



Toward SMEs digital transformation success: a systematic literature review

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Abstract

The core success of digital transformation among small and medium enterprises (SMEs) still needs to be clarified and comprehensively discussed. Meanwhile, SMEs cannot exploit digital advantages due to their limited strategic empirical and practical knowledge. This study aims to (1) describe the research pattern in the SME's digitalization area; (2) identify the core success factors of SMEs' digital transformation to gain business success; (3) search for relevant business aspects that are necessary for SME digital transformation; and (4) develop further research agenda in the field of SMEs' digital transformation. This study uses a systematic literature review and thematic analysis to determine core success factors suggested by primary studies. The literature review suggests that (1) SMEs should consider their baseline, limitation, and idiosyncratic to develop an aligned digitalization strategy; (2) SMEs should consider starting with incremental and gradually improving digitalization; and (3) SMEs should commit to investing in education and continuous learning.

Keywords Digitalization · Digital transformation · SMEs · MSMEs · Critical success factors · Systematic literature review · Thematic analysis

1 Introduction

World Economic Forum (WEF) white paper argues that small and medium enterprises (SMEs) contribute up to 70% of economic growth and up to 90% of global gross domestic product (GDP) (WEF 2022). It indicates that SMEs have significantly contributed to sustaining the economic growth of each country worldwide.

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However, SMEs still face survival issues. In Europe, only 46.13% of SMEs survived five years after birth in 2017–2020 (Eurostat 2022). In the United Kingdom (UK), only 38, 4% of SMEs survived in the first five years, and 54,1% survived in the first three years during 2016–2021 (Office for National Statistics 2021). In the United States of America (USA), no more than 70% of SMEs survive in the first three years (OECD 2016). OECD (2016) concluded that more than 50% of new SMEs would fail in their first five years.

Regarding this issue, business researchers promoted digital transformation as a valuable strategy for enterprises, including SMEs, to improve their organizational and financial performance. By integrating appropriate information technology (IT) features, SMEs probably generate a more efficient business model (Ngo et al. 2022; Van Nguyen et al. 2022), find a larger market, and then promote and distribute their product to their market (Sagala and Sumiyana 2020), and have higher agility to move from one model, strategy, or market to another (Fachrunnisa et al. 2020; Nasiri, Saunila, et al., 2020). Interestingly, exploiting IT potentiality properly for business purposes is challenging, particularly for SMEs. The challenge comes from limited knowledge or accessible information, financial, cultural, and collaboration issues (Ghobakhloo and Tang 2015; Straková et al. 2022; Van Nguyen et al. 2022). These circumstances lead SMEs to misalignment during IT integration (Canhoto et al. 2021; Ori 2018), and in turn, it contributes to their survival issue.

Previous empirical studies and literature reviews have massively investigated digital transformation issues in SMEs. However, they tended to focus on specific topics separately, such as the managerial aspect (Ben Slimane et al. 2022), manufacturing aspects (Ghobakhloo and Iranmanesh 2021; Moeuf et al. 2018), supply chain aspects (Nasiri, Ukko, et al., 2020; Ngo et al. 2022; Pfister and Lehmann 2021; Van Nguyen et al. 2022), and information system (IS) aspects (Metawa et al. 2021; Ragazou et al. 2022). Whereas SMEs should consider all those aspects simultaneously once they decide to digitalize their business. Studies that consider the holistic business aspect to propose core success factors for SMEs in dealing with digital transformation are still limited. According to this issue, we argue that the existing literature contains valuable insights that can be explored and reconstructed into new holistic knowledge regarding SMEs' digitalization success strategy. The holistic knowledge is fruitful as a foundation of thinking for SME actors to generate digital transformation strategies and for future research for further practical investigations. Therefore, this study aims to identify core success factors of SMEs' digital transformation and develop the framework of the digital transformation strategy of SMEs through the systematic literature review approach. The special feature of this paper lies in the carefully selected combination of methods through which the paper provides a unique categorization of themes based on a thematic analysis revealing the core concepts of previous studies. Moreover, the novelty of the paper is that it embeds SME digitalization into the endogenous growth theory and integrates it with three business aspects (information systems, organizational financial) to provide a novel, comprehensive framework for SME digitalization.

We adopt endogenous growth theory as the conceptual foundation to develop structured knowledge regarding the digital transformation framework. The endogenous theory argues that the value of IT is determined by various aspects that

influence its utilization, and the critical element of IT investment is knowledge (Rebelo 1998; Sredojević et al. 2016). This concept is relevant to understand SMEs digital transformation issue as IT tools are not the single factor for successful digital transformation (Greenwood et al. 1988; Luftman et al. 1999; Sredojević et al. 2016; Vongsraluang and Bhatiasevi 2017; Z. Wang and Scheepers 2012). To gain an advantage from digital transformation, SMEs must deal with complex business aspects related to their core issues. The core of a business entity remains on its strategic aspects, which lead them to the established IT utilization strategy (Greenwood et al. 1988; Luftman et al. 1999; Sredojević et al. 2016). Considering that complexity, the use of endogenous growth theory enables researchers to integrate the findings of previous studies by identifying the connecting line and reconstructing it into a new framework by referring to the endogenous growth concept. The new framework could help SME actors and scholars understand the critical value of digital tools in the SME context and how to optimize them to transform their business, prevent misinvestment, generate competitive advantage, and, in turn, improve their survivability. According to that view, the goal of the current study will be achieved through the following specific research objectives (ROs):

RO1 : Describe the research pattern in the SME digitalization area.

RO2 : Identify the core success factors of SMEs' digital transformation to gain business success.

RO3 : Search for relevant business aspects necessary for SME digital transformation.

RO4 : Develop further research agenda in the field of SMEs' digital transformation.

The rest of the study is organized as follows: First, after explaining the motivation and stating our research objectives, we further develop the theoretical background as the framework's foundation. Furthermore, we discuss the method used for this systematic literature review, followed by the discussion of our findings and recommendations for future research agenda. The final part of our study is the conclusion with implications and limitations.

1.1 Theoretical framework

The theoretical background of this study elaborates on the use of endogenous growth theory in the SME digitalization context, and business aspects of SME digitalization. Digitalization study is a unique study. Initially, the use of IT for the industry was seen as a robust principal investment to increase income immediately due to increased labour productivity (Rebelo 1998; Solow 1957; Sredojević et al. 2016). The productivity of research regarding IT acceptance has also grown significantly

and resulted in fundamental models of IS usage such as the Technological Acceptance Model (TAM) (Davis et al. 1989; Davis; 1989), the Unified Theory of Acceptance and Use of Technology (UTAUT) (Venkatesh et al. 2003), and IS Success Model (DeLone and McLance, 1992; DeLone and McLance, 2003). However, along with its development, IT investments required appropriateness to organizational needs. Misinvestment of IT tools and misalignment between IT and business tasks resulted in business stagnation, and companies failed to achieve a competitive advantage (OECD, 2000). Later studies argued that IT investments required innovation in various sectors within business entities simultaneously to generate the expected profitability (Grant 1996; Rebelo 1998; Sredojević et al. 2016). These innovations included human resource development (educational investment), production innovation, marketing innovation, managerial innovation, and various strategic aspects within the company to become an agile entity (Grant 1996; Swafford et al. 2008; Weill et al. 2002). These conceptions align with the view of endogenous growth theory. Endogenous growth theory acquired technology as the driver of economic growth but simultaneously required business innovation to make technology work advantageously. Therefore, we are adopting that concept to develop a holistic framework for SME digital transformation.

1.2 Endogenous growth theory and business digitalization

The endogenous growth theory emerged and developed in macroeconomics to explain how technological change, knowledge investment, research and development, and knowledge spillover resulted in a country's economic growth. However, according to Delmar et al. (2011), the dynamics of technology and knowledge cannot be separated from business dynamics that mix technology and knowledge into products that have economic value. In this case, Delmar et al. (2011) proposed entrepreneurship as a catalyst linking new technological resources with economic growth at the micro level. Related to that view, we argue that endogenous growth theory is still relevant to understanding the critical role of technology in the micro sector, as business entities are the main actors in exploiting new technologies and transforming them into economic growth. In this research, we propose ideas regarding how business entities should carry out the right strategy to generate economic growth by exploiting technological change, managing knowledge, and research and development, which are conceptually constructed on the endogenous growth theory framework.

Endogenous growth theory views economic growth driven by technological change as a result of investment in new knowledge (Romer 1990). Romer (1990) argues that the theory of endogenous growth stands on three premises: (1) technological change is the key to economic growth; (2) technological changes have a crucial role because businesses initiate technological changes to respond to market incentives; and (3) how business works (business instruction) is different from other economic products. When businesses have acquired new business models from technology investments, they can use them repeatedly at no cost to gain market incentives (Romer 1990). The way it works is like how fixed costs work.

Furthermore, the business entity needs strategic action to develop new business instructions, products, and models. In this case, research or scientific investigation processes, experimentation, and refinement are the strategic actions to create new products, services, and business models that make business entities competitive (Romer 1990). Scientific investigation enables SMEs to make decisions based on data and address actual business problems (Dossou et al. 2022; Dutta et al. 2020; Frau et al. 2022). Furthermore, the new business model would need continuous refinement as the organization needs further adjustment to gain the fit model, and business needs are also continuously changing (Apostolov and Coco 2021; Brodeur et al. 2022; Busto Parra et al. 2021). After all, competitiveness generates business growth opportunities in monopolistic competition markets (Bharadwaj et al. 2005; Delmar et al. 2011; Kabanda 2013; Romer 1990), where each business entity has its uniqueness, core strategy, and specific market segmentation and competes with the essence it offers.

In this case, endogenous growth theory requires appropriate knowledge to execute complex business works and then mine the economic incentives through technological changes (Delmar et al. 2011; Sredojević et al. 2016). Applying this concept requires SMEs to simultaneously invest in knowledge mastery to understand their business completely and then make business adjustments following technology investment and vice versa (Delmar et al. 2011; Sredojević et al. 2016). In some cases, it demands complete business transformation, which takes much effort and time until the new technology gives economic growth for SMEs. Besides, competition fluctuation and uncertainty in the market may also challenge the benefit of the new technology. Therefore, those circumstances demand SMEs to innovate their business continuously.

