

The relationship between organizational culture and digital transformation in SMEs: A systematic review



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Abstract This paper presents an organised and thorough review of empirical research about the relationship between organization culture (OC) and digital transformation (DT) in SMEs (small and medium-sized enterprises) from 2018 to 2024. This literature overview includes 26 articles published in Scopus as well as Web of Science (WOS) journals, along with additional records identified from other sources. In accordance with PRISMA standards, this review presents the results in a standardized format. Our findings indicate a substantial impact of OC on DT initiatives, while simultaneously demonstrating that the DT process alters OC, creating a dynamic feedback loop. However, it is noteworthy that some studies have found no significant correlation between OC and DT. This review highlights that most research focuses on cross-sectional studies and conceptual models based on theoretical frameworks. The reviewed literature encompasses a diverse geographical range, including studies from developed and developing countries. Key factors facilitating or hindering DT in SMEs are identified, including open-mindedness, innovation orientation, digital culture, change readiness, cooperation, risk tolerance, leadership commitment, and customer-centricity. The study underscores the need for culturally tailored strategies and models to support SMEs' DT journey. Research gaps are identified, particularly regarding the consequences of DT on OC in the long run among SMEs and industry-specific variations in the OC-DT relationship. Future studies should explore longitudinal designs, incorporate diverse sector contexts, and delve into the influences of leadership in this evolution.

Keywords: culture, digitalization, mindset, leadership, revolution

1. Introduction

Small and medium-sized enterprises (SMEs) are integral to the economic frameworks of both emerging and established nations worldwide (Rajagopal et al., 2024). These dynamic yet fragile enterprises substantially foster human growth, poverty alleviation, and long-term development, employing a considerable portion of the labour force. In countries that are still developing, where small and medium-sized enterprises constitute approximately 90% of businesses, they emerge as key contributors to development (Auzzir et al., 2018). The significance of SMEs in these nations also encompasses addressing individuals' fundamental needs, particularly in rural regions where residents frequently experience unemployment or insufficient formal education. Moreover, SMEs are essential in the effective utilization of local resources and in creating possibilities for semi-skilled laborers.

It has been observed that digital transformation (DT) is a pivotal element for the growth and increasing competitiveness of small and medium-sized businesses (also known as SMEs) globally (Zhang et al., 2022). Nonetheless, digital transformation involves more than the mere embracement of cutting-edge technology; it calls for an extensive alteration in mindsets, organizational behaviors, and culture (Jekov et al., 2017). This shift encompasses more than the digitization of goods and services: it necessitates extensive modifications in procedures to enable business enhancements (Hartl & Hess, 2017). Companies undergoing digital transformation must prioritize not limited to technological products, interactions with consumer, and services but also foster an environment that facilitates transformation and modifies organizational operations (Hemerling et al., 2018).

Organizational culture (OC), the most fundamental component of a company's internal environment, embodies the various cultural differences associated with the diversity of individuals in the firm (Hamdani et al., 2024). Prior research has linked organizational culture with a range of organizational factors, such as business model innovation (Hock et al., 2016), dynamic capability (Shuaib et al., 2021), leadership style (Bowers et al., 2017), innovation capability (Botelho, 2020), knowledge creation capability (Wang et al., 2011), employee commitment (Lee, 2020), and technological innovation (Tuan & Venkatesh,



2010). Within the larger context of digital transformation, a culture that welcomes change is considered to be more innovative and favorable for the effective implementation of digital technologies (Kawiana et al., 2021; Lanza Blengini, 2020).

Since the very start of time, researchers have been interested in studying the culture of organisations, and the scope of their investigation into digital transformation is ever expanding (Reisberger et al., 2024). Recent studies have elucidated the connection between organizational culture and digital transformation (DT) in small and medium sized enterprises. Fahmi et al. (2023) discovered that digital culture, digital literacy, and legacy culture substantially affect employee views on digital transformation and perceived performance. Research conducted by Pirola et al. (2020), Jeansson and Bredmar (2019), Zangiacomini et al. (2020) and Eller et al. (2020) examined the correlation among employee competencies, corporate culture, and digitalization, concluding that insufficient management and knowledge, along with an absence of a cohesive organizational identity and culture, adversely affect digitalization in small and medium-sized enterprises (SMEs). Furthermore, van Tonder et al. (2024) conducted a thorough literature analysis of digital maturity models, emphasizing culture as a crucial feature for assessing the digital development of SMEs.

