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A Critical Review of the Digitalization in Thai Entrepreneurship: Roles, Challenges, and Solutions

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Research Article

Keywords: Digitalization, Digital_transformation, Digital_entrepreneurship, Entrepreneurship_challenges, Thailand

Posted Date: August 31st, 2026

DOI: https://doi.org/10.21203/rs.3.rs-9412679/v1

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Additional Declarations: No competing interests reported.

Abstract

Digitalization has been one of the major drivers in the development of global entrepreneurship. However, amidst the many challenges faced in adopting and adapting to digital technology, there is a gap in the literature that systematically and critically discusses these challenges in the context of entrepreneurship in Thailand. This study aims to examine the role of digitalization in the entrepreneurial landscape in Thailand, identify key challenges, and explore solutions to overcome them. Using a systematic literature review approach, we filtered relevant studies and critically reviewed the main content of the selected literature. Our first finding revealed two different contexts regarding the role of digitalization in entrepreneurship in Thailand, namely digitalization in the context of traditional entrepreneurship, which uses digital technology to grow and develop, and digital entrepreneurship, which is rooted in digital technology. The second finding identifies four major challenges related to the digitalization of entrepreneurship in Thailand. Third, as the main contribution, we propose alternative solutions that can be strategies to overcome these challenges in order to increase the role of digitization in various entrepreneurial landscapes in Thailand.

JEL Classification: L26. M13. O53. O33

1 Introduction

Digital transformation has emerged as one of the major factors shaping the dynamics of the global economy, not least in Thailand's entrepreneurship context. The country is witnessing a significant shift towards technology-based entrepreneurship, driven by the increasing adoption of artificial intelligence (AI), financial technology (fintech), e-commerce, and various digital business platforms (Chairatana et al., 2024; Chotisarn & Phuthong, 2025). The Thai government has introduced the Thailand 4.0 strategy, which aims to transform the economy from a low-cost manufacturing base to one that prioritizes innovation (Akira, 2023; Koen et al., 2018). Despite this positive momentum, several challenges continue to hinder the digital transformation of entrepreneurship in Thailand. Rotchanakitumnuai (2017) reveals that there are still glaring gaps in digital infrastructure, especially outside of Bangkok, that prevent small businesses from adopting new technologies. Some Thai digital economy experts also point to the low level of digital literacy among entrepreneurs, especially in the micro and informal sectors, as a significant barrier to implementing effective digital business strategies in this group (Intaratat, 2021; Intraratat et al., 2025). For example, micro-entrepreneurs in the tourism sector in some parts of Thailand find it difficult to use digital platforms to expand their market reach (Chai-Arayalert et al., 2023; Ditta-Apichai et al., 2024). Similarly, small and medium-sized enterprises (SMEs) in the logistics sector find it difficult to adopt advanced technologies such as the Internet of Things (IoT) and automation, both of which are essential to increase operational efficiency and improve competitiveness (Intalar et al., 2024). Although digital transformation has great potential to enhance the competitiveness of Thai entrepreneurs, considerable efforts are still needed to overcome the various challenges faced by these entrepreneurs.

The literature on the digitalization of entrepreneurship has grown rapidly worldwide (Ács et al., 2017; Autio et al., 2021; Zhai et al., 2023). However, there is still a research gap that specifically addresses the digitalization of entrepreneurship in the context of developing countries, especially in countries with a predominance of micro, small, and medium enterprises, such as Thailand. Some studies focus on the impact of digitalization in specific sectors such as financial technology, agricultural technology, and tourism, especially those that examine new startups (Jongwanich, 2023; Kaewsuwan & Kajornkasirat, 2023). Although these firms are indeed new, entrepreneurs generally have a strong ideological foundation and existing technological capabilities, so they are not starting from scratch in learning digital technology. On the other hand, there is limited research on how traditional SMEs that do not yet have a strong foundation in digital technology can use digital tools to grow, develop, and compete with technology-based startups in similar industries.

Research in the context of traditional entrepreneurship that increases its capacity through digital technology often appears separately from research on new entrepreneurs who have roots in digital expertise (Juasrikul & Vandenberg, 2022). In the literature, the former is often referred to as digital transformation or digitalization (Singhdong et al., 2021; Ueasangkomsate, 2025), while the latter is framed in an emerging context known as digital entrepreneurship (Leung & Cossu, 2019; Niyawanont & Wanarat, 2021). Both contexts generally face similar challenges related to digital technology, such as the readiness of digital infrastructure - both physical and regulatory - and the readiness of entrepreneurs and the workforce within firms where digital talent is still limited. In addition, the constantly evolving nature of digital literacy is also a challenge for entrepreneurs. Comprehensive studies discussing these various challenges, especially in the Thai context, are still limited. Meanwhile, as various challenges continue to emerge in entrepreneurship development in the digital era, there is an urgent need to identify effective strategies to overcome these challenges.

In this paper, we explore the development of literature on digitalization in the Thai entrepreneurial landscape. We filter relevant papers to examine this topic and context using a systematic literature review approach. We focus on filtering important content from the selected articles to identify the various challenges faced and how previous research provides solutions to overcome these challenges. Therefore, this paper addresses three main research questions: What is the role of digitalization in different entrepreneurial contexts in Thailand? What are the main challenges faced? Moreover, what solutions or strategies can be proposed to overcome these challenges?

Our findings provide answers to these questions and reveal two different contexts for the role of digital technology in entrepreneurship in Thailand: digitalization in the context of traditional entrepreneurship (which continues to adapt to rapid advances in digital technology) and digital entrepreneurship (which is ideally fully supported by digital technology). Furthermore, we identify four major challenges related to the digitalization of entrepreneurship in Thailand, which are drawn from selected literature and presented in balance with the global entrepreneurship literature. As a major contribution, we propose alternative solutions that can be strategies to overcome these challenges and promote the application of digital technology in different Thai entrepreneurial landscapes. Theoretically, this study aims to enrich the

global entrepreneurship literature, especially in the context of other developing countries with characteristics similar to Thailand's. In addition, the solutions we offer underscore the importance of future research examining digitalization in the context of Thai entrepreneurship, especially concerning entrepreneurship policy development.

This paper is organized as follows. The second section presents the methodological approach of this critical review, especially concerning selecting the most relevant articles. The third section presents the results of the critical review, focusing on the two main research questions. The fourth section is a discussion section that also leads to achieving the third research objective. The fifth section presents conclusions, implications, limitations, and opportunities for further research.