1.3 Business aspects in SMEs' digitalization

SMEs' digitalization is defined as integrating IT into SMEs' business practices which can generate valuable advantages for SMEs' success and resilience (Ben Slimane et al. 2022; Ghobakhloo and Tang 2015; Moeuf et al. 2018). IT integration in business entities has been studied in various aspects, including acceptability, adaptability, alignment, and IS success. Research in this field has also produced models and frameworks for the successful adoption of IS, such as the TAM (Davis 1989; Davis et al. 1989), the UTAUT (Venkatesh et al. 2003), IS adoption (Moore and Benbasat 1991), and IS-Success Model (Delone and McLean 2003, 1992). Those models suggest how the appropriate design of the new IT helps individual performance and, in turn, improves organizational performance. However, those studies only discuss the multifaceted IT projects and have yet to comprehensively study the business aspects (Ghobakhloo and Iranmanesh 2021). Furthermore, investigations on how IT can produce better business performance have yet to be discussed in IS acceptance and success models (Ghobakhloo and Tang 2015). Thus, more than IS success is needed to explain SMEs' success in digital transformation. When referring to the theory of endogenous growth, technological change must be managed to generate new business value and profitability to the company.

In the context of SMEs, SMEs respond to digitalization differently from large companies. SMEs have an excellent opportunity to benefit from IT investments because of their simple business structure, the wide accessibility of IS nowadays, and the need for inexpensive IS technology (Ben Slimane et al. 2022; Moeuf et al. 2018). These potentials allow SMEs to develop more elastic and flexible strategies to easily adapt to various business conditions (Ghobakhloo and Tang 2015; Moeuf et al. 2018). However, some SMEs still find it challenging to take advantage of technological innovations, which makes them unable to achieve a competitive advantage and even fail to survive in the market, especially SMEs in developing countries (Ghobakhloo and Tang 2015). According to the WEF report (2023), approximately 25% of SMEs perceive technological and innovation demands as the top challenge. 64% of SMEs are struggling to use the data from their systems, and 74% find it challenging to generate value from a company data investment (WEF 2023). Relevant to that, Gobakhlo and Tang (2015) argued that the failure of SMEs to utilize IT potentiality was caused by managerial disadvantages. SMEs do not clearly understand the IS technology resources they have and need, so they fail to take advantage of the IT investments (Ghobakhloo and Iranmanesh 2021; Ghobakhloo and Tang 2015). SMEs need business knowledge to build managerial skills to determine and implement digitalization strategies at the organizational level (Ben Slimane et al. 2022; Metawa et al. 2021; Moeuf et al. 2018). The right organizational management skills will help SMEs to be able to manage IT and develop new business models to achieve competitive advantage (Ben Slimane et al. 2022; Ghobakhloo and Iranmanesh 2021).

Furthermore, Dahmen and Rodríguez (2014) found a strong relationship between the financial literacy of SME owners in making business decisions and the success of SMEs. In the same context, Ropega (2011) also indicated that one of the causes of SME failure is poor knowledge about personal credit, debt, and capital management. In a simple sentence, SMEs with poor financial literacy to manage their business and investments tend to fail in business. In dealing with digitalization, several researchers have also argued that limited financial resources and knowledge of how to manage them are the causes of the lack of response of SMEs to digitalization (Petzolt et al. 2022; Smith et al. 2022; Toomsalu et al. 2019; Yang et al. 2021). Unfortunately, research related to the digital transformation of SMEs rarely includes financial literacy as an essential factor (Frimpong et al. 2022; Molina-García et al. 2022; Widyastuti and Hermanto 2022). Whereas SMEs with good financial literacy tend to have good innovation power and higher quality of making effective decisions (Molina-García et al. 2022). The power of innovation and the quality of decision-making are essential variables for SMEs in determining their IT investment strategy because their accuracy is crucial to digital transformation success.

Referring to the theoretical background above, we summarize it into a conceptual framework presented in Fig. 1. The conceptual framework is helpful as the basis of SME's digital transformation framework that will constructed in this study.

We use three business aspects to present core success factors in the digitalization of SMEs, that is (1) the information system aspect, (2) the organizational aspect, and (3) the financial aspect. These aspects align with endogenous development theory's view because technological change must be managed dynamically, facilitating knowledge

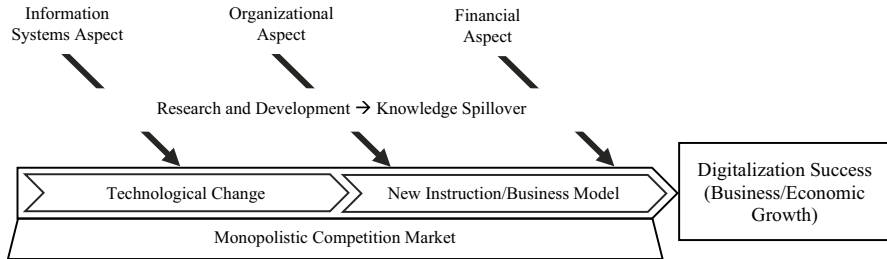


Fig. 1 Theoretical framework

spillover and, in turn, creating new business instructions (Delmar et al. 2011; Romer 1990). Technological changes in the company are the response to the availability of technological innovation in the market and the potential of SMEs to improve their advantage by adopting that technological product. Once SMEs decide to innovate their business through technological changes, they need new knowledge to execute it appropriately. Knowledge spillover schemes play a role after that (Delmar et al. 2011; Sredojević et al. 2016). Knowledge spillover contributes to developing business instruction to apply the innovation plan covering IS, organizational, and financial aspects. Business instruction targets proper IT infrastructure (IS aspect), reliable IS and business management (organizational aspect), and planned investment decision-making (financial aspect). Effective business instruction represents the fit business model, which generates SMEs' competitive advantage in the monopolistic competition market and brings them into successful digitalization. Furthermore, the indicator of successful digitalization is the economic growth of the SMEs' businesses.

2 Research method

2.1 Article selection protocol

We applied "SMEs Transformation" as a keyword in the search column, resulting in 12,371 suggested articles regarding that keyword. Furthermore, we managed the filter and applied several conditions, including (1) added keywords with "SMEs OR Digitalization OR Resilience OR Success"; (2) limited only for article journals and English language; and (3) set to online full text and peer-reviewed articles, past ten years for a date range, and limiting subject area into Business, Management, & Accounting, Computer Science, Decision Science, Social Science, and Economy. Those selection criteria resulted in 193 articles from the Scopus Database and 178 from the Web of Science (WoS) Database. Both data were merged, and we found 66 duplicate titles of journal articles. Therefore, the duplicate titles were dropped from the collected data and left 305 data. We applied that relatively general keyword to collect a wide range of articles and limited it to journal articles. According to González-Albo & Bordons (2011) journal articles are more complete and influential research compared to proceeding papers. In business field, journal article is

the publication channel that tends to publish complete research report while conference proceeding tends to publish preliminary research result.. Furthermore, We use Scopus and WoS databases because they are the most extensive academic literature databases that contain various reputable publishers and journals. Due to rapid technological changes, we limit the data collection to publications from the past ten years. We argue that in that range, we will gain enough information regarding the latest trends in technological innovation applied in the SME sector and the behavioral responses of SMEs during transformation. We also limited the subject area to manage the relevancy. Finally, we applied inclusion and exclusion criteria to select suitable primary articles according to the research objectives.

From the 305 collected articles, we determined the criteria for article selection. Only articles that focus on analyzing SMEs' transformation in responding to the digital era and its impact on SMEs' performance, resilience, and sustainability were included in the data collection. We applied this criterion to maintain the focus of this study on the objective, which is to identify the core success factors of SMEs' digital transformation. In this case, performance, resilience, and sustainability are the indicators of successful transformation. After the selection protocol was applied through abstract screening, researchers had 187 articles left.

Furthermore, we applied more specific criteria to the selected articles. We carefully analyzed the abstracts. Articles containing discussion about the antecedent or critical factors to deal with digitalization, both by organizational and technological aspects, then made SMEs successful or resilient in the market were included in the analysis. This criterion was applied to control the exploration of core success factors related to technological, organizational, and financial aspects that result in economic growth. At the same time, articles that discussed digitalization policy, internationalization, environmental sustainability, and differentiation between large and small companies were excluded from the analysis. In this case, we argue that government regulation is an uncontrollable factor while internationalization and environmental sustainability are factors beyond economic growth. Those factors are excluded to prevent biases in determining the critical success factor according to the three aspects that this study focuses on. The last criterion we used was the quartile of the journal. We only included the journal with a minimum 3rd Quartile (Q3) in Scopus. While in the WoS journal, we only included journals from the core collection of WoS. After the exclusion and inclusion applied to the collected articles, there were 106 articles left to analyze. Figure 2 summarizes the steps of article selection.

2.2 Coding and analysis technique

Qualitative data analysis was applied to the primary studies to identify the topic area and core success factors of SMEs in facing digital attacks. We used Wolcott's (1994) analysis phases as it is simple and focuses on forming a description from the literature that fits the current study's objective (Cresswell, 2007). The phases include (1) Highlighting certain information in the primary studies (sketching ideas); (2) Identifying patterned regularities (coding, condensing, reducing into themes); (3) Contextualising the framework from literature (relating categories to the analytic