Although there is a broad agreement on the significance of culture in effective digital transformations, few studies have specifically examined the cultural elements of DT in small and medium-sized organizations (SMEs) (Tuukkanen et al., 2022). This disparity is especially alarming considering that SMEs typically possess conservative mindsets, exhibit reluctance to innovate, and exercise caution about their financial resources and investments (Kallmuenzer et al., 2024). Furthermore, SMEs jeopardize additional losses by concentrating exclusively on the benefits of new technology while neglecting organizational adaptability and culture (Hu et al., 2023). Additionally, although digital transformation has significantly impacted organizations in the 21st century, there is still a lack of awareness of how digital transformation affects management of human resources (HRM) and organization culture in small and medium sized enterprises (SMEs) (Espina-Romero et al., 2024). Considering the pivotal importance of organizational culture during the digital transformation route, especially for SMEs, there is an urgent necessity for a thorough comprehension of this link. This study seeks to fill these gaps by performing a systematic literature evaluation on the relationship between organization culture (OC) and digital transformation (DT) in SMEs.

Based on the above considerations, there are three research questions: RQ1: What is the relationship between organizational culture (OC) and digital transformation among SMEs, as revealed by existing empirical studies? RQ2: Which cultural factors are essential for achieving the objectives of digital transformation? RQ3: How does the interplay between organizational culture (OC) and digital transformation (DT) evolve as time passes in SMEs?

By investigating how the dynamics of digital transformation in SMEs are grounded in their capacity to establish digital routines, while accounting for various aspects of organizational culture, we look into the reciprocal influence about digital transformation on reshaping organizational culture. The systematic literature review aims to offer helpful insights for academics and practitioners in the field of SME's digital transformation, highlighting the cultural dimensions that both drive and are shaped by this intricate process.

2. Materials and Methods

2.1. Protocol for systematic review

The present systematic review is carried out in conformity to protocols established by PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) and utilize PRISMA flowchart to outline the search process. PRISMA, an enhanced version of the QUOROM guidelines, consists of a 27-item checklist and flowchart. Sierra-Correa and Kintz (2015) highlight three key advantages of PRISMA: formulating specific research questions, establishing clear inclusion and exclusion criteria, and efficiently reviewing extensive databases. The systematic review process comprises three main stages: identification, screening, and inclusion, as illustrated in Figure 1.

In the identification phase, we performed a thorough study utilising two prominent and reputable databases: the Web of Science (WOS) and Scopus. These databases encompass a wide array of subject areas and include several high-quality, peer-reviewed publications, guaranteeing access to the most pertinent and dependable academic research. We formulated two theoretical search phrases specifically designed for these datasets. In WOS, we employed terms such as 'organisation*', 'firm*', 'compan*', in conjunction with keywords like 'culture', 'industry 4.0', 'digitalisation', and 'digitalisation', concentrating on terminology pertinent to SMEs such as 'SME*' and 'small and medium enterpri*'. This method produced 111 relevant documents. We employed a comparable approach for Scopus, limiting the search to the title, abstract, and keyword sections (TITLE-ABS-KEY), yielding 151 relevant results. Our comprehensive literature review is well-grounded on the previous findings. Table 1 shows the improved keyword list that now includes several phrasing variations and a wildcard queries.

This systematic review aims to identify empirical quantitative studies examining the link between organization culture and digital transformation in SMEs. Several inclusion criteria were established, as outlined in Table 2. To ensure our review reflects current literature in the digital era, we limited our search to publications from 2015 to 2024, covering the most recent eleven years of research on information retrieval and synthesis.

Table 1 Search query

Database	Search string
WOS	TS=(("organisation*" OR "organization*" OR "firm*" OR "compan*" OR "corporate" OR "enterprise*" OR "business*") AND "culture") AND ("industry 4.0" OR "digitali?ation" OR "digi?ation" OR "digital transformation" OR "fourth industrial revolution" OR "4IR" OR "4-IR") AND (sme* OR "small and medium enterpri*" OR "small business*" OR "medium-sized business*" OR smb* OR "small firm*" OR "medium-sized firm*" OR msme* OR "micro, small and medium enterpri*"))
Scopus	TITLE-ABS-KEY (("organisation*" OR "organization*" OR "firm*" OR "compan*" OR "corporate" OR "enterprise*" OR "business*") AND "culture") AND ("industry 4.0" OR "digitali?ation" OR "digi?ation" OR "digital transformation" OR "fourth industrial revolution" OR "4IR" OR "4-IR") AND (sme* OR "small and medium enterpri*" OR "small business*" OR "medium-sized business*" OR smb* OR "small firm*" OR "medium-sized firm*" OR msme* OR "micro, small and medium enterpri*"))

Table 2 Screening criteria.