2 Materials and Method

This study adopts the critical literature review protocol of Wibisono (2024b, 2024a), which consists of (1) determining the scope of the literature for database searches, (2) selecting the most relevant articles, and (3) conducting a critical review of the selected articles. In the first protocol, the scope of the literature was determined using the PICOC (population, intervention, comparison, outcome, context) framework approach, which has been widely used in previous literature (Duvendack & Mader, 2020; Paul et al., 2021; Simsek et al., 2023). This study's population (P) consists of scientific articles on main topics related to entrepreneurship that have been published in reputable international journals. The intervention (I) is carried out by linking the topic of digitalization with entrepreneurship, both in the form of the use of digital technology and the process of digital transformation. We intend to compare (C) digitization and entrepreneurship in the specific context (C) of Thailand, which is one of the Southeast Asian countries with moderate entrepreneurial growth. The expected outcome (O) of this study is to show (1) the important role of digitization in entrepreneurship in Thailand, (2) the main challenges faced, and (3) the proposed strategies to overcome the challenges.

The second protocol is to find the most relevant articles according to the PICOC framework. We use the single Scopus database as one of the most comprehensive international databases, which is very selective in determining which journals can be included in its indexing system (Martín-Martín et al., 2018; Singh et al., 2021). Based on the PICOC framework above, there are three main keywords used in the process of searching literature in the database, namely "digital*", "entrepreneurship", and "Thailand". These three keywords are targeted to be found in the title, abstract, and keywords of the article. This process yielded 17 relevant articles. Several restrictions were then applied in the search process. Since digitalization in entrepreneurship is a relatively new topic in entrepreneurship studies in Thailand, we did not limit the year of publication, so the articles found were those published between 2016 and 2024. As an inclusion criterion, the document type was limited to research articles, thus excluding documents in the form of review articles, book reviews, and conference proceedings (exclusion criteria). Review articles were excluded because we wanted to focus on the evidence and findings in empirical articles, while book reviews and conference proceedings were excluded because we assumed that these papers

did not go through a peer review process. All articles were written in English, so we did not exclude languages.

Furthermore, the abstracts of 17 potentially relevant articles were carefully read. The abstracts had to be consistent with the PICOC framework and contain three keywords. Only abstracts that met both conditions were considered the most relevant articles. At this stage, seven articles did not meet both conditions. Although they contained the word digital or digitization, the articles were more related to the digitization of journalism, women's employment, digital privacy laws, education, agrotechnology, and product innovation. In the end, only the ten most relevant articles were considered as selected articles. The process of selecting these articles is summarized in the PRISMA flowchart in Fig. 1. Table 1 shows the grouping of articles based on year of publication and author name, and Table 2 shows the name of the journal and publisher, quality (quartile ranking), and subject category with reference to the Scimago Journal & Country Rank (SJR 2023).

The ten selected articles are critically reviewed (third protocol). In the critical review process, we examine three key research questions from this study. The answers to these three research questions are presented in three separate sections (sections 3.1, 3.2, and 4). Section 3.1 (the important role of digitalization in entrepreneurship in Thailand) and section 3.2 (the main challenges) present important information taken from selected articles, while section 4 (solutions to overcome challenges) presents suggestions or recommendations to overcome these challenges taken from the content of selected articles and linked to various relevant related literature. The aim is to provide new insights into strategies for the development of digitalization in the context of entrepreneurship in Thailand. We conclude the critical review by posing several research questions that can be explored in future research.

Table 1
List of selected articles

No.	Year of publication	No.of articles	Author(s)
1	2017	1	(Wonglimpiyarat, 2017)
2	2019	1	(Leung & Cossu, 2019)
3	2020	1	(Ditta-Apichai et al., 2020; Thavorn et al., 2020)
4	2021	2	(Jawad et al., 2021; Niyawanont & Wanarat, 2021)
5	2023	2	(Khalid et al., 2023; Meedach & Lekcharoen, 2023)
6	2024	3	(Imjai et al., 2024; Weber et al., 2024)
Source: Authors' elaboration			

Table 2
Sources of publications

No.	Source of publication – Publisher	No. of articles	Best quartile (Scimago-JR 2023)
1	International Journal of Cultural Studies - *SAGE Publications Ltd*	1	Q1 – Cultural Studies
2	ABAC Journal - *Assumption University*	1	Q1 - Literature and Literary Theory
3	Business Strategy & Development - *John Wiley & Sons Inc.*	1	Q1 - Economics, Econometrics and Finance
4	International Journal of Information Management Data Insights - *Elsevier B.V.*	1	Q1 – Social Sciences
5	European Business Review - *Emerald Group Publishing Ltd.*	1	Q1 - Business and International Management
6	Journal of Hospitality and Tourism Technology - *Emerald Group Publishing Ltd*	1	Q1 - Business, Management and Accounting
7	Journal of Infrastructure, Policy and Development - *EnPress Publisher, LLC*	1	Q2 – Social Sciences
8	International Journal of Economics and Financial Issues - *Econjournals*	1	Q3 - Economics, Econometrics and Finance
9	The Journal of Private Equity - *Portfolio Management Research*	1	Q3 - Economics, Econometrics and Finance
10	Humanities and Social Sciences Letters - *Conscientia Beam*	1	Q3 - Economics, Econometrics and Finance

Source: Authors' elaboration

3 Critical reviews of selected articles

3.1 The important role of digitalization in Thailand's entrepreneurial landscape

This section describes the main content of the selected papers, especially in terms of the research problems, the specific context studied, the methodological approach used, and the implications of the research findings. This section aims to show the extent to which digitalization plays an important role in the development of entrepreneurship in Thailand. We categorized the selected articles into two groups: articles focused on digitalization in the context of (traditional) entrepreneurship and those focused on digital entrepreneurship (Fig. 2). The first five articles focus on studying (traditional) entrepreneurship using digital technology (digitalization in entrepreneurship). In this context, the entrepreneurs basically still run traditional businesses such as logistics, trade, and tourism, but they use digital tools or

technologies to increase efficiency, productivity, or market reach without fully digitizing their business systems. Meanwhile, the following five articles focus on digital entrepreneurship, which is basically a business or entrepreneurship that is fully rooted in digital technology. In this context, entrepreneurial products, services, models, and systems are essentially tied to digital technology.

