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Barriers to Digital Transformation: A Classification Based on Literature

NEHA MAKKAR[1] AND NUDRAT MOINI RAHMAN*[2]
[1]Research Scholar SMBS and [2]Associate Professor SMBS
Jamia Hamdard University, New Delhi (India)

*Corresponding Author

ABSTRACT

The study aims to conduct a review of the current literature on barriers to digital transformation in the MSME sector. Furthermore, it tries to systematically identify, classify, and prioritize the barriers to digital transformation by synthesizing insights from existing academic literature. Based on the literature reviewed, six areas were found: technology, strategy, finance, organisation, human resource, and others. We have depicted our findings through a diagram that presents sixteen barriers to digital transformation. These barriers are subsequently categorized into technological, organizational, and environmental dimensions in line with the Technology–Organization–Environment (TOE) framework. The study also presents a frequency analysis to present the constraints that require high attention. By integrating thematic classification, visual representation, and frequency-based prioritization, this study contributes a structured and holistic perspective on digital transformation barriers in MSMEs. The findings are helpful for researchers, policymakers, and digital transformation consultants. This study contributes by providing an understanding of barriers to digital transformation to help improve the success of digital transformation efforts.

Keywords: Digital Transformation, Barriers, MSMEs

INTRODUCTION

With digitalisation, companies can enhance their existing business operations by increasing the efficiency of coordination between different processes and providing customers with additional value by improving their user experience (Pardo and Pagani, 2017). Digitalization is not just about reducing costs, but it also involves improving processes to create better customer experiences. It involves Industry 4.0 technologies like Big Data, cyber physical production systems, additive manufacturing, augmented reality, digital printing, 3D printing, radio frequency identification (Rahman, 2021).

Digital transformation is a process of transforming an organization on a large scale, resulting in new business models being created (Pardo and Pagani, 2017; Kane *et al.*, 2015). Digital technologies can give businesses a competitive edge by enabling them to utilize their current strong points or develop new ones (Liu *et al.*, 2011).

Digital Transformation (DT) can be divided into three distinct categories: (1) On the basis of Technology, where new digital technologies are applied; (2) Organizational, which involves changes in processes and developing new business models; and (3) Social, which encompasses all aspects of human life and the enhancement of customer experience (Reis *et al.*, 2018).

Vial's research of 282 publications has concluded that digital transformation (DT) is a process in which digital tools cause disruptions that require organizations to modify their value-creation strategies. Organizations must also manage the structural changes and organizational obstacles which will impact the success of the transformation process (Vial, 2019).

Digital Transformation of business leads to change in current business models, existing processes, and consumer experiences (Schwertner, 2017). Adopting a

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disruptive Industry 4.0 technology is only one component of the multiple decisions and activities that must occur to bring digital transformation in an organization. It requires management commitment, a shift in strategy to re-evaluate operations, and a new way of doing things (Gong and Ribiere, 2021) defines it as "A fundamental change process, enabled by the innovative use of digital technologies accompanied by the strategic leverage of key resources and capabilities, aiming to radically improve an entity* and redefine its value proposition for its stakeholders" (*An entity could be: an organization, a business network, an industry, or society). When Digital Transformation, is happening, companies concentrate on two activities that are mutually beneficial: reworking customer value propositions and utilizing digital technologies to enhance customer interaction and collaboration while transforming their operations (Berman, 2012).

However, Digital Transformation can be difficult, as it often faces organizational, procedural, and cultural barriers. Companies must be willing to re-examine their operations, demonstrate a strong commitment to the process of digital transformation and adjust their strategy to fully utilize the potential of this technology, all while considering the risks and challenges associated with it, in order to achieve improved operational results Digital Transformation provides opportunities in terms of sustainability, automation, data-based decision making, a digital approach in addressing the customers and dealing with them. It also provides technical networking, new jobs profiles, new skills, Industry 4 technology and uniqueness (Šimberová *et al.*, 2022).

Despite of multiple benefits it has, there is an apprehension towards implementing DT which may be due to its demanding nature and the need to create a whole new operational system (Zaki, 2019). Currently Digital Transformation is not considered as a process that affects all the functions within an organisation rather it is considered as another IT project (Lada, 2021). Our research attempts to understand different barriers to DT from a holistic management perspective.