Criteria	Inclusive	Exclusive
Type of articles	Empirical Articles	Reviews, conference proceedings, books, etc
Language	English	Not English
Context	SME	Not SME
Content	Relate to the relationship between OC and DT	Not relate to the relationship between OC and DT

Figure 1 depicts the systematic article selection procedure, which includes initial identification, duplication elimination, screening, and final inclusion for analysis. Out of the 268 studies initially discovered (262 from databases and 6 from alternative sources), 72 references were eliminated owing to duplication. Of the remaining 196 studies, 98 were excluded after screening. Consequently, 98 full-text articles were evaluated for eligibility, resulting in the exclusion of 72 studies for several reasons: not being SMEs (n=3), absence of empirical research (n=8), irrelevance to organizational culture (n=2), classification as book chapters, reviews, or conference papers (n=26), and failure to address the connection between organization culture (OC) and digital transformation (DT) (n=33). In total, 26 papers satisfied the inclusion criteria and were included in the review. The stringent selection process, illustrated in the PRISMA flow diagram, guarantees a thorough and targeted examination of pertinent literature related to the research topic.

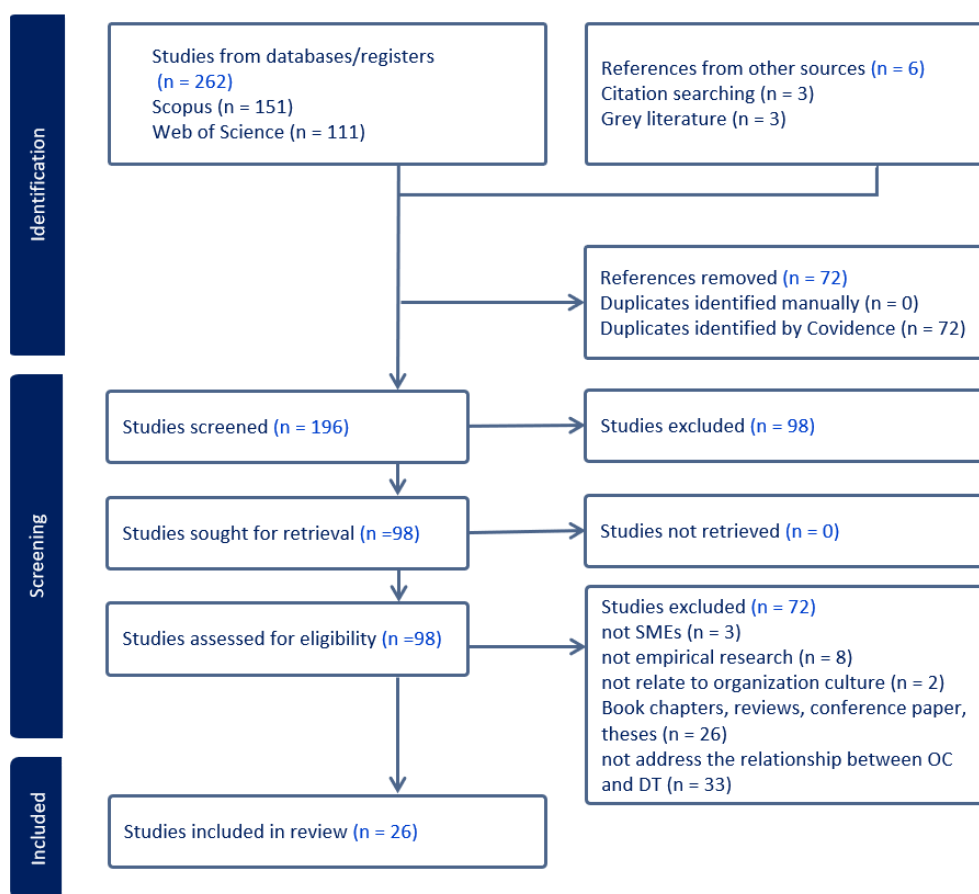


Figure 1 Flowchart of article identification, screening, and inclusion.