3.1.1 Digitalization of entrepreneurship

Ditta-Apichai et al. (2020) investigated the role of the sharing platform economy in the tourism sector and its support for community-based tourism (CBT) and micro-tourism entrepreneurs in Thailand. The study used content and thematic analysis to examine how micro-tourism entrepreneurs in Thailand use digital platforms. The study also used in-depth interviews with key stakeholders and case analysis to explore the experiences and challenges faced by these entrepreneurs. The research findings show that digital platform technology has significantly impacted micro tourism in Thailand. At least six online platforms used by entrepreneurs were identified and categorized into three different micro-tourism business models based on tourism offerings, membership policies, and community contributions. This illustrates that digital platforms not only promote local tourism products and services but also encourage diverse tourism experiences. In addition, the study highlights the partnership between digital platforms and the government to promote micro-entrepreneurship. Collaboration helps to reduce risks and create new opportunities for local communities. These findings underscore the importance of government support and policies that empower communities to realize their full entrepreneurial potential.

Jawad et al. (2021) examined the impact of digitalization on entrepreneurship in Thailand, focusing on the dynamics of the business ecosystem that has evolved in the digital era. The study used a qualitative approach, utilizing in-depth interviews and structured data analysis to uncover entrepreneurs' perceptions of integrating technology into their business operating systems. The goal was to understand how digitalization shapes entrepreneurial patterns and practices in Thailand. The results show that digitalization encourages entrepreneurs to embrace innovations and create products and services that are more responsive to market demand. The increasing number of internet users and online customers indicates a shift in society towards greater reliance on digital technology, which provides new opportunities for entrepreneurs to promote their products and services. In addition, the study highlights that increased government support through pro-digitalization policies has played an important role in this transformation. The government is actively helping entrepreneurs access better resources and explore global markets by offering various training programs and incentives to promote the digital ecosystem. As a result, small and medium enterprises are increasingly adopting digital platforms and evolving from traditional to technology-based business models. Digitization not only encourages innovation but also creates avenues for young entrepreneurs to explore fresh ideas and contribute to the growth of Thailand's digital economy.

Niyawanont & Wanarat (2021) emphasize digital transformation as a significant influence on the performance of Thai logistics entrepreneurs. This study investigates the relationship between digital

entrepreneurship, logistics innovation, and performance through adopting digital technology. The study involved 1012 registered logistics companies in Thailand that innovate by adopting digital technology. A total of 322 respondents representing key positions from each company were then analyzed using an exploratory factor analysis and confirmatory factor analysis approach. The results show that digitalization has brought about significant changes in Thailand's logistics entrepreneurship landscape by integrating digital technology into their operating systems. Since the advent of digital technology, many logistics firms have adapted to meet growing consumer demand and compete globally. In addition, this study shows that the integration of digital technology into business processes not only improves efficiency but also contributes to improving overall logistics performance. As competition intensifies, entrepreneurs in Thailand are increasingly encouraged to innovate and adopt new strategies to manage their businesses. The results of this study show that digitalization has been recognized as an important factor in shaping new business practices in logistics in Thailand.

Khalid et al. (2023) examined the influence of learning orientation, learning processes, and learning leadership on developing organizational culture and promoting business innovation, especially in women-owned tourism enterprises in Thailand. Using a quantitative approach, this study used a questionnaire survey method, distributing 600 questionnaires and obtaining 398 valid responses for analysis. The results show that digital technology and technological knowledge significantly moderate the relationship between firm innovation and organizational culture. The study shows that digitalization has promoted the growth of innovation by improving the learning process. Most respondents indicated that adopting digital technology has increased operational efficiency and product innovation. In addition, technology-enabled learning processes have enabled women entrepreneurs to become more actively involved in technology-based business practices, giving them greater access to market information and collaboration opportunities. The paper also emphasizes that a strong learning orientation focused on innovation and collaboration fostered an organizational culture that is responsive and adaptable to technological change, thereby facilitating entrepreneurial growth. Digitalization not only expands the market reach of entrepreneurs but also strengthens their networks with local and international stakeholders. Overall, the data and findings underscore the important role of digitalization in transforming the entrepreneurial ecosystem in Thailand, leading to the emergence of more new business opportunities and increased participation of women.

Meedach & Lekcharoen (2023) highlighted a significant digital transformation in digital entrepreneurship in Thailand, driven by changes in consumer behavior caused by the COVID-19 pandemic. Technology integration into business practices is evident, with projections showing that online business sales in Thailand will reach $10,947 million and the market value will increase to $15,626 million by 2025, a more than 9% growth rate. This illustrates how digitalization has become embedded in Thailand's economic framework, facilitating more efficient transactions and encouraging the development of technology-based services. Evidence shows that sectors such as logistics services, mobile applications, and digital marketing are increasingly influenced by this trend, creating new opportunities for entrepreneurs to expand their market reach. This paper notes that many firms are beginning to adapt by integrating technology into their business processes to increase efficiency and flexibility in meeting changing

consumer demands. In this context, informal education and digital training play an important role, with the Thai government and business leaders cooperating to build digital infrastructure and improve digital skills among entrepreneurs. This initiative allows young entrepreneurs, especially those with an international education, to see digital entrepreneurship as an attractive career path. Overall, digitalization has changed Thailand's entrepreneurial ecosystem dynamics, showing a clear transition from traditional business operating models to digital-based approaches.

3.1.2 Digital entrepreneurship

Wonglimpiyarat (2017) observed the digital transformation process from the perspective of the crowdfunding FinTech platform business model. This new business model is important for Thailand's financial innovation system and is in line with the national innovation system policy called Thailand 4.0, which aims to support the growth of entrepreneurship, especially startups and small and medium enterprises (SMEs). Thailand 4.0 aims to transform the economy from a low-cost model to one based on knowledge and innovation. It targets areas that can be improved through technology, such as arts, culture, public services, and industry. Crowdfunding is an essential support tool for startups and SMEs struggling with getting help from traditional financial institutions. Wonglimpiyarat conducted interviews with 30 representatives from government agencies and financial institutions, including banks and venture capital firms, and analyzed various policy documents. The findings show that as a growing digital society, financial technology innovation through crowdfunding has significantly impacted startups and SMEs in Thailand. This method has increased access to new funding sources for startups and SMEs that previously faced many obstacles. Thailand's Department of Industrial Promotion aims to support at least 1,500 startups annually through crowdfunding, which raised more than $86 million in 2016, a growth rate of more than 100% from previous years. Several commercial and government financial institutions have demonstrated successful collaboration to support the growth of new FinTech companies. Crowdfunding has made financial services more innovative by providing easy access, low costs, and transparent processes.

