			1
Sustainable Entrepreneurship CSF			1
1 Grey Systems Theory (GST), Best-Worst Method (BWM)			1
Sustainable Value Creation		2	2
1 Conceptual Model		1	
2 Netnography, Grounded Theory		1	
3 PLS-SEM			2

Table 7 consists of several selected topics to explore how to use the methodology and methods used in each topic. Referring to the table above, there are still many areas that can be explored for the use of mixed methods and methods that can clarify the findings on the topic of sustainable digital entrepreneurship. Further research could explore combining exploratory and confirmatory approaches to enrich findings related to digital impacts and the formation of new values.

Table 8. Matrix of Research Focus and Output

Research Focus	Research Output		
	Empirical	Practical	Theoretical
Circular Economy	5	1	1
DE Ecosystem	4		
Digital Critical Success Factors	2		
Digital Innovation	1	1	
Digital Platform	1		
Digital Technology	1		1
Digital Transformation	3		
Green Entrepreneurship	3		
SDGs	3		1
Social Entrepreneurship Education	1		
Social Entrepreneurship Intention	2		
Sustainable Behavior	1		
Sustainable Business Development	1		
Sustainable Business Model Innovation	3		
Sustainable Business Opportunities	2		
Sustainable Business Performance	6		
Sustainable Business Practices	4		
Sustainable Competitive Advantage	4		1
Sustainable Development	4		2
Sustainable Digital Entrepreneurship Characteristics	2		
Sustainable Entrepreneurship CSF	1		
Sustainable Female Entrepreneur	1		
Sustainable Fintech	2		
Sustainable Metaverse	1		
Sustainable Resilience Strategy	1		
Sustainable Value Creation	3		1

Table 8 shows data containing research focus and research output produced from previous research. In general, it is clearly illustrated that research that has been conducted by previous researchers focuses on empirical. Several topics are discussed with a theoretical framework. Then the area that is still open is practical, where this opportunity can be utilized to answer phenomena and answer real needs of the industry. From the practical data, it is clear that there is an opportunity to develop a framework, measurement methods, and implementation methods to support the entrepreneurial ecosystem in the implementation of sustainable digital entrepreneurship.

Table 9. Matrix of Research Focus and Country Context

Research Focus	Countries		
	Advanced	Developing	Global
Circular Economy	6	1	
DE Ecosystem		2	2
Digital Critical Success Factors		2	
Digital Innovation	1	1	
Digital Platform		1	
Digital Technology		2	
Digital Transformation	2	1	
Green Entrepreneurship		3	
SDGs	1	1	2
Social Entrepreneurship Education			1
Social Entrepreneurship Intention	2		
Sustainable Behavior	1		
Sustainable Business Development	1		
Sustainable Business Model Innovation	2	1	
Sustainable Business Opportunities	1	1	
Sustainable Business Performance		5	1
Sustainable Business Practices	2	1	1
Sustainable Competitive Advantage		3	2
Sustainable Development	1	2	3
Sustainable Digital Entrepreneurship Characteristics	1	1	
Sustainable Entrepreneurship CSF		1	
Sustainable Female Entrepreneur	1		
Sustainable Fintech		1	1
Sustainable Metaverse			1
Sustainable Resilience Strategy		1	
Sustainable Value Creation		2	2

From Table 9, it can be seen that research locations are spread across 3 areas, namely global, advanced, and developing countries. From several existing research focuses, it appears that there are still opportunities for development in developing countries, although they already exist in several areas, but additional data is still needed, both theoretical, empirical, and practical. The number of studies that are not too numerous in certain focuses is also a consideration in this area. Given the differences in economic, technological, and regulatory conditions faced by different countries, future research could explore context-specific models that can better represent local entrepreneurial ecosystems and address sustainability challenges.

DISCUSSION

The rapid development of sustainable digital entrepreneurship in recent years, as evidenced by data, confirms that digital integration and sustainability have become topics of discussion in both academic and non-academic settings. The large number of studies published in Q1 journals also demonstrates that this research is growing not only in quantity but also in quality. This presents an opportunity for the development of theory and scholarship to explore the dimensions that shape sustainable digital entrepreneurship.

From the trend analysis conducted, the integration of digital transformation and sustainability has become the most dominant topic. Discussions at this macro level in various studies demonstrate the role of digital technology as a key enabler in supporting the achievement of sustainability goals. However, research at this level has yet to explore micro mechanisms, specifically the role of these dimensions in contributing to sustainability outcomes.