2.2. Descriptive statistics on reviewed studies

From the initial list of 262 studies, we selected 26 for comprehensive review. Only these will be taken into account in the subsequent analysis. This thorough review of the literature (Table 3) includes a variety of journals, illustrating the multidisciplinary aspect of the study issue. Journals like "Sustainability" and "Journal of Cleaner Production" are prominent, indicating a substantial emphasis on environmental and sustainable business practices in the study domain. The reviewed literature also demonstrates a varied geographical range, including research from nations across Asia, Europe, South America, and Africa that are either developed or developing. This worldwide representation increases the research's relevance and offers insights into diverse economic and cultural contexts.

The literature encompasses several sectors, mostly emphasizing manufacturing, while also including service industries, logistics, agrifood, energy, and accounting, so offering a thorough cross-industry perspective on the research issue. Theoretically, the Resource-Based View (RBV) is the most commonly employed framework, appearing in six studies, followed by Dynamic Capabilities in three studies, alongside numerous management theories, indicating a wide theoretical foundation within the literature.

Table 3 Reviewed Papers.

No	Authors/Author	Country	Journal	Research Method	Theory	Industry
1	Ocloo et al. (2024)	Ghana	Cogent Business & Management	Quantitative	RBV	Restaurant
2	Packmohr et al. (2023)	Sweden	IADIS International Journal on Computer Science and Information Systems	Mixed-method	\	General
3	Michna and Kmiecik (2020)	Polish	Sustainability	Quantitative	\	Manufacturing
4	Zhang et al. (2023)	China	Business Process Management	Mixed method	RDT	General
5	Antony et al. (2023)	America, Asia and Europe	International Journal of Quality and Reliability Management	Quantitative	\	Manufacturing and Service
6	Sumrit (2021)	Thailand	Uncertain Supply Chain Management	Quantitative	\	Logistics service
7	Al-Omush et al. (2023)	Pakistan	Sustainability	Quantitative	DC	Manufacturing
8	Wang and Esperança (2023)	China	Journal of Cleaner Production	Mixed method	RBV, DC	General
9	Nguyen et al. (2024)	Vietnam	Journal of Financial Reporting and Accounting	Quantitative	IDT	Accounting service
10	Khattak et al. (2024)	Pakistan	Business Strategy & Development	Quantitative	UET	General
11	Wang et al. (2024)	China	Knowledge Management Research & Practice	Quantitative	KBV	General
12	Varbanova et al. (2023)	Central and Eastern European	Serbian Journal of Management	Quantitative	\	Agrifood and manufacturing
13	Malewska et al. (2024)	Central European countries	Energy Policy	Quantitative	SMT, RBV	energy sector
14	Kafetzopoulos and Katou (2024)	Greek	International Journal of Productivity and Performance Management	Quantitative	DC, RBV	General
15	Wang et al. (2024)	China	Heliyon	Quantitative	RBV	General
16	Espina-Romero et al. (2024)	Peru	Sustainability	Quantitative	HRM	General
17	Hamdani et al. (2024)	Indonesia	International Journal of Social Science	Quantitative	\	AGRO
18	Hautala-Kankaanpää (2022)	Finish	Business process management journal	Quantitative	RBV	Manufacturing
19	Gatica-Neira et al. (2024)	Argentina and Chile	SAGE Open	Quantitative	TOE model	Manufacturing
20	Peter et al. (2020)	Swiss	Journal of Strategy and Management	Mixed method	SAF theory	General
21	Leso et al. (2023)	Brazil	Cognition, Technology & Work	Mixed method	Ground theory	General
22	Li et al. (2018)	China	Information Systems Journal	Qualitative	DC	General
23	Quinton et al. (2018)	\	Journal of Strategic Marketing	Qualitative	SM	General



					theory	
24	Pourmorshed and Durst (2022)	Sweden	Sustainability	Qualitative	\	General
25	Roblek et al. (2021)	11 EU countries	Frontiers in Psychology	Qualitative	DIT	Manufacturing
26	Ascúa (2021)	Brazil, Argentina	Journal of the International Council for Small Business	Qualitative	\	Manufacturing

Note: “\” represents that the content was not mentioned.

Figure 2 depicts the yearly publishing trend from 2018 to 2024. The findings indicate a significant increase in research productivity, especially in recent years. A significant growth commenced in 2023, resulting in seven publications. This increasing tendency persisted until 2024, culminating in a peak of 10 publications. The graph illustrates a pronounced increase in academic interest and research activity in this domain, with the most substantial development evident in the latter two years of the observed span. This trend implies an increasing focus on the subject, either reflecting its heightened significance or the emergence of novel approaches or data sources that enable more comprehensive investigation.