Leung & Cossu (2019) explore Thailand as an important part of emerging digital entrepreneurship in East Asia. This study highlights the influence of Western values, such as the concept of entrepreneurial freedom, on Thailand's informal economy. Leung and Cossu used qualitative research methods by conducting ethnographic observations, interviews with digital entrepreneurs, and social network analysis (SNA) to assess entrepreneurial activity on Facebook, one of Thailand's most influential social platforms. These findings provide evidence of a significant digital transformation in the entrepreneurial landscape in Thailand, which is characterized by the rapid development of the digital startup ecosystem since 2012. Startups are increasingly focusing on digital products and services. In collaboration with business leaders, the government is encouraging the digital entrepreneurship landscape by building digital infrastructure and promoting informal education to foster a digital startup culture. Collaborations between large technology companies such as Rocket Internet and local stakeholders strengthen Thailand's digital entrepreneurship ecosystem. Many internationally educated entrepreneurs in Thailand, especially those under 40, see digital entrepreneurship as a viable alternative to employment. The "digital

nomad" lifestyle, reminiscent of the Silicon Valley culture in California, USA, is becoming increasingly popular among young Thai entrepreneurs. Leung and Cossu conclude that digitalization has transformed Thailand's informal economy from its traditional roots into a network of technology-based entrepreneurs with access to a broader global market.

Thavorn et al. (2020) highlight the role of entrepreneurial self-efficacy (ESE) and innovation in improving the performance of Thai digital startups. The study highlights how Thailand's national strategic policies have fostered an environment conducive to the growth of technology-based startups, such as e-commerce and fintech, over the past two decades. The digital entrepreneurship landscape in Thailand is rapidly evolving and driven by digital transformation, which provides significant opportunities for the younger generation to engage in technology entrepreneurship. Digitalization has accelerated business innovation by enabling companies to develop new products and services based on customer input using advanced technologies such as patent licensing and business automation. In addition, operational efficiency has been improved through outsourcing strategies that allow startups to save time and minimize errors in product development. In terms of marketing, startups are increasingly using social media, online seminars, and digital data analysis to reach a broader customer base and expand their market share. Digitalization has also strengthened startups' financial and operational aspects, with some companies reporting revenue growth of more than 70%, mainly due to expansion into international markets and optimization of digital strategies. The study concluded that digitalization has fostered a more dynamic environment for entrepreneurship, accelerated innovation, improved business efficiency, and transformed marketing strategies and business models - all of which have contributed to the rapid development of the digital startup ecosystem in Thailand.

Weber et al. (2024) focus on the interaction between technological innovation, digital entrepreneurship, and social sustainability. This study uses quantitative research methodology, which includes data collection through surveys and statistical analysis to test the relationship between different variables. The findings reveal significant insights into the impact of digitalization on entrepreneurship in Thailand. More than 80% of entrepreneurs reported increased productivity due to integrating digital technology into their business. In addition, 75% of respondents believe technological innovation has increased their competitiveness in the global market. The growth of the digital startup sector in Thailand is a critical phenomenon. Since 2012, the number of startups has increased by more than 300%, and investment in the sector is expected to exceed US$500 million by 2023. E-commerce and fintech platforms lead the investment landscape, each accounting for more than 40% of the total funding digital startups receive. This shows that digitization improves operational efficiency and expands access to larger markets. Collaboration between the government and the private sector facilitates this growth. The Thai government has made significant investments in digital infrastructure and education programs to develop a workforce capable of meeting the demands of the digital industry. Weber et al. note that digitalization is acting as a transformative force in entrepreneurship, creating new opportunities and driving innovation that will shape the future of the Thai economy.

Imjai et al. (2024) highlight the role of artificial intelligence (AI) and design thinking skills in enhancing digital entrepreneurial innovation capabilities in Thailand. This study examines the relationship between these variables using the quantitative methodology of structural equation modeling (SEM) and factor analysis. This study surveyed 187 business management and entrepreneurship students and found that more than 70% of the respondents believe that integrating AI and design thinking has increased their capacity for innovation. These findings indicate that digitalization significantly impacts entrepreneurship in Thailand, mainly through the integration of technology and innovation-based approaches. AI skills strongly impact entrepreneurial innovation, suggesting that AI improves operational efficiency and decision-making. At the same time, design thinking skills contribute positively to innovation by enabling entrepreneurs to understand market needs better and develop relevant solutions. In addition, strategic intelligence plays an important role in innovation, highlighting the importance of anticipating market changes and managing risk. The increasing adoption of technology evidences the growth of the digital entrepreneurship sector in Thailand. Collaboration between educational institutions and industry has fostered the development of essential digital skills to meet the challenges of the global marketplace. This research confirms that combining advanced technology with a user-centered approach can produce innovative solutions that meet market demand.

3.2 The main challenges

3.2.1 Challenges related to digital technology infrastructure

Leung & Cossu (2019) argue that integrating traditional entrepreneurship into digital platforms is the most fundamental challenge in developing digital entrepreneurship in Thailand. Many traditional businesses, such as informal markets and small businesses, often find it challenging to adapt to a fully digital business model that requires sophisticated infrastructure and technical expertise. In the context of this integration, another challenge is the lack of strong regulations to protect informal workers or traditional small businesses that move from traditional systems to digital platforms, such as online motorcycle taxi drivers and digital market traders, who often face unstable working conditions and inadequate social protection. Large digital platforms - such as online stores or e-commerce and online transport services - tend to dominate the market by offering lower prices, creating an uneven competitive landscape for local businesses. These large companies have more significant resources and broader networks, while local and small digital startups still face challenges related to financing and access to networks. These challenges are compounded by the lack of adequate digital infrastructure outside the capital region of Bangkok, which limits the growth of digital entrepreneurship and digital entrepreneurs in suburban areas.

Jawad et al. (2021) note that the lack of regulatory and policy support for budding digital entrepreneurs creates uncertainty for entrepreneurs who want to embrace digital technologies but face regulatory barriers and a lack of protection for new digital businesses. Effective digitization requires clear regulations and strong infrastructure. Jawad et al. show that current government policy support is still

inadequate. As a result, many entrepreneurs continue to rely on informal networks to run their businesses, which hinders development due to the lack of transparency and access to formal support that is essential for the growth of the digital entrepreneurship ecosystem. Furthermore, Jawad et al. highlight that in developing countries such as Thailand, there is a clear gap in the availability of a technologically skilled workforce to drive innovation and digital transformation. This issue poses a challenge for many digital startups to adapt to the rapidly evolving digital landscape. Although many startups have launched their digital businesses, rapid technological changes - such as big data, cloud computing, and AI - have hampered their ability to keep up with innovations. As a result, the growth of these startups has stagnated, leading to a decline in competitiveness.