The major problem this study focuses on is about the barriers that are required to be considered in introducing digital transformation. Even though there are studies on barriers to digital transformation in previous literature but there is a dearth of studies that have compiled the list of barriers completely. Therefore, in practical application, there is still a lack of clarity on barriers to digital transformation. To address the fundamental issue at hand, it is crucial to establish a shared and thorough understanding of the various obstacles that may arise during the implementation of a digital transformation initiative. Therefore, it is necessary to systematically define these barriers within the context of digital transformation.

Literature Review

Barriers to Digital Transformation

Technology Barriers

According to many experts, technical aspects like current infrastructure that is bit older is not worth digital transformation, data security issues (Vogelsang *et al.*, 2019; Ali and Basha, 2019) can make theft of relevant information by competitors. When numerous computers are linked through Ethernet, an immense amount of data, both structured and unstructured, is used, which requires proper management and administration. Furthermore, there should be harmony between the digital service management and the administrative systems, making it harder to ensure the safety of data (Ali and Basha, 2019). Perceived technology limitations also act as a barrier to the process of DT.

Strategy barriers

Absence of a vision and strategy, lack of overall strategy, Lack of urgency and strategic desire is a major barrier identified that limits digital transformation initiatives (Vogelsang *et al.*, 2019). At Strategic level also, companies do not have strong innovation strategy. The strategy is further not aligned with different processes in the organisation, practices, and the values of organisation. Not much time is spent on framing innovation policies.

Financial Barriers

Financial constraints restrict the process of digitalisation. Budget constraints (Lada, 2021), lack of appropriate financing options (Apoga and Kristine Petrovska, 2022), large cost (Llopis-Albert *et al.,* 2022) act as barriers to Digital Transformation. Lammers *et al.* (2019) in their study found various financial barriers such as higher costs involved in improving existing systems, higher cost of innovation, investment costs, cost to employ various digital tools, high cost of set up and implementation. Also, according to (Lammers *et al.*, 2019) Internally, inadequate funds are allocated for digital initiatives. It also includes training budget for teams and

R&D.

External Financial barriers like Lack of funds and assistance and unavailability of venture capital, Return on Investment, dearth of proven business examples that justify the investment causes difficulty in formulating cost benefit analysis from digital transformation efforts.

Organisational Barriers

Cultural change is required in an organisation to adapt digital transformation of processes. Resistance to change, time taken in transformation efforts act as obstacle. Also, in few industries, lack of standards and law related to exchange of information obstructs digital transformation (Vogelsang *et al.*, 2019). As per (Lada, 2021)'s survey research, organisational structures, organisational resistance to change, organisational culture in terms of poor attitude towards innovation, commitment of teams, no managerial commitment, lack of supervision for digital innovation, employees fear to change, less interest in innovation develops a negative culture within the organisation towards Digital transformation.

Human Resource Barriers

Employees' competencies, motivation level, lack of technical skills and lack of confidence might act as a barrier in digital transformation process of an organisation. They may be reluctant to digitalise operations due to concerns over better transparency and monitoring of their performance, as well as potential job loss. Other companies find lack of knowledge related to Information technology as a barrier to successful digital transformation (Vogelsang *et al.*, 2019). Employees performing specific tasks from a long time in the organisation can also show reluctance to change towards new technology. The unavailability of experts in the external job market; Lack of managers' understanding of how to do it restricts the organisation to introduce digital transformtion (Vogelsang *et al.*, 2019). In case of Manufacturing Industry, (Abdallah *et al.*, 2021) in their systematic literature review found unavailability of labour in the external job market as important barrier by Latvian MSMEs. Along with that, digital skills of employees, resistance to change, manager's knowledge limitations were found to be moderately important. As per (Llopis-Albert *et al.*, 2022), staff requirements associated with digital transformation are obstacles which prevent small to medium-sized businesses from developing and implementing a digital strategy. Middle managers can also be a major obstacle to change process due to their risk-minimizing mentality and adherence to rules (Thornberry, 2001). Additionally, they may be wary of the impact digitalisation could have on their own employment. To foster a more entrepreneurial spirit, research proposes to allow more autonomy to middle managers (Shimizu, 2011).