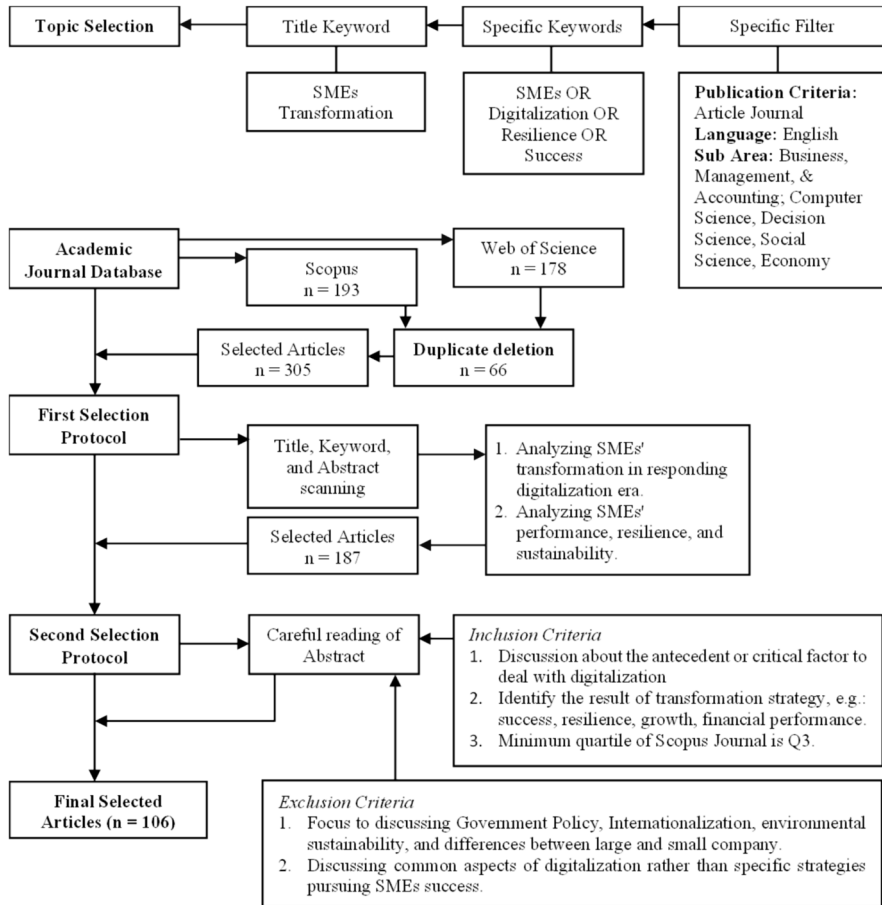


Fig. 2 Article selection protocol

framework); and (4) Displaying findings in tables and figures (Cresswell, 2007). The first phase helps researchers to recognize research patterns. Then, the second phase helps researchers to identify the success factors of SMEs' digital transformation investigated by the primary studies and extract them according to similarities, relevant values, and variability into the core success factors. Furthermore, the last two phases help researchers to categorize and display the core success factors. In the third phase, we applied thematic analysis to interpret the findings into a group of themes or topics (Lucas et al. 2007; Rodgers et al. 2009; Ben slimane et al. 2022). The thematic analysis was used to determine core success factors mentioned or suggested by primary studies, categorize them into several themes, tabulate them into the three business aspects (IS, organizational, and financial), and reconstruct them as conceptual models. We reconstructed the findings into a structured conceptual framework referring to the theoretical framework. The conceptual framework contains the direction, flow, and connections between variables. That approach produced

a sound framework for a better understanding of the concept of digital transformation in the SME context. The result of the analysis was presented separately in two types of tables and one conceptual framework, that is, (1) research practical themes presented in Table 04–011; (2) core success factors presented in Table 012; and (3) the conceptual framework presented in Fig. 3.

3 Results

3.1 Demography of primary studies

The demography of the primary studies presents the demographic of the publication channel, the research method, and the country of origin of the primary studies. That information discloses the publication profile in the related topic and the research gap that may exist in these demographic contexts. Table 1 summarizes the publication channel of the primary studies based on quartiles. A more detailed tabulation regarding the publication channel is presented in Appendix 2. Table 1 shows that 64 primary studies were published in Q1 journals, 31 in Q2 journals, and 11 in Q3 journals. It indicates that more than half of the published articles regarding digital transformation among SMEs have a significant impact, theoretically or practically.

Table 2 presents the research method used by the primary studies. According to Table 2, primary studies used a wide range of research methods, including qualitative, quantitative, mix-method, and research and development (R & D). In the qualitative method group, eight articles used literature review, one article transformation methodology, four Delphi methodologies, one immersion investigation, twenty-two case studies, one critical realism, three interpretative, three fuzzy models, and one pilot research. Furthermore, in the quantitative method group, thirty-eight articles used the survey method (primary data), four archival (secondary data), and one fuzzy model. Finally, eight articles used mix-method, and seven R & D. According to the data, 41, 5% of the primary study was conducted using qualitative, 40, 5%

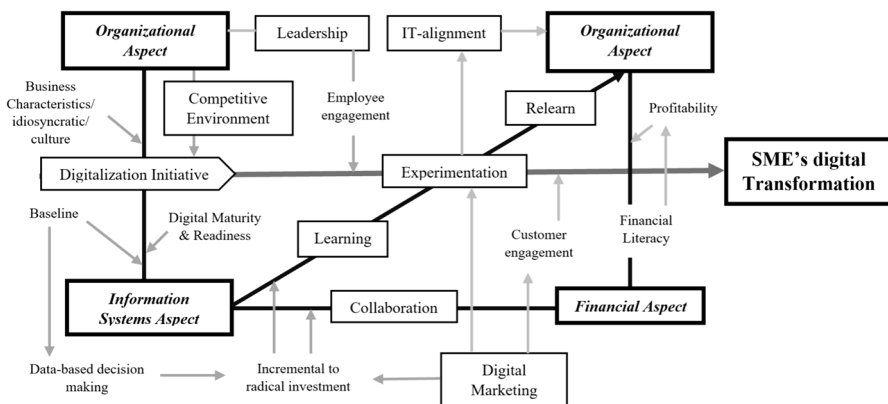


Fig. 3 SME's digital transformation framework

Table 1 Publication channel of the primary studies

No	Quartile	Number of studies	Primary studies
1	Q1	64	A1, A2, A5, A6, A10, A11, A12, A13, A16, A17, A18, A21, A22, A23, A25, A27, A29, A30, A31, A33, A36, A38, A39, A40, A42, A43, A44, A45, A48, A49, A50, A51, A55, A56, A59, A62, A65, A66, A67, A68, A69, A70, A71, A73, A75, A76, A79, A81, A82, A83, A84, A85, A87, A88, A91, A92, A94, A95, A97, A98, A99, A100, A103, A104
2	Q2	31	A4, A9, A14, A15, A19, A24, A26, A28, A32, A34, A35, A37, A41, A46, A47, A52, A53, A54, A60, A61, A63, A64, A72, A74, A77, A80, A86, A90, A96, A101, A106
3	Q3	11	A3, A7, A8, A20, A57, A58, A78, A89, A93, A102, A105
	n	106	

quantitative, 7, 5% mix-method, and 6, 5% R & D. Moreover, case study and survey method were the most frequently used in the qualitative and quantitative groups. Then, the multiple case study technique was the most frequently used in the qualitative group. At the same time, structural equational modelling (SEM) was the quantitative group's most frequently used data analysis technique.

Table 3 presents information regarding the origin of the subject of primary studies. Forty-seven primary studies had research subjects on European countries, while twenty-five were on Asian countries. Primary studies used American, African, and Australian as the research subjects, only one for each. The rest of the primary studies used subjects from several countries from cross-continent and literature-based research. Based on the data, most primary studies have European countries as the research subjects. Italy is the most frequently used subject of European countries, followed by Spain, Germany, and Finland. Furthermore, the most frequent subjects used in Asian countries are India and China. This distribution indicates that there is still a gap in reported findings regarding SMEs' digital transformation based on the origin of the research subject. The research findings of the SME phenomenon in facing digital attacks from Asian, African, and American countries are still rare, specifically from developing countries.

Reported studies that analyze the digital transformation issues in SMEs have grown in the last two decades. The demography tabulation shows that most of the reported studies have been published in significant journals, while around 30% are still published in Q2 and Q3 journals. Interestingly, the researchers used a wide range of methodologies to investigate this phenomenon. It indicates that the readers, practitioners, and scholars have broad information to understand this issue. However, the subject of the previous studies is mostly from European countries, and only a tiny number came from developing countries. In contrast, the application of digital transformation is undoubtedly different between countries according to the nature of business, market, environment, resource accessibility, and competition on the market, as most of the primary studies mentioned in their reported studies. Therefore,

Table 2 Research method of the primary studies

No	Method	Method	Technique	Number of studies	Primary studies
1	Qualitative	Literature review	Cases analysis	1	A25
			Content-centric, interpretive structural model	1	A36
			Content analysis	3	A9, A38, A39
			Bibliographical analysis	2	A66, A87
			Meta-analysis	1	A43
			Not specified	1	A63
		Transformation methodology	Charting the shortest road	1	A27
		Delphi-methodology		4	A12, A24, A57, A91
		Immersion investigation	Maturity model/analysis	1	A5
		Case study	Cross-case study	2	A6, A35
			Multiple-case study	9	A22, A34, A52, A53, A60, A62, A75, A85, A104
			In-depth cases, document analysis	1	A33
			Inductive	2	A50, A56
			Single case study	3	A41, A71, A84
			Open-end approach	1	A73
			Exploratory case study	1	A16
			Not specified	3	A20, A46, A82, A93
		Critical realism	Theoretical and literal replication logic	1	A103
		Interpretative	Triangulation	2	A14, A101
			In-depth interview	1	A17
		Fuzzy model	Comparative analysis	1	A11
			Fuzzy-DEMATEL	1	A59
			Neurofuzzy	1	A96
		Pilot research		1	A42

Table 2 (continued)

No	Method	Method	Technique	Number of studies	Primary studies
2	Quantitative	Survey (primary data)	Logistic regression	3	A61, A98, A106
			Linear regression	6	A31, A45, A47, A74, A77, A81
			SEM	18	A3, A10, A18, A19, A29, A30, A32, A49, A51, A64, A65, A67, A69, A70, A72, A95, A97, A105
			CFA	4	A40, A78, A79, A92
			Hierarchical regression	1	A80
			GLS and/or OLS	5	A1, A2, A37, A48, A88
			Cluster analysis	1	A58
			Descriptive statistics and correlation	3	A23, A76, A89
			Multiple Regression	4	A54, A90, A99, A100
			T-spherical fuzzy cloud	1	A21
			Mix-method	8	A15, A44, A55, A68, A83, A86, A94, A102
			R&D	7	A4, A7, A8, A13, A26, A28
Total		106			

Table 3 Origin of Research Subject

No	Origin	Number of studies	Primary studies
1	Europe	2	A1, A78
	Czech Republic	1	A37
	Denmark	4	A46, A69, A70, A81
	Finland	6	A41, A52, A58, A67, A86, A104
	Germany	3	A39, A71, A77,
	Greece	14	A8, A15, A17, A22, A34, A35, A40, A60, A62, A65, A75, A85, A88, A98
	Italy	1	A42
	Poland	2	A74, A94
	Romania	1	A7
	Russia	7	A18, A24, A45, A57, A61, A76, A82
	Spain	1	A53
	Switzerland	1	A30
	UK	7	A11, A23, A47, A90, A91, A99, A100
	Several European Countries		

Table 3 (continued)

No	Origin	Number of studies	Primary studies
2	Asia		
	China	4	A10, A79, A95, A101
	Oman	1	A3
	Egypt	1	A63
	Hong Kong	1	A20
	India	5	A19, A28, A50, A68, A92
	Indonesia	3	A32, A89, A105
	Iran	1	A44
	Japan	1	A33
	South Korea	2	A51, A64
	Malaysia	3	A32, A49, A93
	Pakistan	1	A29
	Vietnam	2	A72, A73
	Several Arabic Countries	1	A48
3	America	1	A103
	Africa	1	A80
	Australia	1	A2

Table 3 (continued)

No	Origin	Number of studies	Primary studies
6	Other	1	A84
	North America & European countries, and Australia	1	A84
	Developing Countries	1	A14
	European and Latin American Countries	1	A54
	Online Platform	1	A56
	Literature-SMEs-IS	12	A9, A12, A13, A21, A25, A27, A36, A38, A43, A66, A87, A96
	Not Specified	10	A5, A6, A16, A26, A55, A59, A83, A97, A102, A106
	Total	106	

the phenomenon of digital transformation among SMEs in developing countries still needs to be studied further.