A study conducted by Wonglimpiyarat (2017) is an example of how digital technology infrastructure, such as rules and regulations and digital openness and access in the context of entrepreneurship, significantly affects the level of user trust in new products or services offered by entrepreneurs. A business using a new digital technology approach must be able to use that digital technology to understand user needs and strive to provide impactful solutions through the new products or services offered. The crowdfunding case observed by Wonglimpiyarat is one of the financial technology (fintech) innovations and alternative funding sources with great potential for many micro, small, and medium enterprises (MSMEs) and startups in Thailand. According to Wonglimpiyarat, public trust is a very important initial factor for the smooth operation of a digital crowdfunding business. People or users who are not yet familiar with crowdfunding or other financial technologies may still be concerned about the risk of fraud or potential misuse of funds by issuers or agents. Therefore, crowdfunding managers need to understand that the digital technology they use is not only aimed at providing easy, cheap, and efficient services but also at creating transparency where every user can access the information they need on the platform provided by the crowdfunding manager.

3.2.2 Challenges related to digital technology entrepreneurship

The problem of integrating digital technology is also a concern for Thavorn et al. (2020), who view this problem from the perspective of the level of entrepreneurial self-efficacy (ESE) of Thai entrepreneurs, which varies widely but tends to be low. This is evidenced by their low confidence in marketing or innovation using digital technology. Some entrepreneurs still rely on conventional business methods and are reluctant to adopt technological innovations due to a lack of technical expertise. Their reliance on conventional business models leads to low levels of innovation and an inability to adapt and compete with various developments in digital business. Although they continue to innovate in various ways, the innovations tend to focus only on the product or service aspects and digital marketing, while other aspects, such as the digitization of business processes as a whole, receive less attention. On the other hand, traditional companies or digital startups still in the early stages of transitioning to a digital business model often face capital constraints in developing their digital business systems. Some companies outsource technology to save on investment costs, but this creates a dependency on third parties, hindering business agility in developing their digital solutions. Expanding into a digital business

model requires a significant investment, but not all entrepreneurs have a stable financial situation. Only companies with a substantial innovation strategy and good operational readiness are able to achieve this expansion.

In the logistics entrepreneurship sector, Niyawanont & Wanarat (2021) highlight that the main challenges faced by SME logistics entrepreneurs, who account for more than 93% of Thailand's logistics sector, are their difficulties in expanding their customer base and investing in technology due to limited resources. These limitations hinder their ability to compete with large companies, which often use more sophisticated technology. The rapid development of digital technology is changing the logistics business model, introducing innovations such as autonomous vehicles, robots, and drones that increase the speed and efficiency of logistics operations. However, many logistics SMEs are struggling to keep up with these changes. One of the main obstacles is a lack of digital literacy, which is essential for integrating new technologies such as big data and the Internet of Things (IoT) into their systems. These obstacles make it difficult for them to grow and compete with larger logistics companies that can operate more efficiently. The study concluded that digital transformation in the logistics industry is not just about technological improvements but also requires a more holistic approach that includes revamping business and operational strategies and corporate culture.

3.2.3 Challenges related to organizational openness and digital entrepreneurship culture

A study by Khalid et al. (2023) shows the challenges of digitalization in Thai tourism entrepreneurship from an organizational learning perspective. The study highlights significant gaps related to the low level of digital literacy among women entrepreneurs, especially in adopting various new technologies and integrating these technologies into their business operations. This problem is exacerbated by cultural rigidity in organizations. Khalid et al. show that organizational cultural support can accelerate firms' learning and innovation process and make it easier for firms to adapt to technological change. To overcome these challenges and strengthen organizations in adapting to technological advances, effective leadership is essential. Business leaders in Thailand's tourism sector are urged to take proactive steps to foster a corporate environment conducive to learning and innovation. Although building a learning and innovation infrastructure is a challenge in almost all sectors, Khalid et al. argue that business leaders in Thailand's tourism sector can encourage increased digital literacy within their organizations to make the most of available technology.

In their research, Weber et al. (2024) argue that many traditional businesses find it challenging to adopt technological innovations due to a lack of organizational readiness. Internal resistance and inadequate resources and infrastructure often hinder an organization's ability to adapt to new technologies. Although these companies recognize that significant digital technology innovation can create a sustainable and competitive business, they typically take a conservative approach to technology adoption, ultimately limiting their efficiency and competitiveness. Internally, there are doubts about

whether this sustainability can be achieved long-term. In addition, there are concerns that the digital transformation they are undertaking could threaten employment conditions within the organization.

3.2.4 Challenges related to entrepreneurial digital literacy

According to Meedach & Lekcharoen (2023), one of the major challenges faced by entrepreneurs in Thailand, especially those running small and medium enterprises (SMEs), is the lack of awareness and digital literacy among business owners. This condition is also not balanced by the adequacy of skilled workers with digital skills in their businesses. In fact, digital skills and talent are essential for strategic planning and adequate decision-making in today's digital landscape. Many business owners find it difficult to analyze data and interpret market trends, forcing them to rely on a limited number of digital talents. The lack of digital literacy also prevents SME leaders from mastering effective digital communication techniques, essential for building relationships and networks with various stakeholders. Meedach and Lekcharoen also point out that the COVID-19 pandemic has accelerated the shift in consumer behavior toward e-commerce. However, this shift has benefited only large platforms such as Shopee and Lazada. As a result, Thai SMEs are left to compete for a shrinking market share. They often rely solely on social media platforms such as Facebook and Instagram, which, while helpful, do not offer the broad reach and profitability large companies enjoy. The Thai government has indeed launched several initiatives to improve the digital skills of entrepreneurs, such as establishing the SME Promotion Office. However, there is still an urgent need for additional strategies to engage more SMEs and empower them to thrive in the rapidly evolving digital landscape.

Regarding using artificial intelligence (AI) to increase entrepreneurial innovation, Imjai et al. (2024) observed the importance of increasing understanding and proficiency in using digital technologies to increase the confidence of digital entrepreneurs. Like crowdfunding, a form of financial technology (fintech) innovation, AI has great potential to improve operational efficiency. Unfortunately, many Thai entrepreneurs still struggle to integrate and use this technology in their businesses. This knowledge gap is often due to insufficient training and practical experience. According to Imjai et al., to promote a deep understanding of advanced technologies such as AI, a digital entrepreneur can use a design thinking approach, as this can encourage entrepreneurs to focus on a deep understanding of how to use AI technology to understand user needs and develop impactful solutions.