Another finding, on the topic of business model innovation and sustainable value creation, demonstrates a transformation in business model creation by integrating digital aspects into sustainability. The data revealed that the development of this business model innovation is still general and lacks an in-depth understanding of how startups or SMEs structure their operational business models. This presents another opportunity for development, related to how these two crucial aspects can be operationalized.

Conversely, several dimensions, such as the circular economy, sustainable behavior, and sustainable resilience strategies, remain underexplored by other researchers. This is a significant concern, given that these dimensions hold significant potential in explaining how businesses can operate and grow long-term in a dynamic digital marketplace, aiming for sustainable outcomes. The limitations in the study and development of these dimensions represent a gap that needs to be filled to better understand businesses adapting to sustainable digital entrepreneurship.

Furthermore, other findings indicate that there is still limited exploration linking sustainable digital entrepreneurship and the SDGs. Although some literature discusses sustainability, only a small portion directly links it to SDG indicators. This gap indicates that sustainability impact measurements are still quite diverse in practice and academia. Standardized and clear measurements are needed, and contributions in this field are needed.

From a methodological perspective, qualitative and quantitative approaches have been widely used by researchers attempting to address issues in sustainable digital entrepreneurship. However, the use of mixed-methods approaches in this complex phenomenon remains limited, creating an opportunity for further research, as they are useful for obtaining a more comprehensive picture of the sustainable digital entrepreneurship field. Furthermore, research output is still dominated by empirical contributions rather than practical ones, creating an opportunity to connect theory and practice.

Another finding concerns the geographic context. Data distribution reveals that there are still limitations in developing countries, including resource constraints, digital aspects, and pressures on achieving sustainability outcomes, or SDGs. The bibliometric analysis identified four dominant research themes, while the systematic literature review and gap analysis enabled a higher-level conceptual synthesis. Rather than directly reproducing the bibliometric clusters, this study integrates related research streams into six broader dimensions that more comprehensively represent the structure of sustainable digital entrepreneurship. This synthesis provides a coherent taxonomy that captures the relationships among digital capability, entrepreneurial orientation, sustainability strategy, business model innovation, ecosystem support, and performance outcomes. [Table 10](#) presents the resulting conceptual dimensions and their associated research focuses.

Table 10. Sustainable Digital Entrepreneurship Concepts and Research Focus

Dimension	Research Focus
Digital Foundation & Capability	• Digital Technology • Digital Transformation • Digital Platform • Digital Innovation • Digital Critical Success Factors
Entrepreneurial Orientation & Actor	• Green Entrepreneurship • Social Entrepreneurship Education • Social Entrepreneurship Intention • Sustainable Female Entrepreneur • Sustainable Entrepreneurship Critical Success Factors • Sustainable Digital Entrepreneurship Characteristics
Sustainability Strategy & Practices	• Circular Economy • Sustainable Behavior • Sustainable Business Practices • Sustainable Development • SDGs Orientation • Sustainable Resilience Strategy
Business Model & Opportunity Creation	• Sustainable Business Model Innovation • Sustainable Business Opportunities • Sustainable Business Development • Sustainable Value Creation
Ecosystem & Financial Enablers	• Digital Entrepreneurship Ecosystem • Sustainable Fintech • Sustainable Metaverse
Performance & Competitive Outcomes	• Sustainable Business Performance • Sustainable Competitive Advantage • Sustainability Metrics

These six dimensions are consistent with previous literature on entrepreneurship, digital transformation, and sustainability. Previous research has focused on digital capabilities, entrepreneurial orientation, sustainability practices, business model innovation, ecosystems, and performance measurement (Gregori & Holzmann, 2020; Isensee et al., 2023). A key finding is the development of a construct that describes the creation of sustainable value from digital entrepreneurship. Therefore, these six dimensions are not merely a single dimension but complementary components of sustainable digital entrepreneurship.

Digital Foundation and Capability

This concept is the main foundation of sustainable digital entrepreneurship, explaining how digital transformation and digital capabilities become the basis for value creation. It is supported by digital technology, platforms, and infrastructure that drive digital innovation. Research also focuses on digital critical success factors, indicating the crucial role of digitalization beyond just operational tools. For example, digital capability refers to a company's ability to leverage data, platforms, and advanced technology to identify opportunities and improve the efficiency and effectiveness of business processes.