4 Discussion

4.1 Themes of success factors in SME digital transformation

Table 4, 5, 6, 7, 8, 9, 10 and 11 present the patterned themes from all primary studies. Eight themes were categorized to explain the main areas to gaining successful transformation of SMEs in facing digital attack. Twelve primary studies were included in the SME's limitation theme, twenty-three in the organizational learning theme, seven in the IT-alignment theme, sixteen in the leadership theme, twelve in the digital marketing theme, eight in the collaboration theme, five in the competitive environment, and twenty-six in the digitalization process/model theme. Furthermore, we identified the core success factors proposed by the primary studies and distributed them into three main aspects: organizational, information systems, and financial. The tabulation is presented in Table 12 and is discussed further.

4.1.1 SME's limitation

Primary studies have mentioned the limitations of SMEs in facing digitalization. Many SMEs cannot survive in the market because they cannot catch up with the opportunities of digital tools. Indeed, the main issue is more than just IT. Instead, the appropriate exploitation of IT tools will bring the SMEs to find their competitive advantage and turn to enormous market opportunities. Previous studies mentioned that the limitations of SMEs are the lack of cognitive response, skilled labour, financial access, innovation culture, benefit clarity, R & D, value creation, collaboration, and tend to have a short-term plan (Amaral and Peças 2021b; De Lucas Ancillo et al. 2022; Ingaldi and Ulewicz 2020; Khin and Hung Kee 2022; Smith et al. 2022; Straková et al. 2022). That makes most SMEs have an under-exploitation of ICT tools (Moeuf et al. 2018). Although ICT's complex and expensive investment in SMEs is unnecessary (Amaral and Peças 2021b; Petzolt et al. 2022). That circumstance placed SMEs into ambiguity in making digital transformation decisions. On the one hand, they have a narrow product portfolio that does not need full use of ICT investments as well as they have little financial resources, but on the other hand, if they do not deal with ICT, they cannot maintain competitiveness.

Due to the existence of limitations of SMEs, incremental innovation is probably the suitable alternative to starting digital transformation (Amaral and Peças 2021b; Ingaldi and Ulewicz 2020; Trischler and Li-Ying 2022). Incremental innovation means the small steps to begin innovation. In the first step, SMEs could optimize their current resources and technology on hand to change the way they do business. In the process, SMEs can identify their actual needs and invest in new technology in small areas but continuously. Incremental initiation could help SMEs gradually transform barriers into enablers and continuously develop digital awareness, organizational reform, and talent attraction (De Lucas Ancillo et al. 2022; Khin and Hung

Table 4 Research practical themes—SME's limitation

No	Themes	Main discussion	Suggestion	Number of Studies	Primary articles
1	SME's Limitation	Primary studies discussed the limitations of SMEs in dealing with digital transformation and their alternative strategy	<p>Limitation</p> <p>Lack of cognitive responses of entrepreneurs and their attitude toward digital transformation opportunities are considered mental barriers. As a result, entrepreneurs do not perceive the ICT investment as beneficial, considering it difficult to manage, and perceive that they can't predict the sustainability of digital initiatives [A21]</p> <p>SMEs tend to lack skilled labour, financial access, innovation culture, norm or benefit clarity of ICT investments, and lack broadband infrastructure [A5, A24]</p> <p>SMEs tend to have narrow product portfolios that do not guarantee full use of ICT investments (technological barriers), resistance to change (technological, Human, and training barriers), limited funds for given investments (economics barriers), lack of value chain management and value creation, lack of investments on R&D, lack of commitment from top management, the turbulence of the environment (contextual barriers) [A24, A42, A49, A86, A103, A106, A90]</p> <p>Lack of collaboration [86]</p> <p>Tendency to think short term than plan long term, lack of suitable technology/tools, over-reliance on legacy technology, cultural resistance, lack of formal strategy, lack of central coordination, internal politics [A91, A90]</p> <p>Most SMEs are under-exploited of IS/IT (Least expensive and revolutionary technologies) and lack the expertise to make use of the recent trends (have difficulties managing complex computer solutions) [66]</p> <p>Investing in complex and expensive technology is not necessary. The low-level investment is relatively easy to facilitate and has a relevant impact on SMEs' performance [A5, A86]</p> <p>Suggestion</p> <p>SMEs should have an awareness of product and service characteristics needed in specific geographical areas and proactively search for new customers (markets) using digital media [A24]</p> <p>SMEs should transform the barriers into enablers to deal with digitalization, and develop digital awareness, organizational reform, and talent attraction [A21, A49]</p> <p>SMEs should emphasize IT-infrastructure, and relevant IT-security, focus on service offerings, develop standard products and working procedures, and develop collaboration with universities or research institutions [A86, A94, A90]</p> <p>SMEs should have the willingness to acquire new knowledge and tolerance to failure (experimentation) [A91]</p> <p>SMEs should better engage in customer service needs, protecting customers, adding value, doing experimentation, and promoting collaboration [A103]</p> <p>SMEs should give serious attention to creating new value in services [106]</p>	12	A5, A21, A24, A42, A59, A66, A86, A90, A91, A94, A103, A106

Table 5 Research practical themes—organizational learning

No	Themes	Main discussion	Suggestion	Number of studies	Primary articles
2	Organizational Learning	Primary studies discussed the importance of acquiring new knowledge, specifically digital tools, and how to adapt employees to new devices and ways to work	<p>SMEs (both leaders and employees) should learn and re-learn to become digitally competent and develop agility through their digital competencies [A22, A30, A48, A50]</p> <p>Realizing digital opportunities and options (inconsistent understanding of digitalization acts as a barrier) [A48]</p> <p>Completely understand their business (doing self-assessment); product, production systems, market segmentation, tools and machinery, human resources, stakeholder, competitor, and related IS [A33, A73, A76]</p> <p>Understand the importance of education and training for digitalization (people are as important as the technology itself) [A47, A57, A61, A95, A97]</p> <p>Develop a systematic plan to align employees to the new IS. Consider evidence-based recommendations [A19, A83]</p> <p>Ensure tangible and intangible assets with solid dynamic capabilities and digital strategy [A97]</p> <p>Develop a network to academia for collaborative organizational learning and continuous improvement [A20]</p> <p>Maintain employee motivation [A19]</p> <p>Choose the trustworthy and easy-to-learn IS [A19, A30]</p> <p>Continuously upgrade human resources [A69, A33, A48]</p> <p>Recognize the value of developing the team's capacity to become conversant with digital technology to enhance business operations [A48]</p> <p>Trained and incentivized employees to learn new IS (train the digital talent) [A19, A57, A104]</p> <p>Develop analytics capabilities (owners and employees) [A71]</p> <p>Enabling employees to participate in strategic meetings and spreading knowledge through interdepartmental meetings to foster absorptive capacity and value creation [A65, A67]</p> <p>Cooperate with partners who can help to exploit and transform external knowledge [A67]</p> <p>Balancing IT integration and strategic differentiation [A33, A73]</p> <p>Learn and adjust the specific strategy of each sequence for a better fit with firm needs (understand similarities and differences among SMEs) [A47, A73, A83]</p> <p>Connect externally acquired knowledge with internal dynamics [A18, A69]</p> <p>Use existing capabilities and resources to be a flexible specialist [A33]</p> <p>Understanding the physical, communication, and information layers during digitalization [A63]</p> <p>Understanding data characteristics (availability, accessibility, credibility) and how to manage them (fusion, security, and multimodality) [A63]</p> <p>Consider learning webpage, VPN connection, search engine optimization, own domain page, mobile app, and cloud usage to develop good interaction with the customer [A96]</p> <p>Unexistence of rational learning and ICT deficiencies will seriously affect economic growth [A18]</p>	23	A18, A19, A20, A22, A30, A33, A47, A48, A50, A57, A61, A63, A65, A67, A69, A71, A73, A76, A83, A95, A96, A97, A104

Table 6 Research practical themes—IT-alignment

No	Themes	Main discussion	Suggestion	Number of studies	Primary articles
3	IT-Alignment	Primary studies discussed the importance of appropriate technological investment according to the company's needs, existing work culture, business environment, and customer needs and expectations	<p>Developing innovation and new business models based on practical experience in the industry [A51]</p> <p>Develop competitive advantage by providing organizational and technological facilities [A57]</p> <p>Typical digitalization must align with organizational, operational, and technical particularities [A78]</p> <p>SMEs should consider strategy, human resources, organizational fit, and operations carefully [A78]</p> <p>SMEs should consider the functionality of certain ICT to its specific benefits on strategic aspects during a business process [A80]</p> <p>SMEs should push the company to adopt more and more digital solutions (digitalize various aspects of business management such as logistics, research and development, human resource management, information flows, operations, sales, and services) [A88]</p> <p>IT and organizational capability are linked. Therefore, SMEs should consider their IT capability/maturity, internal knowledge dissemination, and internal engagement to determine appropriate strategic planning for successful digital transformation [A90]</p> <p>Gain benefits from a digital platform, a new value approach, and network capability [A29]</p>	7	A3, A29, A51, A57, A78, A80, A88

Table 7 Research practical themes—leadership

No	Themes	Main discussion	Suggestion	Number of studies	Primary articles
4	Leadership	Primary studies discussed the leadership style to promote transformation and its agility in responding to a business's internal and external dynamics	Aligning leaders' vision for digital transformation with managerial and operational work [A53] SME leaders should have a big picture in deciding and managing digital transformation [A55] SME leaders should have initiative, awareness, and proper knowledge before deciding to respond to uncertainty [A32, A43, A55, A68] SME leaders should develop relational and innovation capabilities to face volatility, uncertainty, complexity, and ambiguity (VUCA) [A40] SME leaders should have a proactive and reactive entrepreneurial orientation to define the threat as a challenge and an obligation to change [A85, A92] Develop agile leadership to develop strategic flexibility (exploit new business opportunities, sensitive to change strategy, use flexible systems, resource fluidity, develop employees, and avoid inactivity and stagnation) [A32, A40, A44, A77, A100] Invest in their own (leader) digital literacy [A44] Develop a comprehensive strategy, roadmap, and clear direction toward digital transformation [A43, A93] SMEs tend to be more human than big companies (employees are central to rebuilding value); SME leaders may deploy digital skills (train employees to use related technology and motivate them to adhere) more effectively and have financial planning to pursue individual development [A79, A92, A99] Managerial recognition must simultaneously focus on digitality and a sustainability strategy to achieve high financial performance [A81] SME leaders should identify prospective talent, develop a credible team to redesign structure and business process and develop a good knowledge management culture [A35, A43]	16	A32, A35, A40, A43, A44, A53, A55, A68, A77, A79, A81, A85, A92, A93, A99, A100