Figure 2 Annual number of publications. Source: Scopus Database & Wos Database.

Table 4 illustrates the variety of research methodologies utilized in the selected studies. Quantitative approaches were predominant, including 16 studies, whilst mixed methods and qualitative designs were each employed in 5 studies. Significantly, structural equation modelling was often utilized in the quantitative research. The qualitative approaches included several methodologies such as interviews, case studies, and action research. This methodological breakdown elucidates the analytical methodologies that inform the ensuing study.

Table 4 Research methods.

Quantitative methods	Mixed Methods	Qualitative designs	Total
16 ^a	5	5 ^b	26

Note: a. An applied structural equation modelling approach was utilized in the majority of these research.
 b. Interviews, roundtable discussions and studies of cases are used.

3. Results

3.1. The correlation between OC and DT in SMEs

Multiple research have established a substantial positive correlation between organizational culture and and the process of digital transformation (DT) initiatives in SMEs. The culture of an organisation, in conjunction with the abilities and attitudes of owners and managers, is favorably connected with the digital transformation activities of SMEs (Ocloo et al., 2024). This cultural aspect, along with structural reasons, constitutes roughly fifty percent of the perceived obstacles to digital transformation (DT) in SMEs (Packmohr et al., 2023). The cultivation of a digital culture is essential for augmenting digital competencies and promoting sustained competitive performance in manufacturing SMEs (Al-Omush et al., 2023b). Digital



culture has been shown to enhance the relationship between management overconfidence and digital transformation (Khattak et al., 2024). Moreover, fostering an innovative culture and enhancing digital and entrepreneurial knowledge directly positively influences the perception of digital transformation performance (Leso et al., 2023). Within the domain of cross-border E-business, entrepreneurs acknowledged the necessity of establishing an appropriate organizational culture, with some striving to emulate the competitive team culture of successful digital platform providers (Li et al., 2018).

Several investigations have been carried out to investigate the mediating and regulating functions of organizational culture (OC) during the digital transformation procedure. Digital organizational culture (DOC) mediates the connection of digital transformation to the development of new business models in SMEs within the energy sector (Malewska et al., 2024). According to research by Wang et al. (2024), digital culture has an indirect impact on innovation performance and moderates the relationship between digital culture and boundary-spanning search in the context of digitizing business processes. According to Kafetzopoulos and Katou (2024), the ability to adapt to changing market conditions and the influence from Industry 4.0 mediate the connection between organizational culture (OC) and strategic flexibility. To further illustrate the contextual importance of digital culture in explaining the variations in the effects of digital platforms on corporate performance, it is worth noting that digital culture influences the connection between digital platforms and efficiency in business operations (Hautala-Kankaanpää, 2022).

Although the majority of studies have found that the business's culture has a favorable effect on DT, there are a few that have found the opposite. There was no significant relationship between digital transformation in accounting and organizational culture or employee awareness, according to research on Vietnamese SMEs (Nguyen et al., 2024). According to (Zhang et al., 2023), a factor like organizational culture can have varying impacts on a firm's intention to digitally change, depending on how it interacts with other factors. This is known as the concept of causal asymmetry. Curiously, according to Espina-Romero et al. (2024), digital management of human resources mediated the association between DT and OC, even though an explanation of the direct connection between both was not substantial. These outcomes highlight how intricate and multi-faceted the connection is between SME digital transformation (DT) and organization culture (OC).

Additionally, particular research implies a bidirectional relationship between organizational culture (OC) and digital transformation. Although many studies suggest that digital organizational culture influences digital transformation (DT), evidence exists demonstrating that a thorough DT process can facilitate the advancement of digital organization culture (Malewska et al., 2024). Digital transformation (DT) and digital competences affect digital management of HR, which subsequently influences company culture (Espina-Romero et al., 2024). The DT process encompasses the analysis of existing culture, the management of digital culture, and the transformation into a digital organization and culture (Pourmorshed & Durst, 2022). This indicates that the relationship between culture and DT is not one-dimensional but rather a dynamic, interacting process.

3.1. Cultural aspects relevant to DT success

Analysis has pinpointed some cultural characteristics that facilitate successful digital transformation (DT) in SMEs. These elements can be classified into three primary dimensions: mindset, practices, and leadership.