Research has shown that the integration of digital technologies such as IoT, AI, and digital platforms can improve companies' resource efficiency and open up new opportunities for sustainable business. Furthermore, digital platforms can also play a role

in addressing climate issues (George et al., 2021). Companies' digital capabilities, including digital sensing, seizing, and transforming, are key factors in business model innovation (Xu et al., 2022). This digital readiness also helps companies achieve sustainable transformation (Bican & Brem, 2020). In general, this dimension focuses on the digital capacity of both organizations and individuals to support sustainable digital transformation. These findings also reinforce DCT as the underlying theoretical lens of this study. The identified digital foundation and capability dimension reflects firms' abilities to sense digital opportunities, seize emerging technologies, and transform organizational resources into sustainable value creation. This theoretical perspective provides the foundation for understanding how the six proposed dimensions collectively support sustainable digital entrepreneurship.

From a theoretical perspective, this dimension complements DCT, which focuses on sensing, seizing, and transforming digital opportunities to achieve a company's sustainability vision and goals. Practically, these findings provide an opportunity for startups and SMEs to prepare and prioritize digital readiness and technological capacity before developing digital initiatives for sustainability.

Entrepreneurial Orientation and Actor

This concept emphasizes the success factors of sustainable digital entrepreneurship, which are influenced by the business orientation, characteristics, and values held by the entrepreneur. Research focused on the entrepreneurial orientation and actor dimension includes social entrepreneurship, green entrepreneurship, entrepreneurial intention, sustainable female entrepreneurs, and their critical success factors. This indicates that the sustainable digital realm is not only technology-based but also rooted in the human side, such as mindset, motivation, and entrepreneurial readiness. In this case, educational provision, experience, and the ability to adapt are key to the importance of human capital in sustainable digital entrepreneurship. Not only is technology the main point, but actors who have vision, values, and competence are also key factors in implementing digital integration for sustainable impact.

Research on green entrepreneurship and social entrepreneurship is a key driver in realizing digital utilization for sustainability (Sharma et al., 2023). Furthermore, intention, mindset, and awareness also play a crucial role (Ip, 2024). Furthermore, research has explored the characteristics of entrepreneurs in sustainable digital entrepreneurship, such as systems thinkers and dynamic visionaries (Isensee et al., 2023). Other critical success factors, such as managerial competence, transparency, and social orientation, are important enablers for entrepreneurs in this field. These dimensions generally demonstrate the importance of the actor and their orientation toward sustainability as supporting technology.

From a theoretical perspective, this dimension develops sustainable entrepreneurship and human capital by explaining the role of entrepreneurs' mindsets, values, and competencies in driving sustainability through digital innovation. Practically, this dimension encourages better preparation in entrepreneurship education, the development of entrepreneurial and organizational leadership, and sustainability awareness, which can be implemented in various programs to increase entrepreneurial readiness.

Sustainability Strategy and Practices

This dimension explains how sustainability principles are applied to a company's operational activities. Research focuses on topics such as the circular economy, sustainable behavior, sustainable business practices, SDGs orientation, sustainable

development focus, and sustainable resilience strategy, which are widely studied, demonstrating that sustainability is not merely a normative goal but a crucial part of business strategy implementation. Sustainability is seen as part of a dynamic process in creating value and achieving sustainability impact goals. The integration of SDGs also helps implement indicators in a company's daily activities, making them more measurable and globally relevant.

Research in this dimension focuses on how companies can implement sustainability strategies in their business operations. For example, the circular economy approach, CSR, and the SDGs are now central to building sustainable business operations (Ilić et al., 2022; Stawicka, 2021). This integration of digital and sustainability can be a powerful catalyst for developing adaptive and efficient strategies (Ogrean & Herciu, 2021). In general, sustainability is not merely a concept; it requires concrete action in business activities.

This dimension encourages sustainability to be viewed as part of a business's operational strategy, rather than simply for reporting. Practically, these findings indicate that incorporating sustainability indicators and SDG alignment plays a crucial role in the long-term operational journey of businesses.

Business Model and Opportunity Creation

The next dimension is business model and opportunity creation, which are crucial elements of the value creation process in sustainable digital entrepreneurship. The research focuses on SBM innovation, sustainable business opportunities, sustainable business development, and sustainable value creation. This illustrates the importance of integrating digital and sustainability into business models, leading to innovations that not only identify market opportunities but also provide solutions and impact social and environmental challenges.