Table 8 Research practical themes—digital marketing

No	Themes	Main discussion	Suggestion	Number of studies	Primary articles
5	Digital Marketing	Primary studies discussed the optimization of the digital marketing strategy by generating an online presence	<p>Use social media to develop and maintain an online presence [A45, A54, A74, A89, A102]</p> <p>Develop an online presence by promoting, presenting, motivating images/videos, sharing knowledge, and collecting customer and employee feedback [A2, A10, A54, A98]</p> <p>Develop the social skill to identify and connect customers' expectations with product development and marketing strategies [A45]</p> <p>Focus on collecting new customers using online advertising, search engine optimization, online sales (shop), and delivery service [A58]</p> <p>Adaptive and focus on critical digital marketing strategy for SMEs' situation [A58]</p> <p>Generate time series data about website transformation and provide applicable early warnings of company competitiveness changes [A105, A54]</p> <p>SMEs should consider structural, relational behaviour, and cognitive, and knowledge transfer dimensions of social media platforms to achieve their Ambidextrous Capability [A98]</p> <p>SMEs should carefully integrate and coordinate social media as a communication channel to deliver a clear and consistent message to the customers to develop value [A102]</p> <p>Facilitate customer value creation, informativeness entertainment, and sensory appeal using the omnichannel strategy on social media during the purchase phase [A62]</p> <p>Develop linkage for collaboration or partnership opportunities by using social media. SMEs should consider collaboration work with specialists and customers (open innovation) [A10, A74, A89, A102, A105]</p>	12	A2, A4, A10, A45, A54, A58, A62, A74, A89, A98, A102, A105

Table 9 Research practical themes—collaboration

No	Themes	Main discussion	Suggestion	Number of studies	Primary articles
6	Collaboration	Primary studies discussed the importance of collaboration to reduce competition, access more resources, and gain a broader market	<p>Collaboration is one of the leading enablers or determinants of digitalization success [A15, A39, A84]</p> <p>SMEs should consider sharing IT vision, artifacts, and competencies during digital orchestration supported by multilevel social structures. SMEs should maintain their successful relationship by allocating, structuring, and coordinating their respective IT resources and competencies [A84]</p> <p>SMEs must have a trust structure under collaboration work and platforms [A39]</p> <p>SMEs should develop and maintain managerial cognition and social capital to organizational capabilities through community and team building (internal and external collaboration) [A56, A64]</p> <p>Using cloud computing for efficient and effective collaborative works and data science for credible decision-making (Invest in related technology that improves relationship performance or integrates current systems to enhance relationship performance) [A39, A70]</p> <p>Creating shared values based on envelopment strategy [A64]</p> <p>Improve the participation rate of employees, customers, and stakeholders to increase trust and engagement [A15]</p> <p>Consider collaboration work with IT specialists or scientists [A74]</p>	8	A15, A39, A56, A64, A70, A74, A84, A89

Table 10 Research practical themes—competitive environment

No	Themes	Main discussion	Suggestion	Number of studies	Primary articles
7	Competitive Environment	Primary studies discussed the importance of a competitive environment to stimulate innovation and digitalization initiatives among SMEs	<p>Develop digital antibodies to face crisis and uncertainty by adopting digital technologies, reducing cost, and positively overcoming the new difficulties [A72, A87]</p> <p>Understanding SME characteristics (the region with the competitive situation, enterprise size, enterprise age, limited liabilities company, the enterprise has some innovation, micro and macro-economic conditions, and rich and poor areas) and then translating all success factors into their language [A1]</p> <p>Update technological infrastructure constantly to keep up with the competitive landscape [A72]</p> <p>TOE (Technology-Organization-Environment) business model and digital tools would help SMEs deal with new circumstances [A87]</p> <p>The widespread sharing of IT (good business environment) and looking for opportunities to gain information easily. Considering internal (capacity, cost, human resource, to-manage-ment support) and external (competitive pressure, IT innovation, policy support) enablers and their compatibility [A101]</p> <p>Standardization of IoT components, present globally and maintain the balance of local and global mindset [A60]</p> <p>Able to shape solutions on customer-based data platforms. Customers and partners are essential to defining service strategy (Servitization) [A60]</p>	5	A1, A60, A72, A87, A101

Table 11 Research practical themes—digitalization process/model

No	Themes	Main discussion	Suggestion	Number of studies	Primary articles
8	Digitalization Process/Model	Primary studies discussed the alternative transformation or business model strategy and the critical factor that is effective for SMEs in dealing with digitalization in business processes, decision-making, manufacturing, and financial resources	<p>Revise business model for value creation [A6]</p> <p>Define dynamic capability [A36]</p> <p>Define baseline, readiness, and existing digital maturity [A9, A36, A38, A75]</p> <p>Consider non-technological aspects [A9, A14, A35, A46]</p> <p>Define financial planning and explore more accessible resources [A31, A38, A49, A52]</p> <p>Consider the Plan, Do, Check, Act (PDCA) quality cycle [A27]</p> <p>Develop phases based on priority and criticality [A7, A12, A31, A46, A52]</p> <p>No need for digitalization across all business dimensions. Focus on selected strong areas of organization to develop digital strategy and vision and replace legacy technology with digital technology [A37]</p> <p>Build managerial and digital capability to deploy existing resources [A37]</p> <p>Use Design Thinking Framework and diagnostic tools [A13]</p> <p>Formalization of planning according to best practices and emerging challenges proposed [A12, A23]</p> <p>Develop a trustworthy and capable team [A35, A52]</p> <p>Fitting, aligning, and experimentation [A8, A12, A82]</p> <p>Proper use of social media, big data, and IT tools [A12]</p> <p>Increasing trust and engagement of employees [A14, A23, A46]</p> <p>Develop agile structure by flexible, responsive, and incremental reconfiguration [A25]</p> <p>Design of decision-aided tools in the digital or intelligent system [A26]</p> <p>Focus on efficiency (Cost Reduction) and productivity [A26, A46, A82]</p> <p>Adopt IoT, digital manufacturing, cloud strategy, and data analytics, and generate a digital product [A28]</p> <p>Higher initial investment in standardized software and high-performance hardware [A95]</p> <p>Using data science and scientific analysis for decision-making [A28, A34, A37]</p>	26	A6, A7, A8, A9, A11, A12, A13, A14, A16, A17, A23, A25, A26, A27, A28, A31, A34, A36, A38, A41, A46, A49, A52, A75, A82

Table 12 Core success factors

No	Themes	Enablers code			Primary studies
		Organizational	Information systems	Financial	
1	Digitalization process/model	Experimentation, Engagement; Flexible	Incremental to radical; Adaptable; Compatible; Agile	Alternative resources; Efficiency	A6, A7, A8, A9, A11, A12, A13, A14, A15, A16, A17, A23, A25, A26, A27, A28, A31, A34, A36, A37, A38, A41, A46, A49, A52, A75, A82
2	Organizational learning	Absorb; Selection; Update; Sharing; Collaborative	Easy to learn; Data	Knowledge investment; Profitability	A18, A19, A20, A22, A30, A33, A47, A48, A50, A61, A63, A65, A67, A69, A71, A73, A76, A83, A95, A96, A97, A104
3	Leadership	Understanding; Initiative; Motivating; Agile	Communication; Data	Cost/Benefit Analysis; Feasibility Analysis	A32, A35, A40, A43, A44, A53, A55, A68, A77, A79, A81, A85, A92, A93, A99, A100
4	Collaboration	Engagement; Relationship; Partnership; Trust	Collaborative work, tools sharing, multiple user tools	Sharing capital, Sharing Resources; Profit Sharing	A39, A56, A64, A70, A84
5	Digital marketing	Online Presence; Relationship	Optimization; Communication; Relate	Efficiency	A2, A4, A10, A21, A45, A54, A58, A62, A74, A89, A94, A98, A102, A105
6	IT-alignment	Knowledge Connection; Alignment	Align	Financial leverage; Profitability	A3, A29, A51, A57, A78, A80, A88
7	Competitive environment	Momentum	Compatible; Agile	Cost/Benefit Analysis; Feasibility Analysis	A1, A60, A72, A87, A101
8	SME's limitation	Limited knowledge; Uncertainty; Less Benefit; Misalignment	Misalignment; Over-exposure IS; Not-compatible	Overinvestment; Unpredictable profit	A5, A21, A24, A42, A59, A66, A86, A90, A91, A94, A103, A106

Kee 2022; Yang et al. 2021). In that way, SMEs should tolerate the failure to find relevant IT structures and continuously develop the infrastructure, business design, task structure, and new culture (Petzolt et al. 2022; Toomsalu et al. 2019; Vuřa et al. 2022). Furthermore, SMEs would better focus on creating value in service to develop customer engagement and protection and promote business-customer collaboration (Smith et al. 2022; Straková et al. 2022). The summaries of the SME's Limitation theme are presented in Table 4.

4.1.2 Organizational learning

To gain success in digital transformation, SMEs, both leaders, and employees, must learn and relearn about anything related to their core business, including new technologies and how to adapt them according to their specific business needs (Corvello et al. 2022; El-Haddadeh 2020; Khurana et al. 2022). Primary research indicated that this learning can be focused on three factors, namely (1) mastery of knowledge related to the business being run (products, segmentation, and core business) (Fitzgerald et al. 2021; North et al. 2020; Van Nguyen et al. 2022); (2) mastery of software and hardware relevant to business needs (Khalil et al. 2022; Savastano et al. 2022; Van Nguyen et al. 2022); and (3) continuous learning in business process refinement (Corvello et al. 2022; El-Haddadeh 2020; Khurana et al. 2022). These three focuses can be carried out by involving employees in formal training or a community of practitioners and developing a healthy knowledge management culture in the business (Cegarra-Navarro et al. 2010; Miroshnychenko et al. 2021; Müller et al. 2021; Nasiri, Saunila, et al., 2020). Basic skills that SMEs may need to learn are (1) data characteristics; (2) data management; (3) data analysis; (4) webpage management; (5) VPN connection management; (6) Search Engine Optimisation (SEO); (7) data and transaction security; (8) mobile apps; (9) cloud-based applications; (10) digital and social media marketing; and (11) proper physical, communication, and information layer management of the devices used (Metawa et al. 2021; Sándor and Gubán, 2021).