3.2.1. Cultural mindset

The fundamental component of effective digital transformation is the development of an open-minded and flexible organizational culture. This perspective promotes receptivity to novel concepts, innovation, critical analysis, and the reevaluation of established knowledge and practices (Pourmorshed & Durst, 2022). A culture defined by "flexibility, creativity, entrepreneurship, and risk-taking" has been recognized as the most reliable predictor of innovation (Gatica-Neira et al., 2024). This open mentality naturally develops into a digital culture, defined as "a corporate culture that endorses principles and conventions for the utilisation of digital technology" (Sumrit, 2021). Expanding the notion of organizational culture to the digital realm, it may be argued that, in the digital workplace, the culture must evolve to include digital behaviors for long-term sustainability (Duerr et al., 2018). Digital organization culture refers to the manner in which the internet and other technologies transform organizations and their engagement with stakeholders. Digital organizational culture comprises a collective set of assumptions and knowledge pertaining to an organization's functioning within a digital context (Deshpande & Webster Jr, 1989). Digital culture, akin to organization culture, is a significant impediment to the necessary transformation towards increased digitization (Hartl & Hess, 2017).

Importantly, this digital culture has a boosting function in digital strategy's relation to digital competence (Al-Omush et al., 2023a), and it acts as a positive moderator for the correlations between corporate competitiveness and the deployment of digital technology (Wang & Esperança, 2023). Both of these findings are significant. However, the fact that SMEs (small to medium-sized enterprises) face a variety of obstacles in the process of building this mentality is something that must be acknowledged. These challenges include the influence of founders or owners who frequently also function as managers, limited resources, and problems in implementing broad cultural changes (Ascúa, 2021; Michna & Kmiecik, 2020; Roblek et al., 2021).

3.2.2. Cultural Practices

Specific practices that facilitate digital transformation are indicative of the cultural mindset. Initially, it is essential to establish a robust innovation orientation, which encompasses "fostering a culture of innovation" and "fostering an awareness of digital and entrepreneurial concepts" (Leso et al., 2023). An organization's capacity to identify opportunities early and detect feeble signals from the market is improved by this innovation-focused culture (Quinton et al., 2018).

Secondly, it is imperative to establish a culture of everlasting learning and collaboration. This encompasses the promotion of "innovation and teamwork" (Wang & Esperança, 2023) and the encouragement of "employees to participate in sessions for training in trying to learn novel knowledge" (Wang et al., 2024). These practices encourage the acquisition of the skills and knowledge that are indispensable for the successful implementation of DT.

Thirdly, it is imperative to nurture a culture that prioritizes experimentation and calculated risk-taking. This necessitates "facilitating activities grounded in research and testing" (Leso et al., 2023) and cultivating a "tolerance to failure" (Roblek et al., 2021). Nevertheless, the digital transformation efforts of numerous SMEs may be impeded by their risk-averse cultures. Many companies place a higher value on safety and security than on potential gains, avoiding risk in most cases (Brodny & Tutak, 2021). Such a risk-averse culture contrasts with the concept of a digital orientation, which involves frequent experimentation with new tools and the adoption of innovative technologies (Kallmuenzer et al., 2024).

Finally, digital transformation (DT) endeavors are guaranteed to be in accordance with market requirements by a customer-centric culture that prioritizes "orientation to end customers" (Roblek et al., 2021) and enhances the digital customer experience (Pourmorshed & Durst, 2022).

3.2.3. Leadership and management

Leaders' dedication and exemplary behavior are crucial to the success of any cultural transformation effort. The establishment of "digital leadership and culture" and "management commitment to the use of IT for business operations" are both part of this (Gatica-Neira et al., 2024; Ocloo et al., 2024). It is the responsibility of leaders to manage the shift to a digital culture (Pourmorshed & Durst, 2022), provide an example for employees to follow during digital transformation, and promote employee participation in DT-related decision-making (Espina-Romero et al., 2024). Rodrigues et al. (2022)' study highlights how SME managers can capitalize on new business opportunities through the use of information technology and by fostering an organizational culture focused on innovation.

In summary, effective digital transformation in SMEs necessitates a comprehensive approach to cultural change, including mentality, behaviors, and leadership. The interaction among these dimensions fosters a conducive atmosphere for design thinking projects. Nonetheless, it is crucial to acknowledge that the link between organization culture (OC) and digital transformation (DT) is intricate, with certain research indicating that culture may not consistently exert a substantial direct influence on digital transformation (Nguyen et al., 2024; Zhang et al., 2023).