Research in this dimension aims to identify business opportunities and develop more innovative business models. Digital integration, sustainable business model innovation (SBMI), is key to creating value that leads to economic, social, and financial impacts (Gregori & Holzmann, 2020). Furthermore, business model transformation requires a balance between innovation, risk, and sustainability, with approaches varying across sectors. Implementing digital value creation will also present unique challenges in its configuration (Fuerst et al., 2023). In general, a business model that integrates digital and sustainability is needed.

This dimension demonstrates the crucial importance of combining business model innovation and opportunity recognition in sustainable digital entrepreneurship. It provides a crucial illustration of how sustainability goals can be achieved with digital capabilities through understanding opportunities and the ability to innovate.

Ecosystem and Financial Enablers

This dimension highlights the external environment that supports the successful development of sustainable digital entrepreneurship. Interactions within the ecosystem, such as those between entrepreneurs, investors, governments, digital platforms, and the interconnected business community, are key. This ecosystem provides a platform for collaboration, exchange of access, knowledge, and resources between actors within the ecosystem. Platforms like the metaverse and financial support also provide important insights into how the ecosystem serves not only as a context but also as a systemic phenomenon, reflected in active mechanisms accelerating the growth of digital sustainability.

Research on the digital entrepreneurship ecosystem explains that providing infrastructure, networks, and access to resources is crucial in supporting entrepreneurs (Roshan et al., 2024). Furthermore, digital platforms and websites supporting the sharing economy can be enablers for entrepreneurs to collaborate, utilize resources, and create value (Pizzi et al., 2022). Furthermore, new platforms such as the Metaverse are opening new opportunities in the field of sustainability (Gupta et al., 2023). In general, sustainable digital entrepreneurship requires the support of a planned and robust ecosystem.

These findings add to the theory of ecosystems in entrepreneurship, demonstrating that sustainable digital companies require not only technology as a resource, but also financial, institutional, and collaborative support. Practically, policymakers can determine the right steps to make these ecosystems more vibrant.

Performance and Competitive Outcomes

This dimension focuses on measuring the performance results of implementing sustainable digital entrepreneurship. Previous research has focused on two key areas: sustainable business performance and sustainable competitive advantage, where combining the two empowers companies to achieve long-term excellence. Performance is measured not only in financial terms but also in social and environmental impacts, in line with the triple bottom line principle. This dimension emphasizes that the outcomes of sustainable digital entrepreneurship are the result of measurable business performance and sustainability impact.

Sustainable competitive advantage can be achieved by integrating resources and capabilities through innovation in business and marketing strategies (Quaye & Mensah, 2019). A sustainability orientation, digital transformation, and innovation can provide additional competitive advantages in the sustainability realm (Du et al., 2025). Digital adaptability and a positive stakeholder approach have also proven to be key to digital sustainability (Suseno & Basrowi, 2023). Furthermore, dynamic capabilities and knowledge management will help companies improve sustainable performance across economic, environmental, and social dimensions (Permatasari et al., 2023).

Unlike previous research in the field of entrepreneurship, which focused on financial performance, this dimension demonstrates a new combination in measuring an entrepreneur's success. It can now be measured through indicators such as economic, social, and environmental dimensions, reflecting sustainable technology-based businesses. Furthermore, the previously separate framework can now be integrated with a more coherent structure, incorporating six interconnected dimensions. This integration will provide a comprehensive explanation, starting from the existence of digital resources, the entrepreneur themselves, sustainability strategies, comprehensive ecosystem support, and how all of these can lead to sustainable performance.

Recent studies also support the themes identified in this review. For example, in the Business Model Innovation dimension, Manansala and Mallorca (2025) note the importance of ESG or sustainability integration, with audit quality and good governance embedded in a company's business operations. In their study on the Digital Transformation dimension, Sukendri et al. (2026) argued that technologies like AI can aid corporate communication and strategy. Furthermore, in the entrepreneurship and sustainability orientation dimensions, Paramita and Prasetyo (2025) demonstrated that sustainability reporting can improve corporate performance, both financially and in terms of reputation.