In tourism entrepreneurship, managing user trust is also very important. A study by Ditta-Apichai et al. (2020) found that local tourism businesses using digital platforms, such as Airbnb and TakeMeTour, often face risk management and transaction security challenges. These platforms need to ensure that their users, namely hosts and guests, can transact safely and comfortably. In the context of local tourism, access to digital technology and digital literacy is still uneven, especially in suburban and rural areas. As a result, the Thai government has supported the development of micro-enterprises in tourism through programs such as Amazing Thailand. However, the problem is that not all small tourism businesses can effectively use digital platforms. In addition, Thai digital startup entrepreneurs have also introduced more local platforms such as Local Alike, but they also face obstacles in achieving business growth (scale-up) because they have to compete with digital tourism platform companies that have

greater resources and broader market reach. Although many local Thai platforms emphasize partnerships with local communities, not all local communities are ready to engage effectively in this digital platform business model.

4 Solutions to overcome challenges: further discussion

As explained in section 3.1.1, the first challenge in the digitalization of entrepreneurship in Thailand is related to the state of digital entrepreneurship infrastructure, which in the Thai context is still developing in some areas but somewhat lagging in areas outside the capital, suburbs, and rural areas. Based on the results of the study from this selected article, several ways that can be applied to improve the digital entrepreneurship infrastructure include developing a sustainable digital infrastructure for long-term goals and advocating for policies that continue to support the growth of digital businesses but need to reduce the regulatory burden that can hinder their development. This solution is consistent with a study by Bergholz et al. (2024), who conducted a case study of microenterprises across Germany. Bergholz et al. highlight that key digital infrastructure, such as high-speed Internet access and a highly digitally literate workforce, are critical to the growth of digital startups, even in suburban areas. Significant infrastructure gaps between urban centers and suburbs often limit the potential of the digital economy and exacerbate existing gaps in the entrepreneurial ecosystem. Therefore, these technical infrastructure-related barriers need to be overcome.

On the other hand, Intraratat et al. (2024), in their research on the use of ICT in the handicraft sector in Northern Thailand, argue that to overcome the challenges posed by inadequate digital technology infrastructure, the government needs to implement a more comprehensive digital infrastructure development strategy. The perception of people in small areas, especially women entrepreneurs, tend to see technology as something complicated and complex. Therefore, a more compelling approach is needed to bring digital technology closer to the community. One solution is to provide financial incentives or subsidies, such as tax incentives for small businesses and digital startups. The following important aspect of digital infrastructure that cannot be ignored is the role of policy and regulation. To keep the digital entrepreneurship ecosystem and the digital economy growing, Jeong (2023) and Naudé (2024) emphasize the importance of policy reforms that support this ecosystem. Strong regulations can increase public trust and provide individuals and entrepreneurs with a sense of security and protection from the threat of cybercrime.

The second challenge outlined in section 3.2.2 is related to digital technology entrepreneurship, where three things are emphasized in this challenge, namely entrepreneurial readiness (psychological perception), digital technology uptake, and entrepreneurship enhancement. One of the main obstacles to the digitalization of entrepreneurship in Thailand is the low level of digital technology absorption among enterprises, especially MSMEs and startups, which are still transitioning from a conventional business model to a technology-based one. In principle, this phenomenon occurs in almost many countries. For example, in China and Taiwan, many small and micro businesses have limited capital to enhance their internal technological capabilities, which ultimately hinders the process of integrating digital technology

into their businesses (Li et al., 2018; Lin & Lai, 2021). According to Castaldo et al. (2023), substantial capital is one way to create startup flexibility and resilience in the long run. To overcome these obstacles, the government and the private sector need to provide technology subsidies to MSMEs and startups that want to develop digital systems independently Nasution et al. (2025). These subsidies can be in the form of support and access to digital software and infrastructure (internet, cloud, etc.), as well as technology training that allows them to be more independent in managing digital technology.

As found by Niyawanont & Wanarat (2021), SME logistics firms, which represent 93% of Thailand's logistics industry, find it challenging to expand their customer base and adopt technological innovations due to limited resources. To accelerate the process of scaling up this business, Wonglimpiyarat (2017) once stated that crowdfunding or other forms of financial technology innovation, such as venture capital Cavallo et al. (2019), can be an alternative form of funding for digital entrepreneurs, especially for small or micro-entrepreneurs who face capital constraints but have financial capacity constraints that need to be bankable. Encouraging business scale-up can also be done through digital business incubation and acceleration programs, as suggested by several entrepreneurship experts (Almansour, 2022; Qureshi et al., 2021). This digital business incubation program can help entrepreneurs access the right mentors and experts, expand market networks, and help startups overcome various challenges in their development process. What needs to be considered is that this incubation or acceleration program requires support from various parties, including the government, academia, and businesses, to ensure that small businesses or startups can grow in a healthy entrepreneurial ecosystem.

The third challenge outlined in section 3.2.3 relates to organizational openness and digital entrepreneurial culture, highlighting the importance of digital literacy, organizational readiness, and adaptive leadership in addressing this issue. In Thailand, digital literacy among entrepreneurs is still relatively low, especially among small business owners and women entrepreneurs in suburban or rural areas. As Khalid et al. (2023) highlighted, specialized training programs that focus on improving the digital skills of entrepreneurs with limited exposure to technology are essential. Initiatives such as workshops and specially designed online courses also offer a cost-effective solution to improving digital literacy among entrepreneurs, regardless of location. According to Chen et al. (2021), this approach can effectively reduce resistance to change among entrepreneurs and facilitate the adoption of digital technologies. The challenges of rigid organizational cultures can be overcome by fostering a collaborative and sustainable learning ecosystem (Porkodi et al., 2023). In this process, business owners and their teams work together to navigate digital transformation and embrace new technologies. Strong leadership is also essential for successful digital transformation. Business leaders must proactively create an environment that fosters organizational learning and technological innovation. Wongwuttiwat & Lawanna (2018) suggest that implementing a digital leadership development program can be a valuable option for training leaders to oversee the process of digital transformation in business and consistently integrate new technological capabilities into their organizations.