3.3. Evolution of the culture-DT interplay over time

The evolution of the interplay between organization culture (OC) and digital transformation (DT) in SMEs seems to be a dynamic and iterative process. Initially, the prevailing digital organization culture substantially impacts the implementation and application of digital technologies (Abdallah et al., 2022; Andriole, 2020). SMEs with a digitally-focused culture are more inclined to pursue digital transformation projects, as their values and norms correspond with the tenets of digital innovation and agility (Busco et al., 2023). As the digital transformation process progresses, it starts to impact the organizational culture, establishing a feedback loop that fosters additional cultural change (Pfaff, 2023).

As SMEs proceed in their digital transformation journey, the interaction becomes increasingly intricate and bidirectional. The adoption of new digital technologies and processes frequently requires modifications in work practices, skill sets, and decision-making frameworks, hence transforming the organizational culture (Heavin & Power, 2018). This phase may be marked by instances of tension and conflict, as the prevailing culture confronts the requirements of digital transformation (Nadkarni & Prügl, 2021). SMEs that adeptly traverse this stage typically cultivate a learning culture that welcomes change and experimentation, enabling them to adapt more efficiently to the persistent obstacles of digital transformation (DT) (Martínez-Caro et al., 2020).

In the later phases of digital transformation (DT), the differentiation between organizational culture and digital transformation may progressively obscure in SMEs. As digital technology become integral to all facets of the business, the culture itself becomes increasingly digital (Pfaff et al., 2023). This transition can create a self-perpetuating loop in which the digitally transformed culture fosters additional technological adoption and innovation. Nonetheless, it is crucial to recognize that this process is neither linear nor homogeneous among all SMEs. Elements like industry environment, leadership approach, and external influences can profoundly affect the speed and character of this cultural-digital co-evolution (Nadkarni & Prügl, 2021).

4. Discussion

This systematic literature review uncovers a complicated and nuanced relationship between organizational culture (OC) and digital transformation (DT) in SMEs. Although numerous studies underscore the pivotal influence of cultural factors on the success of digital projects, certain research findings indicate a more equivocal correlation, emphasizing the complex nature of this relationship.

A substantial body of research lends evidence to the claim that a supportive organization culture (OC) is essential to the achievement of successful digital transformation in SMEs (Abdallah et al., 2022; Andriole, 2020; Busco et al., 2023). Open-mindedness, innovation orientation, digital culture, change readiness, cooperation, risk tolerance, leadership commitment, and customer-centricity are some of the key cultural traits that have been recognized as being facilitators of digital transformation (Cox & Evans, 2020; Hamdani et al., 2024; Khattak et al., 2024; Roblek et al., 2021; Wang & Esperança, 2023). With these components, it is believed that an environment that is favorable to digital innovation and adaptation can be created. In many cases, the effective implementation of DT is tied to a shift in the organization's culture, specifically the readiness and capacity of employees to spread their expertise and build a collaborative vision for the firm.

However, it is crucial to acknowledge that certain research have identified the association between organizational culture and digital transformation as non-significant. Organizational culture and employee awareness do not have a significant relationship with digital transformation in accounting (Nguyen et al., 2024). This finding aligns with an earlier study on digital transformation by Singh et al. (2021), which also found no significant link between organizational culture and digital transformation. This conflicting conclusion highlights the complexity of the OC-DT relationship and implies that the influence of cultural factors on digital transformation may be contingent upon context or affected by other variables not thoroughly addressed in current research. The variability in results underscores the necessity for a more refined comprehension of the way and when in which organizational culture impacts digital transformation results in SMEs.

Another significant theme emerging from our analysis is the dynamic and bidirectional nature of the relationship between digital transformation (DT) and organizational culture. Digital transformation and creativity can cultivate an a growth-focused culture among the workforce (Gupta et al., 2024). Rather than being a static prerequisite, cultural change often evolves alongside the DT process (Pfaff, 2023), with each element reinforcing and shaping the other. This finding suggests that SMEs should approach cultural transformation as a continuous, iterative process not a singular initiative. This theme emphasizes the need for a dynamic approach to cultural transformation during the DT process, suggesting that cultural change and digital transformation can mutually reinforce each other (Espina-Romero et al., 2024; Malewska et al., 2024). This complexity underscores the unique cultural and contextual factors influencing digital transformation (DT) in SMEs.