Others

(Apoga and Kristine Petrovska, 2022) Factors related to Government and regulatory environment outside the company offering no standards and framework for digitalisation act as a barrier. Factors related to outside environment like no collaboration and cooperation between various actors throughout the supply chain provide obstacle to digital transformation efforts of the company.

Digital transformation has been examined through various theoretical frameworks to understand organizational adoption of digital technologies. Among these, the

Technology–Organization–Environment (TOE) framework

It is one of the most widely used models for analyzing digital transformation at the firm level.

The TOE framework explains technology adoption through three contextual dimensions: technological, organizational, and environmental (Tornatzky *et al.*, 1990). The technological context captures factors such as perceived benefits, compatibility, complexity, and technological readiness. The organizational context includes firm size, top management support, human resource capabilities, and organizational culture, while the environmental context reflects external influences such as competitive pressure, regulatory environment, and industry support. Owing to its comprehensive and flexible structure, the TOE framework has been extensively applied to classify drivers and barriers of digital transformation, particularly in studies focusing on MSMEs and emerging economies.

There are other theories also to understand the process of digital transformation like Technology Acceptance Model (TAM), Diffusion of Innovation (DOI) theory, the Resource-Based View (RBV), and institutional theory. However, TOE is a broader framework that covers not just individual but organisational as well as internal and external factors. Current research has adopted TOE framework to classify

literature on barriers to digital transformation.

Frequency-based matrix

A frequency-based matrix is a systematic analytical tool used in literature review studies to organize, classify, and quantify how often specific themes, constructs, variables, methods, or theoretical frameworks appear across prior research. In this approach, key dimensions derived from the reviewed literature are listed in a matrix format, and their frequency of occurrence is recorded based on the number of studies addressing each dimension. This provides with synthesis of current significant literature helping in identifying dominant barriers and trends. Such matrices provides more transparency and clarity of literature (Feuerriegel *et al.*, 2025; Li *et al.*, 2022).

Research Gap

The literature on digital transformation is highly fragmented with studies focused on a particular technology adoption or sector specific case analysis.

Although numerous studies identify barriers to digital transformation, very few studies include a complete synthesis of all barriers and reasons behind such barriers. As a result, a comprehensive picture of barriers and their underlying causes remain unclear.

Also, the application of Technology–Organization–Environment (TOE) framework is for examining digital transformation, has largely been selective or partial. Prior literature often put more emphasis on individual constructs of TOE framework without systematically mapping the full range of identified barriers across technological, organizational, and environmental contexts.

Moreover, there is no clarity on relative importance of different barriers. Most studies treat identified constraints as equally significant leading to need to understand the priority that should be given to different barriers. This absence of prioritization restricts the practical utility of existing research for owners and other stakeholders to allocate resource.

Addressing these gaps requires not just consolidation of all barriers but a classification and identification of those barriers that most persistently impact digital adoption efforts.

Purpose and Scope of the Study

In response to the above gaps,in the literature, the current study presents a consolidated list of all barriers to digital transformation identified in the prior literature through a fishbone diagram and classifies them in a well-established theoretical framework for conceptual understanding. The study presents findings in a visual representation along with underlying causes of various barriers under different heads leading to a comprehensive representation. Moreover, these barriers have been further examined to understand recurrence across exiting studies considered relevant for the topic under research. A frequency matrix have been prepared to identify barriers occurring more frequently needing higher priority to be addressed by stakeholders and decision makers.

Through this integrative approach, the study aims to move beyond descriptive reviews and contribute a structured foundation for future empirical research, policy formulation, and strategic decision-making related to digital transformation in MSMEs.

METHODOLOGY

Kai Petersen (2008)'s systematic literature review was used to identify barriers towards digital transformation. Methodologically, the study aligns with the principles of systematic mapping studies, which aim to structure and categorize existing research to identify dominant themes, research gaps, and future directions.

The analysis has been done with inductive logic, where insights and barriers related to digital transformation have been identified from the existing literature.