The fourth challenge outlined in section 3.2.4 focuses on improving digital literacy, highlighting the importance of digital technology education, government, and private sector support during the digital

transformation process, and the need for transparency to build consumer trust. A comprehensive approach is needed to improve digital literacy among Thai entrepreneurs, including technology education and improved access to digital resources. Ala et al. (2022) emphasize the importance of AI-based training and advanced technologies in entrepreneurship education beyond teaching the basics of digitization. This training should also cover big data analytics, AI-based digital marketing, and practical e-commerce strategies. Challenges related to access to digital technologies in suburban and rural areas can be overcome through joint government and private sector support, making digital services more affordable even in remote areas (Tiwasing et al., 2022). The formation of digital learning communities and mentoring programs is also crucial to helping entrepreneurs adopt new technologies. Gumbo & Moos (2024) show that Digital Innovation Centers can be a place for entrepreneurs to share experiences, receive guidance from industry mentors, and accelerate the growth of their businesses. Finally, fostering user trust in digital transformation in business remains a significant challenge. Research by Ko et al. (2022) shows that transparency in the use of technology can increase user trust. In the digital tourism sector, as shown in research by Taecharungroj & Mathayomchan (2019), trust can be strengthened through standardized digital rating systems and reviews that allow consumers to objectively evaluate the pros and cons of the products or services offered.

Based on the above description, the following Fig. 3 summarizes alternative solutions related to the four challenges of digital transformation of entrepreneurship in Thailand.

5 Conclusion

This critical review paper aims to investigate three main objectives: the extent to which digital transformation has changed the entrepreneurial landscape in Thailand, the main challenges faced, and strategies or solutions to overcome these challenges. This study draws on key findings from selected articles to highlight important points relevant to these objectives. The first part of the critical review (section 3.1) examines the impact of digitalization on entrepreneurship in Thailand, which is divided into two categories: the impact of digitalization on traditional entrepreneurship and, specifically, on digital entrepreneurship. The first category refers to traditional businesses that are not entirely digitized but have begun integrating digital technology into various business operations, as seen in the tourism and logistics sectors. In this context, adopting digital technologies - such as digital platforms and devices - has facilitated business growth by promoting innovation, efficiency, and rapid adaptation to market demand. The second category focuses on businesses fully embracing digital technology in their business processes. Here, commonly used digital products and services such as fintech and e-commerce have dominated the digital business landscape in Thailand. This transformation has also led to an increase in the qualification of digital human resources and the integration of more sophisticated digital technologies such as AI, big data, and cloud, enabling digital startups to grow and scale up. In the second part of the critical review (section 3.2), we outline the key challenges facing the digital transformation of entrepreneurship in Thailand. These challenges are categorized into four main aspects: entrepreneurial digital infrastructure, digital technology, organizational openness and culture,

and digital literacy. We elaborate on the challenges associated with these four aspects and propose solutions or strategies to overcome these challenges, which are discussed in detail in section 4.1.

This study is expected to improve our theoretical understanding of the process of digital transformation in the context of entrepreneurship in general or digital entrepreneurship in particular, especially in the context of Thailand, one of the developing countries in Asia. We argue that the journey of digital transformation in various aspects of entrepreneurship in Thailand has shown that it is essential to pay attention to various critical factors supporting this digitalization process's success. Although various kinds of literature have explained the factors that can increase the success of digitalization, various obstacles and challenges have also emerged that have the potential to hinder the development of entrepreneurship. These challenges come not only from companies as organizations but also from the self-perception of entrepreneurial leaders and all their employees. Going digital is not only about using new technologies but also about changing how an organization thinks and works in the face of rapid changes in digital technology.

The need for public policy support as a result of collaboration between government, the private sector, and academia is widely emphasized in the literature. This is mainly related to the need to improve digital infrastructure, which is not limited to improving digital access but also strengthening regulations and policies to ensure this digitization's security and sustainability. We also see that digitalization in Thailand needs to be developed widely, not only in developed areas such as the capital or major cities but also in suburban or rural areas where various micro and small entrepreneurs are located. Micro and small entrepreneurs need a touch of digitalization to keep up with the times, but they have minimal access to digitalization resources. It is also important to note that while digitalization can foster innovation and improve people's welfare, it also has the potential to disrupt various aspects of entrepreneurship and increase economic disparities between regions.

Exploring the study of digital transformation in the context of entrepreneurship from a broad perspective presents several challenges, especially when limiting it to just one country case. In this paper, we use a literature review method that focuses on previous relevant research on digitalization in the specific context of entrepreneurship in Thailand. This approach certainly limits the review analysis because it means looking at the entrepreneurial landscape only through the lens of a developing country like Thailand, which may be relevant for the Asian and Southeast Asian regions but not for the broader global region or even in the context of developed countries. Although the debate on digital transformation and entrepreneurship is extensive, our current research seeks to contribute to the field, even if it does not achieve a comprehensive global impact. The challenges and solutions we discuss in this paper offer valuable insights for future research, encouraging a contextual understanding of Thai digital entrepreneurship as part of a global framework. Furthermore, although we have highlighted the urgent need for improvements in digital infrastructure and related policies, we have not fully explored these issues in depth from a policy perspective. This gap is mainly because relevant research focusing on Thailand in the entrepreneurship literature is still limited. In addition, conducting research on digital entrepreneurship with a strong policy emphasis requires sophisticated methodological skills, from

designing research methodologies to analyzing results that can genuinely inform accurate entrepreneurship policy recommendations. This is another significant challenge for future research efforts. Given these limitations, we raise several fundamental questions that require further investigation:

1. How does the profile of entrepreneurship digitization in Thailand compare to other developing countries in Asia or Southeast Asia, and to what extent can Thailand be used as a benchmark for developing an effective entrepreneurship digitization strategy?
2. Alternative solutions to overcome challenges like those presented in Fig. 3 are still largely theoretical. How can these propositions be empirically tested?
3. What methodological approaches can be used in the future to produce high-impact research that provides policy recommendations for Thailand as well as in the context of other countries?

These questions have received little attention in previous research, both in the context of Thailand and other countries with similar characteristics.

Declarations

Competing interests

The authors declare no competing interests.

Author Contribution

With the submission of this manuscript, I would like to undertake the following:1. All authors of this research paper have directly participated in the planning, execution, or analysis of this study.2. All authors of this paper have read and approved the final version submitted.