Longitudinal research on the co-evolution of organizational culture and digital transformation may yield significant insights into the dynamic nature of this relationship. Practitioners must prioritize the cultivation of a digital organization culture as an essential element of the digital transformation process (Pourmorshed & Durst, 2022). This entails promoting an open innovation structure enhancing internal communication, and establishing a definitive tolerance mechanism for failures (Roblek et al., 2021). Moreover, overcoming obstacles such as insufficient knowledge of emerging technologies, infrastructural constraints, shortages of competent personnel, and aversion to change a crucial component for the effective implementation of DT in SMEs (Ascúa, 2021). By taking into account these cultural and organizational elements, SMEs can more effectively position themselves to capitalize on the advantages of digital transformation and improve their competitiveness in the digital era (Gatica-Neira et al., 2024; Hamdani et al., 2024; Peter et al., 2020).

5. Final Considerations

Although digital transformation is a well-established domain involving multiple systematic research, there is a paucity of comprehensive papers on digital transformation (DT) in SMEs (Fauzi et al., 2023). The purpose of this systematic literature review was to compile a list of all the studies that have examined the connection between digital transformation (DT) and organizational culture in SMEs, and to highlight the ones that should be the focus of future investigations. Few literary works were found while searching for the terms "organization culture" "digital transformation" and "SME." The literature review reveals that the research gap about organization culture and digital transformation for SMEs is quite new. Our results can be used to provide light on current studies and to suggest new directions for DT research.

5.1. Theoretical implications

This article examines particular research issues and clarifies the intricate correlation between cultural elements and digital transformation (DT) processes in SMEs through thorough field mapping and analysis of the study corpus. Findings indicate that the relationship between organization culture and digital transformation in small and medium-sized enterprises is dynamic and mutually influential. We identify several cultural qualities that facilitate successful digital transformation programs, including innovation orientation, risk tolerance, and adaptability. This study illustrates that as SMEs experience digital transformation (DT), their organizational culture adapts accordingly, establishing a reciprocal cycle of change. The comprehensive understanding of the bidirectional relationship between culture and digital transformation in SMEs establishes

a robust basis for future study and theoretical advancement. Subsequent research could profit from examining the manifestation and evolution of these cultural elements in diverse SME contexts, as well as their potential to improve DT outcomes across various industries and organizational sizes.

5.2. Practical implications

This study provides substantial practical contributions by consolidating empirical facts that can guide strategic decision-making and policy development to improve competitiveness in SMEs. Our findings clarify an intricate connection between organizational culture and digital transformation (DT), offering practical insights for SME leaders, policymakers, and practitioners. These insights can inform the creation of focused interventions and cultural activities that provide an atmosphere favorable to effective digital transformation implementation. Furthermore, the varied and even contradictory evidence shown in our literature study emphasizes the intricacy of the phenomena and stresses the necessity for contextual considerations in digital transformation efforts. The disparity in findings underscores the significance of our study's results and highlights essential topics for future investigation.

6. Limitations and Future Research Recommendation

The sources examined for this study included Scopus and the Web of Science (WOS), utilizing filters for "empirical articles." Consequently, investigations beyond this dataset were eliminated, representing limit on the research. This constraint also manifests during the choosing of terms included in the search, namely terminology associated with the term digital, namely: "digital transformation*," "digitalization*," "digitization*," or "IR 4.0." Consequently, research addressing the same notion of DT but use different language were excluded. Future research may aim to incorporate additional terminology in order to comprehend the progression of discussion on this area. Moreover, the complicated connection among organisational culture (OC) and digital transformation in SMEs presents multiple opportunities for future research.

Firstly, as Naranjo-Valencia et al. (2016) have examined how adhocratic, clan, market, and hierarchy cultures affect Spanish firms' creativity, future research may focus on identifying diverse organizational culture types that embody and promote digital transformation process. Investigate the specific mechanisms through which cultural attributes facilitate or hinder digital transformation efforts in resource-constrained environments.

Secondly, future research should prioritize longitudinal studies to examine the co-evolution of organization culture (OC) and digital transformation (DT) over time. By developing comprehensive frameworks that account for the unique cultural and contextual factors influencing DT in SMEs, it can provide a more thorough knowledge of the lasting effects of organization culture on digital transformation in SMEs. This may entail examining factors influencing the enduring viability of digital transformation initiatives.

Thirdly, DT is highly intensive in human capital, creativity, and intelligence. It is a cultural revolution. Therefore, organizational culture and leader type are relevant. Research in the future needs to explore the role of leadership in shaping and sustaining cultural change during digital transformation initiatives so that SMEs can effectively take advantage of this new technological wave. By addressing these study gaps, experts may offer more refined recommendations for SMEs confronting the problems of cultural change during their digital transformation processes.

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Ethical Considerations

Not applicable.

Conflict of Interest

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