The first step of the process is to define the research problem. This study is mainly trying to find the barriers that affect digital transformation initiatives in an organisation. To find an answer to the problem, a combination of terms was used to search literature.

It include search strings such as ("digital transformation" OR "digitalisation" OR "Industry 4.0") AND ("barriers" OR "challenges" OR "obstacles") AND ("organisation" OR "SMEs" OR "business"). These search combinations helped in identifying studies that specifically addressed challenges related to digital transformation implementation.

For data collection, secondary data were obtained from peer-reviewed academic publications. The databases used for literature review included Elsevier, Springer, Google Scholar, and Web of Science.

The initial search across these databases resulted in around 250 articles. After removing duplicate studies,

approximately 210 articles remained for further screening. In the next stage, titles and abstracts were screened to assess their relevance to the research objective, which reduced the number of studies to 85. Further, studies were evaluated whether they discussed barriers or challenges related to digital transformation. After applying the inclusion and exclusion criteria, a final set of 30 studies was selected for detailed analysis.

Moreover, articles written in English were considered only. These selected studies included qualitative as well as quantitative papers. The papers belonged to different countries and different industries.

Studies that discussed digital technologies without discussing organisational challenges or barriers were not included in the analysis.

For data analysis, thematic coding was applied to identify recurring barriers to digital transformation across the selected studies. This qualitative analytical approach allowed the categorization of barriers based on patterns emerging from literature.

During the coding process, statements referring to challenges, obstacles, or barriers related to digital transformation were extracted from the selected articles. Similar concepts were grouped together and gradually organised into broader thematic categories. These themes were then consolidated into a set of distinct barriers identified across the reviewed studies.

Also, a diagram was used to depict various categories of barriers that we identified from literature. To enhance theoretical relevance, the classification was subsequently aligned with the technological, organizational, and environmental barriers.

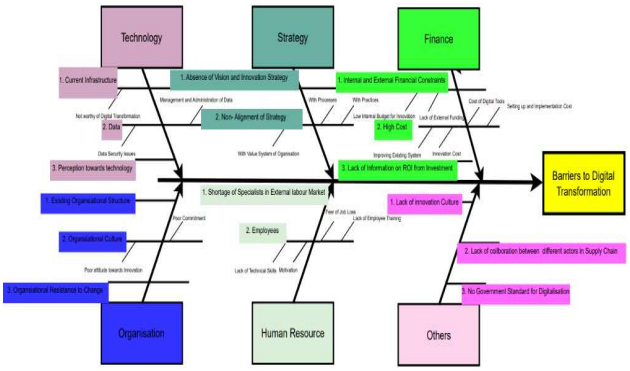
In the final analytical stage, a frequency-based assessment was conducted to examine the relative prominence of each barrier across the reviewed studies. The frequency reflects the recurrence of thematic emphasis on specific barriers within literature rather than a strict quantitative count of identical terms.

For interpretation, The barriers were emphasized on the basis of the extent to which they had appeared in the reviewed literature. Barriers repeatedly highlighted as key constraints across multiple studies were classified as very frequent, whereas barriers mentioned less consistently were categorized as moderate or occasional. The classification reflects the prominence with which barriers are discussed in prior studies rather than a strict numerical count.

RESULTS AND DISCUSSION

Barriers to digital transformation

The current study found sixteen barriers to digital transformation for an organisation after conducting review of literature. The findings are represented through Fig. 1 given below:



Source : Aurthor's own work

Fig. 1 : Barriers to digital transformation

Based on a systematic review of prior literature, the current research identifies sixteen barriers to digital transformation, which are conceptually summarised into six pillars: *Technology, Strategy, Finance, Organisation, Human Resources,* and *Other contextual barriers*. The fishbone diagram shows these barriers presenting how multiple interrelated factors collectively obstruct digital transformation initiatives at the organisational level.

Technology-related barriers consist of three key dimensions. First, outdated or inadequate IT infrastructure inhibits the organisation's digital initiatives. Second, challenges related to data, including weak data management practices data security issues and theft of information, restrict the confidence in digital transformation. Third, a negative perception towards technology, particularly unawarenss about the probable advantages of digital transformation, reduces owners' willingness to adopt digital tools (Ali and Basha, 2019).