Investing in education in digital transformation is indeed a costly investment both in terms of monetary and effort indicators (OECD, 2000). However, investment in education is the key to continuous innovation which is the key to success for SMEs in facing digital attacks (Cegarra-Navarro et al. 2010; OECD, 2000). Awareness of the need for investment in education and the accuracy of decision-making in mastering specific competencies play an essential role in successful learning (Corvello et al. 2022; El-Haddadeh 2020; Khurana et al. 2022). To facilitate the process of learning and adapting to new ways of working, SMEs should start with IT tools that are simple and easy to learn but still reliable in meeting business needs (Chatterjee et al. 2022; El-Haddadeh 2020). Furthermore, SMEs must maintain internal knowledge development and sustainability of innovation to produce sound knowledge management. SMEs can do this by forming multi-skilled work teams and involving employees in strategic meetings, resulting in horizontal and vertical exchange of knowledge (Miroshnychenko et al. 2021; Müller et al. 2021). In addition to generating the growth of knowledge within the internal organization, this also causes a sensation of engagement which can maintain employee motivation to continue

developing (Chatterjee et al. 2022). Besides that, SMEs must also be involved in the business community to absorb valuable external knowledge in optimizing company performance (Cegarra-Navarro et al. 2010; Nasiri, Saunila, et al., 2020). In sum, organizational learning is vital in enabling SMEs to transform external and internal knowledge, the challenges and opportunities, and the available technologies and resources into business innovation. Therefore, SMEs need to develop their capability of learning through educational investment. The summaries of the Organizational Learning theme are observable in Table 5.

4.1.3 IT-alignment

Alignment has long been a strategic factor determining the successful adoption of new technologies (Cragg et al. 2002; Henderson and Venkatraman 1989; Hussein et al. 2002; Luftman and Brier 1999). So it is no surprise that several primary studies highlighted the IT-alignment as an essential factor determining the success of digital transformation (Kim 2021; Nwaiwu et al. 2020; Onyinyi and Kaberuka 2019). The core idea of IT-alignment is that SMEs can ensure that the invested digital tools, software, and hardware address the actual business task problems, expected innovation, available skills and expertise, and financial strength (Nwaiwu et al. 2020; Onyinyi and Kaberuka 2019). By adopting appropriate IT, SMEs can reduce the irritation during the migration process and optimize returns from IT investments as expected (Strnadt 2006; Tallon and Pinsonneault 2011). If misalignment occurs, then SMEs face the risk of misinvestment, which makes IT investment in vain because it does not follow organizational values, the learning process is long because the knowledge gap is too large, and generates lower costs due to the need for many adjustments (Toomsalu et al. 2019). Therefore, careful evaluation and planning are required before deciding which digital tools to invest in. Furthermore, Raimo et al. (2021) indicated that management must encourage SMEs to adopt more digital solutions in various business aspects such as logistics, R&D, human resource development, information management, operations, sales, and services. However, for reasons of caution, the direction of innovation cannot be placed solely on technological developments. The availability of sophisticated and varied digital tools can only accommodate some specific needs of businesses, especially SMEs with simple business structures and selling physical products (Amaral and Peças 2021b; Chatterjee et al. 2022; El-Haddadeh 2020). Sophisticated digital tools only used for simple business tasks and not optimized potentiality will turn to over-investment. Therefore, placing alignment indicators on the needs and practical experience of the organization is a better way (Kim 2021; Nwaiwu et al. 2020). The summaries of the IT-Alignment theme are observable in Table 6.

4.1.4 Leadership

Scuotto et al. (2021) stated that SMEs tend to be more human than big companies. This statement indicates that decision-making in SMEs is greatly influenced by their owners, where generally, the owners act as top management. That is because SMEs typically have a simple organizational structure so that a variety of managerial and

decision-making tasks are centered on one or a few people, unlike big businesses with complex responsibility centers. Thus, the orientation of leadership in SMEs is critical in determining the direction and success of digital transformation in SMEs. The leadership aspects discussed by primary studies focus on something other than leadership style but on leadership orientation and attitudes in responding to digitalization opportunities practiced by management or owners (Fachrunnisa et al. 2020; Isensee et al. 2020; Leso et al. 2022; Nair et al. 2019). First, SME leaders must have the sensitivity, initiative, awareness, and knowledge to capture the big picture of opportunities, challenges of IT adoption for their business, and the profitability opportunities that can be generated (Fachrunnisa et al. 2020; Isensee et al. 2020; Leso et al. 2022; Nair et al. 2019). The big picture must be translated into operational visions, reachable missions, and campaigns for employees (Penco et al. 2022; Vrontis et al. 2022). SME leaders must provoke employees to be involved, motivated, and proactively develop themselves to support the transformation (Penco et al. 2022; Vrontis et al. 2022).

Furthermore, SME leaders must be able to formulate a strategy, roadmap, financial analysis, and clear direction but with an agile structure to help employees succeed in digital transformation (Isensee et al. 2020; Rusly et al. 2021). To operationalize this strategy, SME leaders must be able to identify their talents, train them, form work teams, and delegate responsibilities (Garbellano and Da Veiga, 2019; Isensee et al. 2020). SME leaders must also be open to new information and immediately make adjustments when necessary (strategic flexibility) (Jafari-Sadeghi et al. 2023; Nousopoulou et al. 2022; Scuotto et al. 2022; Troise et al. 2022). Therefore, SME leaders must be able to deal with volatility, uncertainty, complexity, and ambiguity (VUCA) in dealing with business dynamics (Troise et al. 2022). In simple terms, besides having adequate literacy and knowledge in seizing digitalization opportunities, SME leaders must be able to formulate a clear vision so that it is easy for employees to understand, analyze the profitability of digital investment, provoke employees to be actively involved, form a culture of knowledge management, determine the right strategies and tools, and be resilient and agile over various uncertainties. The summaries of the Leadership theme are presented in Table 7.

4.1.5 Digital marketing

Given the character of SMEs which have a simple structure and production line, tend to have physical products and limited market scope, marketing is the most strategic area to optimize, even with sophisticated digital platforms (Borah et al. 2022; Ingaldi and Ulewicz 2020; Lányi et al. 2021). The main target of digital marketing is to generate a social presence on online media and maintain consumer engagement (Lányi et al. 2021; Ramantoko et al. 2018; Sinha and Fukey 2021). The social presence will make the market aware of the existence of a product as an entry point for buying intentions. SMEs can optimize interactions through online communication facilities to create consumer engagement and value creation referring to customer expectations (Alam et al. 2022; Borah et al. 2022; Scuotto et al. 2019). SMEs can build engagement through promotions, motivating images or videos, facilitating testimony, giving positive feedback, providing quick responses, and even inviting

consumers to collaborate with open innovation (Borah et al. 2022; Lányi et al. 2021; Scuotto et al. 2019; Wibowo et al. 2021). Several studies used relationship management to describe how companies maintain good communication with consumers to develop engagement (Scuotto et al. 2019; Sinha and Fukey 2021). The strategies above are intended to stimulate consumer sensory appeal, resulting in purchase intention, purchase satisfaction, and repurchase (Matarazzo et al. 2021). Finally, SMEs must understand and evaluate data generated by social media, search engines, and digital marketing platforms that are used to measure the performance of the digital marketing strategy used and improve it on an ongoing basis.

Digital marketing could be challenging for SMEs, particularly for those who are new to social media platforms or other marketing channels. Fortunately, SMEs can easily use their technology on hand, like smartphones, to produce digital content and operate digital marketing strategies with open-source applications. However, a marketing strategy, data and digital literacy, robust content, marketing strategy, and communication skills are still needed to stimulate social presence and consumer engagement. Additionally, SMEs may need more financial and digital resources to apply advanced advertising features and strategies to improve their exposure in online environments. In this case, skills limitations could be upgraded through educational investment and collaboration strategy. Furthermore, the advanced strategy could be managed gradually with minor improvements. The summaries of the Digital Marketing theme are presented in Table 8.

4.1.6 Collaboration

Collaboration is seen as the leading enabler because it opens a way out for various limitations SMEs face (Candelo et al. 2022; Han and Trimi 2022; Pelletier et al. 2021). The limitations of SMEs in dealing with digitalization that were often disclosed in previous studies are (1) limited knowledge and skills, (2) limited financial availability, and (3) limited digital maturity or IT tools (Amaral and Peças 2021b; De Lucas Ancillo et al. 2022; Yang et al. 2021). Internal and external collaboration can mediate these three limitations (Candelo et al. 2022; Min and Kim 2021; Nichifor et al. 2022). However, initiating and implementing sustainable collaboration has its challenges for SMEs. The barriers to collaboration may exist due to the ambiguous role between partners, unclear benefits, and potential leak of the company's confidential information. This risk tends to make business actors or individuals averse in collaboration or sharing valuable knowledge to remain competitive in the market. Therefore, collaboration initiation should be considered the mutual benefit and bounded in a clear contract between parties. For instance, internal collaboration could be applied between management and employees with profit-sharing schemes on specific transformation projects (Li et al. 2018; Min and Kim 2021). To overcome knowledge limitations, SMEs can build partnerships with external parties such as IT specialists, scientists, universities, or business partners with profit-sharing schemes or knowledge transfer, training, and mentoring (Han and Trimi 2022; Min and Kim 2021; Nichifor et al. 2022). Furthermore, financial constraints and digital maturity also potentially hinder SMEs from initiating collaboration. However, it can be accommodated through joint ventures, capital sharing, and IT artifact sharing

(Pelletier et al. 2021). The challenges are trust, healthy cooperation patterns, and collaboration platforms. Therefore, SMEs must still develop digital literacy, build a healthy collaboration structure, and determine a fair profit-sharing agreement for both parties (Han and Trimi 2022). Meanwhile, for collaboration platforms, SMEs can customize suitable and easy-access devices, such as chat forums, cloud-based collaboration spaces, and virtual conferences (Nichifor et al. 2022). The summaries of the Collaboration theme are observable in Table 9.