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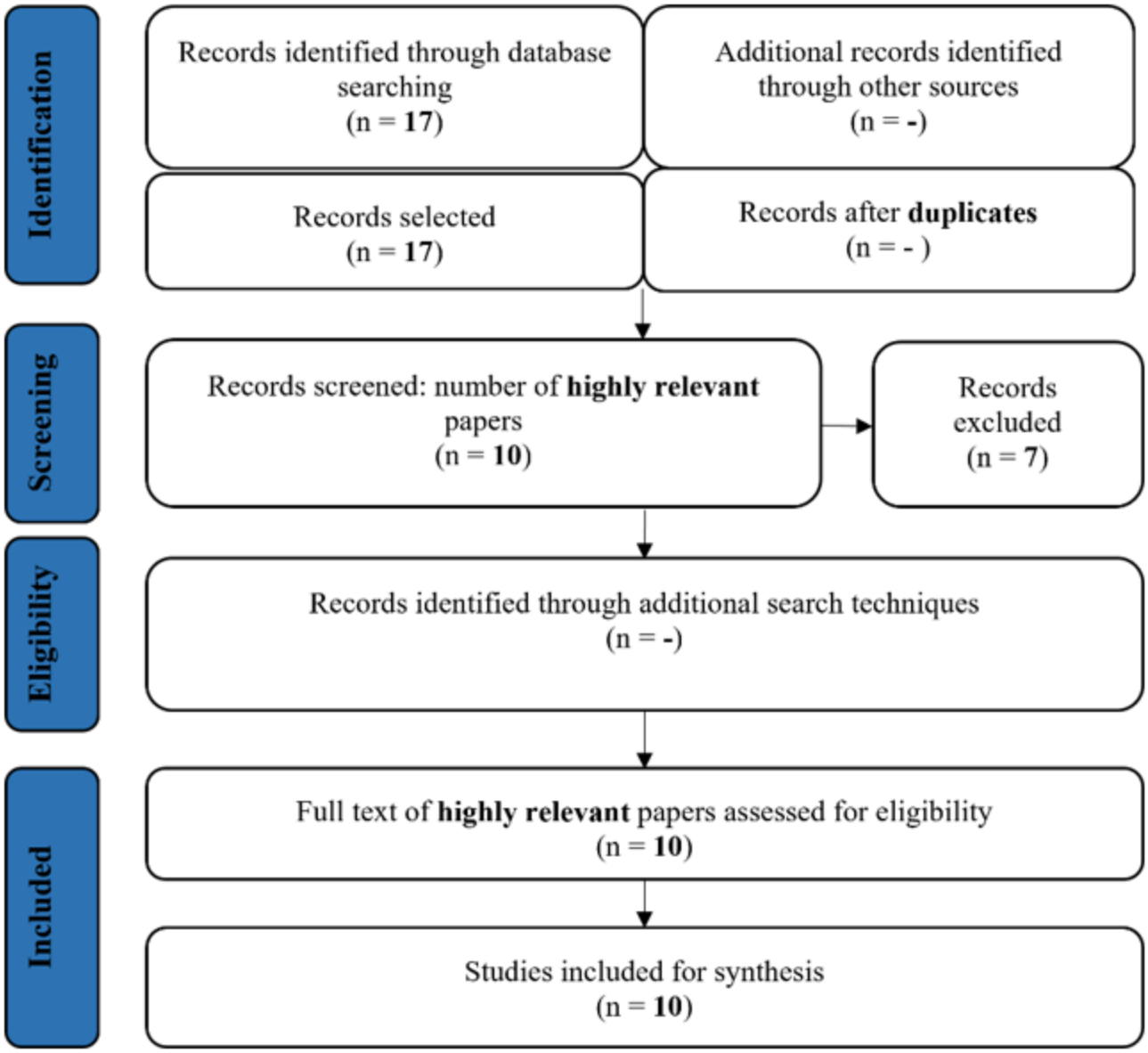
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Figures



Source: Authors' elaboration

Figure 1

PRISMA Flow Diagram

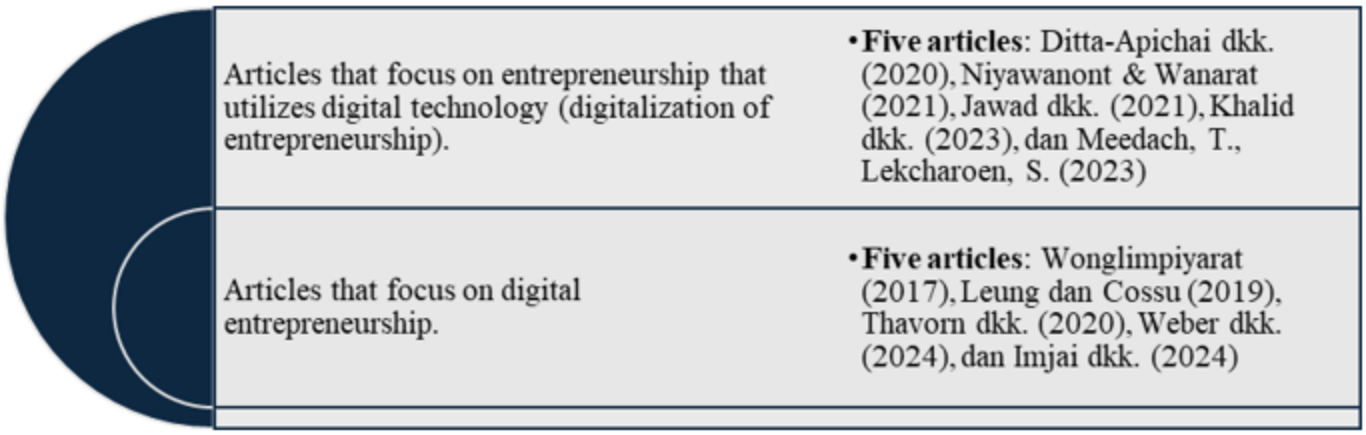


Figure 2

Categorization of articles based on study focus

Challenges and solutions in digital transformation (entrepreneurship)			
Digital technology infrastructure	**Digital technology entrepreneurship**	**Organizational openness and entrepreneurial digital culture**	**Entrepreneurial digital literacy**
•Equal development of digital infrastructure •Advocacy of digitalization regulations and policies	•Self-readiness for digital transformation •Absorption of digital technology •Startups and scaling up	•Remote/online training •Collaborative learning •Digital leadership development	•Digital technology education (entrepreneurship) •Collaboration among stakeholders •Creating digital transparency

Source: Authors' elaboration

Figure 3

Alternative solutions related to the challenges of digital transformation in entrepreneurship