The strategy pillar highlights the absence of digital orientation. It includes two critical barriers: absence of a clear vision and strategy for digitalisation and non alignment of strategy into firm's process, practices and with value system of the organisation. In the absence of alignment with other areas it just becomes a simple IT project which does not result in complete transformation of the enterprise (Vogelsang *et al.*, 2019).

Barriers related to Finance pillar presents resource constraints and financial uncertainty. The first in financial pillar is related to financial constraints internal as well as external. By internal it refers to internal budget dedicated for digital transformation efforts and external refer to funding available from external sources (Lammers *et al.*, 2019). Second is higher cost of improving existing systems in a firm, high cost of digital tools, innovation cost, setting up and implementation cost (Apoga and Kristine Petrovska, 2022). The third is uncertainty about result and lack of the cases from industry proving good return on investment from digital tools (Lada, 2021).

The organisation pillar covers structural and cultural obstructions. Existing organisational structures often lack digitally oriented top management, while organisational culture is characterised by poor managerial commitment and resistance to innovation, both of which constrain transformation efforts.

Barriers related to Human Resource involves Employees. They do not have required technical skills and motivation needed towards digital transformation efforts. The second is shortage of experts and specialists in external labour market. Finally, the other contextual barriers encompass systemic issues beyond the firm's immediate control, including category relates to lack of innovation culture, lack of collaboration between different components in the supply chain and no standard by the government for digitalisation of firms.

An Integrated TOE-Based Barrier Framework for Digital Transformation

Explicit Mapping of Barriers into the TOE Framework

Technological Context

The technological context captures characteristics of technologies relevant to adoption, including infrastructure readiness, perceived attributes, and associated risks.

The availability and adequacy of existing digital infrastructure remain a fundamental technological constraint, as limited or outdated systems restrict the feasibility of implementing advanced digital solutions within MSMEs. In addition to infrastructural limitations, concerns related to data security and privacy further inhibit digital adoption, as apprehensions regarding data breaches and system vulnerabilities increase perceived risk associated with digital technologies. Perceptions towards technology also play a critical role, where skepticism about reliability, usability, and relevance of digital tools negatively influences adoption decisions. Moreover, uncertainty surrounding the financial outcomes of digital investments, particularly the lack of clear information regarding return on investment, reduces managerial confidence and delays commitment toward digital transformation.

These barriers directly relate to the attributes, availability, and perceived value of digital technologies. Inadequate infrastructure constrains the technical feasibility of adoption, while security concerns and negative perceptions increase perceived risk. Similarly, limited understanding of ROI reflects uncertainty regarding technological benefits, which discourages investment decisions. As these factors shape how digital technologies are evaluated and understood by firms, they are appropriately positioned within the technological dimension of the TOE framework.

Organizational Context

Organizational factors constitute a significant internal impediment to digital transformation within MSMEs. Rigid organizational structures and deeply embedded routines often limit the flexibility required to accommodate digitally enabled processes. Resistance to change further intensifies this challenge, as employees and middle management may perceive digital initiatives as disruptive to established ways of working. Organizational culture also plays a critical role, particularly when innovation, experimentation, and learning are not actively encouraged.

The absence of a clearly articulated digital vision and long-term strategy further constrains transformation efforts, leading to fragmented and ad hoc adoption of digital tools. This challenge is compounded when strategic intentions are not aligned with existing organizational practices, operational processes, and underlying value systems, resulting in implementation gaps. Human resource-related barriers, including fear of job loss, inadequate training, and low motivation levels, further weaken organizational readiness by reducing employee engagement and competence in using digital technologies. Collectively, these organizational constraints hinder the ability of MSMEs to translate technological opportunities into sustained digital outcomes.

These barriers originate from internal organizational arrangements and human factors that influence a firm's readiness for transformation. Leadership vision and strategic alignment determine whether digital initiatives

are prioritized and coherently implemented. Structural rigidity, resistance to change, and cultural inertia hinder organizational adaptability, while inadequate training, fear of job displacement, and low motivation constrain employees' ability and willingness to engage with digital systems. The absence of an innovation-oriented culture further limits experimentation and learning, making these barriers central to the organizational dimension of TOE.