4.1.7 Competitive environment

Several primary studies found that a competitive business environment is a natural stimulant for SMEs to innovate (Abrahám et al. 2015; Martinelli et al. 2021; Ragazou et al. 2022; J. Wang et al. 2021; Zamani et al. 2022). SMEs naturally respond to market challenges and adopt IT to stay competitive (Ngo et al. 2022). Besides that, the uncertainty generated by the COVID-19 pandemic has increasingly resulted in the responsiveness of SMEs to transform by adopting digital technologies (Ngo et al. 2022; Ragazou et al. 2022). SMEs interpret the pressure generated by the market as a threat of loss of profits, market, and even bankruptcy. Therefore, SMEs must take the transformation initiative to survive (Ngo et al. 2022; Ragazou et al. 2022). Fortunately, Ragazou et al. (2022) stated that with a simple business structure, SMEs have digital antibodies in dealing with crises. SMEs can adopt simple and inexpensive digital tools to leverage their supply chain, selling, and marketing activities to keep them connected (Abrahám et al. 2015; Ngo et al. 2022). SMEs can also reach new market areas and segmentations by adopting relevant information through digital tools and creating new value on products, services, and business processes (Ngo et al. 2022; Ragazou et al. 2022). Those improvements lead them to generate their competitive advantage. Referring to the technology-organization-environment (TOE) perspective, aligning technology with organizational characteristics and challenges in the business environment becomes more accessible and flexible for SMEs because they only need simple technology installations to maintain access to consumers (Ragazou et al. 2022). In this case, SMEs need to optimise these advantages by optimising internal absorption capacity, responding to competitive pressures based on data and scientific analysis, standardising the technology components used, considering device compatibility, balancing global and local views, and focusing on servitisation. (Abrahám et al. 2015; Martinelli et al. 2021; Wang et al. 2021). The summaries of the Competitive Environment theme are presented in Table 10.

4.1.8 Digitalization process/model

Empirical studies argued that each SME's digitalization process or business model is different (Kim 2021; Nwaiwu et al. 2020). However, at the same time, a suitable business model during digital shifting is essential for successful SMEs' digital transformation (Apostolov and Coco 2021; Brodeur et al. 2022; Busto Parra et al. 2021). Before investing in new IT tools, SMEs have to revise their business model and define the objective of their digital transformation (Andersen et al. 2022). To succeed in redesigning the business model and deciding the powerful reachable

objective, SMEs must determine their current business baseline, digital maturity, readiness to adopt new technology, and dynamic capability (Brozzi et al. 2021; Ghobakhloo and Iranmanesh 2021; Gregurec et al. 2021; Zangiacomini et al. 2020). SMEs' understanding of specific company profiles, core values, uniqueness, characteristics, and idiosyncratic are the core issues in deciding SMEs' transformation in the right direction (Fitzgerald et al. 2021; North et al. 2020; Van Nguyen et al. 2022). Furthermore, SMEs must develop the phases of change based on the priority and criticality of certain stages (Anshin and Bobyleva 2021; Brodeur et al. 2022; Eller et al. 2020; Kääriäinen et al. 2021; Klamet 2017). The priority and criticality should follow the business uniqueness identified before.

According to the contingency principle, each business has its own idiosyncratic to determine the best strategy, including its transformation and phases (Keeley 1978; Umanath 2003). Besides that, SMEs also should consider best practices from business partners, business and IT specialists, and competitors and reconfigure them according to their business characteristics (Depaoli et al. 2020). Using the scientific method and empirical data is crucial in deciding the right direction of SME transformation (Dossou et al. 2022; Dutta et al. 2020; Frau et al. 2022). Once the objective and the phases have been carefully constructed, then SMEs have to develop financial planning by determining the cost, its accessible sources, and expected return in a specific time (Eller et al. 2020; Gregurec et al. 2021; Khin and Hung Kee 2022; Klamet 2017). Several studies also recommended that SMEs develop an agile and flexible structure as they need continuous adjustment and experimentation to fit and align the new business model to the existing one (Apostolov and Coco 2021; Brodeur et al. 2022; Busto Parra et al. 2021).

SMEs also could optimize their existing IT tools with different business models focusing on cost reduction and productivity (Brodeur et al. 2022; Busto Parra et al. 2021; Dossou et al. 2022; Kääriäinen et al. 2021) or invest high saturation technology like IoT, digital manufacturing, cloud computing, big data, or even producing digital products (Brodeur et al. 2022; Dutta et al. 2020; Teng et al. 2022). In some cases, SMEs do not need to invest in high-performance IT or radical shifting of digital tools because SMEs have a simple structure, manufacturing process, and limited resources (Amaral and Peças 2021a). Therefore, high saturation technology may result in overinvestment in IT tools and a more costly strategy. Nevertheless, in other cases, high-performance IT probably gives SMEs more opportunities to pursue a competitive advantage and win the market (Teng et al. 2022; Yousaf et al. 2021). Therefore, the wise suggestion is that SMEs start with incremental transformation, followed by more complex digitalization as their digital maturity grows (Depaoli et al. 2020; Trischler and Li-Ying 2022).

Finally, to operate the planning, SMEs must develop trustworthy and capable teams responsible for executing the digitalization process (Garbellano and Da Veiga, 2019; Klamet 2017). Besides, the talented team should be supported with trust and maintained with engagement (Damaskopoulos and Evgeniou 2003; Kääriäinen et al. 2021). As mentioned before, digital shifting is a lengthy process requiring continuous experimentation. Therefore, the company should trust in their employee and maintain their engagement to make sure that the digitalization purpose is reached

and turns into a successful transformation. The summaries of the Digitalization Process/Model theme are observable in Table 11.

4.2 Core success tabulation and conceptual framework

The conceptual framework of this study is constructed based on the review result of each identified theme. Firstly, the review results are extracted into the core success code and then tabulated into three main areas, including (1) the organizational aspect, (2) the information system aspect, and (3) the financial aspect. Secondly, we restructure the core success code by referring to the endogenous growth theoretical framework (Fig. 1) into the new conceptual framework. The core success code is helpful as the keyword data that business practitioners can refer to initiate digitalization. Furthermore, the conceptual framework helps operationalize the code. The conceptual framework could deliver a holistic understanding regarding the connection between the core success factor, the phases of digital transformation, and the principal strategy for digital transformation in the SME context. Researchers could refer to the keyword and conceptual framework to further explore the best practices for the successful digital transformation of SMEs.

According to Table 12, digital transformation and business model shifting in SMEs need experimentation. Experimentation results in dynamic and continuous changes during new model refinement. Therefore, a flexible and agile structure and an engagement between the entity and its human resources are necessary. In addition, SMEs should consider starting the IT investment from incremental to radical saturation regarding the adaptability, compatibility, and agility of the invested IS. Incremental investments help SMEs deal with digitalization in limited financial figures and then gradually improve investment levels as the effectiveness of the new IT increases.

Furthermore, when observed more deeply, experimentation is a process of organizational learning to achieve best practices in new business formats. SMEs cannot just determine, use, and scale profits from a digital device without studying the features of the digital device, its role in the business task, and measuring the escalation of business performance that can be generated. Therefore, as soon as digital transformation is decided and started, the organization must always research to find the most suitable business model besides always studying the competition that is happening, how to accommodate customer expectations, create value, and achieve competitive advantage.

In helping SMEs during digital transformation, SMEs could consider internal and external collaboration. Collaboration allows SMEs to control obstacles encountered during technology migration and business model shifting. SMEs probably develop collaboration internally between manager and employee through project work (vertical) or by creating a collaborative culture between employees (horizontal). In addition, collaboration with external parties could cover broader strategic aspects, such

as sharing capital, sharing tools, sharing knowledge, or sharing projects. External collaboration can be done with business partners, IT and business specialists, universities, the government, or the community. The essence of internal collaboration is to build engagement and good relationships between entities and people involved in the business. In contrast, external collaboration fills the gaps in resources that may exist. In conditions of limited knowledge, availability of tools, and capital liquidity, collaboration bridges this by involving parties who have relevant resources to work together on digital transformation projects. Furthermore, collaboration must be based on trust to form a healthy relationship and unforced involvement. Collaboration, of course, generates the need for a separate transformation beyond the business transformation itself. Therefore, collaborative projects also impact IS needs that support groups, mobile, multi-task, and remote work. At the same time, collaboration opens access to financial resources, which are common obstacles for SMEs to start digital transformation.

Afterward, SMEs must connect their pieces of knowledge to achieve a harmonized strategy. Knowledge of the company's existing conditions must be connected to digital literacy that is already owned to get aligned IT innovation ideas. At the same time, SME leaders must also connect the idea to the company's financial profile and financial literacy to determine the expected profit projections. Connecting various knowledge in the company's business dimensions helps SMEs find alignment in starting digital transformation. This alignment will help companies avoid over and useless digital investments. In this case, the process of knowledge connection encourages continuous learning during SMEs' digitalization journey.

Finally, the competitive environment should be responded to by SMEs as a strategic moment to innovate. SMEs that enter to hot market would be trained to have survival instincts by continuously transforming. They naturally form flexible business models and adopt agile IS and dynamic financial structures. New SMEs can choose two alternatives related to this phenomenon: first, to enter the hot market to build agility; and second, to do benchmarking or even collaborate with SMEs in the hot market to study indicators of success they have carried out in digital transformation.

To operationalize the tabulation code, we developed a structured framework that integrates the core success factor code into the theoretical framework that was previously designed. The conceptual framework of digital transformation in SMEs is presented in Fig. 3. The conceptual framework contains eight themes and the core success factors needed during SMEs' digitalization journey. The framework starts from the existing organizational aspect that SMEs should reflect on before initiating digitalization. Furthermore, SMEs should consider IT aspects, learn how to use them for specific relevant business tasks, and relearn during the experimentation to align the IT and organizational aspects and find the fit model of digital transformation. Finally, SMEs should design appropriate financial planning to manage productive IT investment. Successful digitalization will improve organizational aspects into a new form of business model. The indicator of successful digital transformation is the economic growth of SMEs itself.

The conceptual framework is constructed in a general form and extracted from the published research articles from the academic repositories. The application of the framework needs further adjustments according to the country's characteristics in terms of economics and cultural uniqueness. As mentioned in the discussion above, based on the contingency principle, each business environment has its own idiosyncratic to determine the best strategy, including its digital transformation strategy (Keeley 1978; Umanath 2003). In this case, the proposed framework is valuable as the basis for further field and empirical investigation to meet practical implications in particular economics and cultural environments.

4.3 Review for future research agenda

Based on the systematic literature review findings, we propose several future research agendas, as outlined below.