Furthermore, this framework will contribute theoretically and practically. Theoretically, the research taxonomy can help researchers develop sustainable digital entrepreneurship into a broader and more in-depth perspective across its dimensions in the future. Practically, this framework can serve as a guide for those within the entrepreneurship ecosystem, including academics, investors, entrepreneurs, universities, and policymakers, in designing collaborative ecosystems.

From all the existing dimensions, it can be concluded that sustainable digital entrepreneurship is an integrated system that connects digital foundations, actor orientation, sustainability strategy, business model innovation, a robust ecosystem, and sustainability performance measurement. This approach provides a conceptual foundation for understanding the critical dimensions supporting the integration of digital entrepreneurship and sustainability.

CONCLUSION

This study provides a comprehensive synthesis of sustainable digital entrepreneurship literature through a systematic literature review and bibliometric analysis. Beyond identifying publication trends and research gaps, the primary contribution of this study is the development of an integrated six-dimensional taxonomy consisting of digital foundation & capability, entrepreneurial orientation & actor, sustainability strategy & practices, business model & opportunity creation, ecosystem & financial enablers, and performance & competitive outcomes. This taxonomy offers a more coherent conceptual structure for understanding how digital entrepreneurship creates sustainable economic, social, and environmental value. The findings also demonstrate the rapid evolution of sustainable digital entrepreneurship while highlighting the need for deeper investigation into the operational mechanisms that integrate digital transformation with sustainability practices.

Furthermore, this research also identifies several gaps that could potentially provide opportunities for further research. These gaps include the potential for maximizing mixed methodology, focusing on the SDGs, and practical measurement to facilitate measurability and standardization of sustainability in the digital context. Six main concepts can still be explored in it, such as digital foundation & capability, entrepreneurial orientation & actor, sustainability strategy & practices, business model & opportunity creation, ecosystem & financial enablers, and performance & competitive outcomes.

Practically, this proposed framework can serve as a roadmap for entrepreneurs in developing their business models, exploring opportunities, and planning sustainability-related goals, ensuring their operations lead to a sustainable impact. For policymakers, these findings serve as a basis for policy design and evaluation. Researchers can identify opportunities from these findings for developing more multidisciplinary theories, testing models developed by previous researchers, and conducting comparative studies in different contexts.

Further research could focus on strengthening the interaction between digital entrepreneurship and sustainability, both the SDGs and ESG. Although there has been much discussion regarding the SDGs, there has been no measurable implementation of these indicators in business operations. Future research could also provide insights into how digital business activities can measurably impact sustainable goals. Regarding research methods, there are many possible approaches, including a combination of qualitative and quantitative methods, such as interviews, case studies, PLS SEM, fsQCA, and other methods.

LIMITATION

This study has several limitations, such as the database used only Scopus, which gives the possibility of missing data that may still be relevant. In addition, the limited keywords may limit data discovery. Suggestions for further research include deepening the keywords and expanding literature data sources.

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ABOUT THE AUTHOR(S)

1st Author

Puji Prabowo is a doctoral student at the School of Business and Management (SBM), Bandung Institute of Technology (ITB), Indonesia. He is also a Binus University lecturer, socio-entrepreneur, and business coach. He is enthusiastic about the entrepreneurial

ecosystem, entrepreneurial skills, innovation, creative ideas, and business development. He graduated with an MBA from ITB.

Email: pujiprabowo5@gmail.com

ORCID ID: <https://orcid.org/0000-0003-2620-0249>

2nd Author

Prof. Wawan Dhewanto, Ph.D, is a Professor of Entrepreneurship at the School of Business and Management (SBM) at the Bandung Institute of Technology (ITB), Indonesia. He has been a Professor of Entrepreneurship since 2021. His research interests lie in entrepreneurship and technology management, including entrepreneurship, entrepreneurial leadership, digital startups, and SMEs. He has also written eight books on entrepreneurship.

Email: w_dhewanto@sbm-itb.ac.id

ORCID ID: <https://orcid.org/0000-0002-6705-5191>

3rd Author

Akbar Adhiutama, Ph.D., is an associate professor and researcher in operations management, also researching in the management of technology and supply chain management at the School of Business and Management (SBM) at the Bandung Institute of Technology (ITB). He earned his Ph.D. in technology management from the Shibaura Institute of Technology, Japan. His research focuses on applying, innovating, and leveraging technology for business operations to achieve sustainable growth.

Email: akbar@sbm-itb.ac.id

ORCID ID: <https://orcid.org/0000-0002-8625-038X>