Environmental Context

Environmental factors arising from the external business context also exert a strong influence on digital transformation initiatives. Financial constraints, both internal and external, significantly limit the capacity of MSMEs to invest in digital technologies, particularly in resource-constrained settings. High acquisition and maintenance costs associated with digital systems further exacerbate these constraints, making digital adoption economically challenging for smaller firms.

In addition to financial pressures, the lack of collaboration and coordination among supply chain actors restricts opportunities for shared learning, data integration, and collective digital advancement. Institutional factors also play a role, as the absence of standardized government guidelines or regulatory frameworks for digitalisation creates uncertainty and limits strategic clarity. Such environmental constraints not only shape the feasibility of digital adoption but also interact with organizational and technological factors, reinforcing barriers to effective digital transformation.

These barriers are shaped by market conditions, institutional frameworks, and inter-organizational relationships. Financial constraints and high technology costs reflect broader economic and industry-level conditions affecting affordability. Weak collaboration within the supply chain limits knowledge exchange and coordinated digital adoption, while the absence of standardized digital guidelines creates regulatory uncertainty. As these factors arise from the external business environment, they are appropriately classified under the environmental dimension.

Indicative Frequency and Importance of Digital Transformation Barriers Identified in Key Literature

The systematic literature review conducted in current study identified 16 barriers to digital transformation in MSMEs, grouped into six categories — Technology, Strategy, Finance, Organisation, Human Resource, and Others – and aligned with the Technology–Organisation–Environment (TOE) framework. A critical understanding r literature shows that while these barriers exist but there is significant variation across studies in terms of their applicability as per context.

Comparative Analysis Across Studies

Financial constraints emerge as the most consistently reported barrier in the MSME digital transformation literature. Studies across different contextual groundings reveal that the cost of technology acquisition, implementation, and maintenance constitutes a major

Table 1: Explicit Mapping of Barriers into the TOE Framework

TOE Dimension	Barrier Category	Specific Barriers Identified
Technology	Technological readiness	Inadequate or outdated digital infrastructure
	Risk and security concerns	Data security and privacy issues
	Technological perception	Unfavorable perception towards digital technologies
	Economic uncertainty of technology	Lack of information on return on investment (ROI) from digital investments
Organization	Structural rigidity	Existing organizational structure limiting flexibility
	Change management	Organizational resistance to change
	Cultural constraints	Organizational culture not supportive of digital adoption
	Strategic orientation	Absence of a clear vision and digital strategy
	Strategic alignment	Non-alignment of digital strategy with organizational practices, processes, and value systems
	Workforce insecurity	Fear of job loss among employees
	Skill deficiencies	Lack of employee training related to digital tools
	Human motivation	Low employee motivation toward digital initiatives
	Innovation capability	Lack of an innovation-oriented organizational culture
	Financial readiness	Internal and external financial constraints
Environment	Inter-organizational relations	Lack of collaboration among supply chain actors
	Institutional support	Absence of government standards and guidelines for digitalisation

Source : Author's own work

Table 2: Indicative Frequency and Importance of Digital Transformation Barriers Identified in Key Literature