1. *SMEs' digital transformation in developing countries.* Most primary studies are conducted in European countries and some Asian countries, which indicates gaps in research findings from specific regions. Also, research results from developing countries still need to be made available. This circumstance results in limited practical knowledge to be implemented by SMEs from areas not covered by previous studies. That also implies a gap with the expectation of the contingency principle due to the limited research results SMEs can refer to in developing countries.
2. *Incremental digital transformation model.* Several researchers recommended radical digital transformation with high-intensity IT investments (Brodeur et al. 2022; Dutta et al. 2021; Teng et al. 2022). However, this condition contradicts SMEs, which commonly have many limitations, like assets, knowledge, and financial resources. At the same time, research analyzing incremental and gradual investment patterns is still rare. Additionally, previous research focused on the organization and mechanization of IT use. In contrast, Jafari-Sadeghi (2023) argued that the micro foundation aspect is critical to SMEs' digital transformation success. This argument is reinforced by SMEs' unique conditions, which are generally small in dimensions, simple products, and organizational structure and managed directly by the owner. This uniqueness, of course, results in a different response to digitalization and a different transformation pattern than large corporations. Therefore, the pattern of gradual transformation from incremental to radical and micro foundation aspects are essential variables that need further analysis to succeed in digital transformation in SMEs.
3. *SME learning and IT-alignment as the core factors in the transformation journey.* Organizational learning interacts with all themes found, and so does IT-alignment, highlighted for each transformation phase. Knowledge is the key reason to make an investment decision, and relearning would become a critical activity during experimentation (Corvello et al. 2022; Khurana et al. 2022; North et al. 2020;

Van Nguyen et al. 2022). Additionally, business growth demands relearning so it can be followed by sustainable innovation. In line with that, fitment, refinement, and experimentation narrow down to one reason: alignment (Apostolov and Coco 2021; Busto Parra et al. 2021; Chatterjee et al. 2022; Pelletier et al. 2021; Pelletier and Cloutier 2019). Based on the primary studies' results, organizational learning cannot be separated by organizational, information systems, and financial aspects during digital transformation. Many primary studies discussed that topic. However, organizational learning from a micro foundation point of view in resulting successful digital transformation with IT-alignment and simple investment orientation still needs to be researched. Further research should explore this issue for producing managerial, IS, and financial literacy indicators which must be mastered by SME owners, leaders, managers, and practitioners to deal with digital transformation.

5 Conclusion

This systematic literature review aimed to (1) identify the reported manuscripts regarding SMEs' digital transformation, (2) identify the core success factors of SMEs' digital transformation to gain business success, and (3) develop further research agenda in the field of SMEs' digital transformation. This systematic literature review was more than identifying, categorizing, and presenting valuable information from primary studies. We tried to elaborate and develop a comprehensive framework for SMEs' digital transformation based on its core success factors. The framework would give future researchers and SMEs significant direction during the transformation journey.

The strength of our contribution lies in the application of holistic business aspects (information system, organizational, and financial) and thematic analysis for a unique categorization of core success factors for SMEs digital transformation. In addition, this work used the endogenous growth theory as the basis for developing a conceptual framework for SME digitalization.

The reported manuscripts have discussed various aspects of digitalization in SMEs with various suggestions. However, most subjects or primary research are from European countries and developed countries. Therefore, there is still a gap in the comprehensive understanding of the digitalization phenomenon among SMEs. Then, even though there are many critical factors of digital transformation among SMEs that primary studies have discussed, it is still rare to discuss business aspects holistically in one study. Therefore, we summarized and categorized them into three main aspects of business in the digital era, namely organizational, information systems, and financial aspects.

We categorized the primary studies into eight themes that could be considered critical factors SMEs should consider during their transformation journey. The themes were: (1) SME's Limitation; (2) Organizational Learning; (3) IT-Alignment; (4) Leadership; (5) Digital Marketing; (6) Collaboration; (7) Competitive

Environment; and (8) Digitalization Process/Model. We then identified the core success factors for each theme and separated them into organizational, IS, and financial aspects. Through its process, we found the great line that all themes and their core success factors boil down to learning and alignment. SMEs should learn about their business circumstances, baseline, and readiness. They should also learn new technology, experiment, and relearn to optimize the function. In terms of financial aspects, they have to learn how to get alternative financial support, rigorously measure costs and benefits, and make decisions based on measurable data. During transformation, the critical aspects that were often discussed are fitment, experimentation or refinement, and appropriateness of skill, tools, and company needs, which in simple words, is called alignment. The framework of SMEs' digital transformation has been presented in Fig. 3. SMEs, scholars, and IS researchers could consider the framework to develop their digitalization agenda and conduct more research to guide SMEs' digitalization. The framework presented the core success factors of SMEs' digitalization and the links between them in the digitalization process. Therefore, practitioners, scholars, and researchers can define the positioning of certain factors in certain digitalization phases. That is useful as guidance to develop further SMEs' digitalization strategies and research agendas.

According to those findings, we have proposed several future research directions. Firstly, fill the gap of capturing the phenomenon of SMEs' digital transformation in developing countries, predominantly in Asian and African countries. Secondly, consider the incremental transformation model followed by gradual escalation. Thirdly, explore more about SME learning and IT-alignment as the core factors in the transformation journey. Indeed, the proposed research agenda is simple and specific. However, that is the strategic area that previous research has not yet addressed, while SMEs need a more reachable digitalization strategy under their limitations. More specifically, developing countries with large markets allow SMEs to be more resilient. At the same time, the opportunity could not be openly accessed without accessible knowledge, relevant research findings, and best practices that SMEs can refer to. Furthermore, future research agenda tends to develop SMEs' skills and knowledge to make them agile and resilient in facing more uncertainty in this digital era. Learning and IT-alignment are the core issues that SMEs must address at every phase of transformation that in the future they have to do in their everyday business life.

Finally, some potential limitations need to be considered. The first group of limitations comes from the article selection protocol. The current study has only investigated journal articles in two selected databases within a certain timeframe on the topic. Previous research that is relevant but beyond these limits was certainly left out of this analysis. Therefore, caution must be applied when interpreting the results. Moreover, this systematic literature review did not explore the technical aspects of digital tools and their adoption in SMEs. The main objective was to deliver a generally valuable framework for managerial decision-making and further research directions. Therefore, further empirical research can play a role in the core area of SMEs' digitalization to bring more relevant insights and enlightenment for SMEs to deal with digitalization.

Further research could be technical or managerial, depending on the specific issues SMEs face in their business environment.

Appendix

Appendix 1: List of articles

- A1. Abraham, J., Strielkowski, W., Vořta, M., & řlajs, J. (2015). Factors that influence the competitiveness of Czech rural SMEs. *Agricultural Economics*, *61*(10), 450–460.
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Appendix 2: Publication channel

No	Name of journal	Quartile	Primary studies
1	Agricultural Economics	Q1	A1
2	Business Process Management Journal	Q1	A98
3	Cognition, Technology & Work	Q1	A55
4	Computers in Industry	Q1	A5
5	Creativity and Innovation Management	Q1	A6
6	Engineering Management Journal	Q1	A82
7	Enterprise and Society	Q1	A33
8	European Journal of Information Systems	Q1	A104
9	European Management Journal	Q1	A23, A65, A67
10	Frontiers in Psychology	Q1	A45, A91
11	IEEE Transactions on Engineering Management	Q1	A100
12	Information Systems Frontiers	Q1	A30, A69, A71
13	Information Systems Journal	Q1	A56
14	Information Systems Management	Q1	A84
15	International Journal of Agile Systems and Management	Q1	A13
16	International Journal of Computer Integrated Manufacturing	Q1	A49
17	International Journal of Information Management	Q1	A21
18	International Journal of Logistics Research and Application	Q1	A73
19	International Journal of Production Research	Q1	A66

No	Name of journal	Quartile	Primary studies
20	Journal of Ambient Intelligence and Humanized Computing	Q1	A22
21	Journal of Asia Business Studies	Q1	A68
22	Journal of Business Research	Q1	A31, A44, A50, A62, A99
23	Journal of Cleaner Production	Q1	A43, A81
24	Journal of Enterprise Information Management	Q1	A76
25	Journal of Intelligent Manufacturing	Q1	A27
26	Journal of Manufacturing Technology Management	Q1	A36
27	Journal of Open Innovation: Technology, Market, and Complexity	Q1	A48
28	Journal of Small Business and Enterprise Development	Q1	A25, A83, A85
29	Journal of Small Business Management	Q1	A17, A103
30	Journal of Strategic Information Systems	Q1	A16
31	Meditari Accountancy Research	Q1	A88
32	Production Planning & Control	Q1	A75
33	Sustainability	Q1	A2, A12, A29, A38, A42, A51, A59, A79, A87, A92, A94, A95
34	Technological Forecasting and Social Change	Q1	A39, A40
35	Technology in society	Q1	A10
36	Technovation	Q1	A70
37	Telecommunications Policy	Q1	A11
38	The Service Industries Journal	Q1	A18
39	Total Quality Management & Business Excellence	Q1	A97
40	Academia Revista Latinoamericana de Administración	Q2	A24
41	African Journal of Economics and Management Studies	Q2	A63
42	Amfiteatru Economic	Q2	A61
43	Applied Sciences	Q2	A4
44	Cogent Business & Management	Q2	A80
45	Competitiveness Review: An International Business Journal	Q2	A28, A54
46	Electronics	Q2	A74
47	Information	Q2	A77
48	Interdisciplinary Approach to Economics and Sociology	Q2	A106
49	International Journal of Emerging Market	Q2	A72, A101
50	International Journal of Information Systems and Project Management	Q2	A46
51	International Journal of Innovation Management	Q2	A37, A86
52	International Journal of Innovation Studies	Q2	A47
53	International Studies of Management and Organization	Q2	A9
54	Journal of Asian Finance, Economics and Business	Q2	A14, A64
55	Journal of Management and Governance	Q2	A60
56	Journal of Small Business Strategy	Q2	A32, A34
57	Journal of Strategy and Management	Q2	A15, A19, A53

No	Name of journal	Quartile	Primary studies
58	Journal of Universal Computer Service	Q2	A41
59	Management and Production Engineering Review	Q2	A96
60	Measuring Business Excellence	Q2	A35
61	Processes	Q2	A26
62	Publishing Research Quarterly	Q2	A52
63	Terra Economics	Q2	A90
64	Asian Journal of Business and Accounting	Q3	A105
65	Bulletin of Electrical Engineering and Informatics	Q3	A3
66	Business: Theory and Practice	Q3	A78
67	Intangible Capital	Q3	A57
68	International Journal of Networking and Virtual Organization	Q3	A20
69	International Journal of Innovation and Technology Management	Q3	A8, A58
70	Pertanika: Social Sciences & Humanities	Q3	A89
71	Polish Journal of Management Studies	Q3	A93
72	Serbian Journal of Management	Q3	A7
73	Vision	Q3	A102

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