Barrier	TOE Dimension	Indicative Frequency in Literature	Indicative Importance	Key Supporting References (from reviewed studies)
Internal and external financial constraints	Environment	Very frequently discussed	Very High	Moeuf *et al.* (2017); Vogelsang *et al.* (2019); Apoga and Petrovska (2022); Šimberová *et al.* (2022)
High cost of digital technologies	Environment	Very frequently discussed	Very High	Vogelsang *et al*. (2019); Moeuf *et al.* (2017); Abdallah *et al.* (2021)
Lack of digital skills and employee training	Organization	Very frequently discussed	Very High	Küsters *et al.* (2017); Moeuf *et al.* (2017); Vogelsang *et al.* (2019)
Absence of vision and digital strategy	Organization	Frequently discussed	High	Kane *et al.* (2015); Thomas *et al.* (2016); Vial (2019); Verhoef *et al*. (2021)
Non-alignment of digital strategy with organizational practices and processes	Organization	Frequently discussed	High	Kane *et al.* (2015); Liu *et al.* (2011); Vial (2019); Thomas *et al.* (2016)
Inadequate or outdated digital infrastructure	Technology	Frequently discussed	High	Abdallah *et al.* (2021); Moeuf *et al.* (2017); Rahman (2021); Lucas Nhelekwa *et al.* (2022)
Organizational resistance to change	Organization	Frequently discussed	High	Vogelsang *et al.* (2019); Shimizu (2011); Thornberry (2001); Morakanyane *et al.* (2017)
Organizational culture not supportive of digitalisation	Organization	Moderately discussed	Moderate–High	Kane *et al.* (2015); Vial (2019); Zaki (2019); Vogelsang *et al.* (2019)
Lack of innovation culture	Organization	Moderately discussed	Moderate	Berman (2012); Zaki (2019); Verhoef *et al.* (2021)
Fear of job loss among employees	Organization	Moderately discussed	Moderate	Vogelsang *et al.* (2019); Shimizu (2011); Thornberry (2001)
Lack of information on ROI from digital investments	Technology	Moderately discussed	Moderate	Liu *et al.* (2011); Kane *et al.* (2015
Data security and privacy concerns	Technology	Moderately discussed	Moderate	Gong and Ribiere (2021); Zaki (2019); Vial (2019)
Unfavorable perception towards digital technologies	Technology	Moderately discussed	Moderate	Morakanyane *et al.* (2017); Reis *et al.* (2018); Vogelsang *et al.* (2019)
Lack of collaboration among supply chain actors	Environment	Occasionally discussed	Moderate	Lammers *et al.* (2019); Pagani and Pardo (2017); Margherita Pagani (2017)
Absence of government standards and guidelines for digitalisation	Environment	Occasionally discussed	Low–Moderate	Šimberová *et al.* (2022)
Rigid or hierarchical organizational structure	Organization	Occasionally discussed	Low–Moderate	Liu *et al.* (2011); Vogelsang *et al.* (2019); Morakanyane *et al.* (2017)

Source : Author's own work

obstacle for resource-constrained enterprises (Omowole *et al.*, 2024; Stich *et al.*, 2020). Similarly, lack of digital skills are widely identified as a critical internal constraint (Mattos *et al.*, 2024; OECD, 2021)..

However, areas of comparative divergence are equally instructive. Organisational culture and resistance to change, while prominently discussed in European and North American studies (Omowole *et al.*, 2024; Ben Slimane *et al.*, 2022), lack discussion in studies from South and Southeast Asia, where structural and infrastructural have been discussed more. This shows that any barrier can not be considered to be relevant universally.

Differences Across Industries and Countries

The literature also reveals meaningful variation across industries. Research on food manufacturing SMEs highlights regulatory compliance and legacy system integration as particularly acute barriers, whereas studies focusing on professional services emphasise data governance and cybersecurity vulnerabilities (Arranz *et al.,* 2023). In manufacturing sectors, the complexity of integrating Industry 4.0 technologies into existing production systems introduces barriers that are qualitatively different from those confronting service-based MSMEs (Mattos *et al.*, 2024). The current study's

inclusion of "Technology" as a distinct barrier category – encompassing issues of digital infrastructure readiness and system incompatibility –reflects this sector-level variation and reinforces the need for context-sensitive policy interventions.

Developed Versus Developing Economies

A particularly significant analytical gap in the literature concerns the differential experience of MSMEs in developed and developing economies. Studies drawing on European and OECD data tend to foreground issues of regulatory compliance, data privacy (including GDPR), and the cost of advanced technology adoption (OECD, 2021; Arranz *et al.*, 2023). In contrast, research from emerging economy contexts — including Ghana, Indonesia, and South Asian markets — reveals a more fundamental layer of constraint, including inadequate digital infrastructure, low IT competency, limited access to formal financing channels, and weak institutional support for digitisation (Egala *et al.*, 2024). This structural disparity implies that barriers classified under "Finance" and "Others" in the present study may carry substantially different weights and policy implications depending on national context. The tendency of influential review studies to draw predominantly from high-income country samples — as noted by Fernández-Portillo *et al.* (2024) — limits the generalisability of their findings and reinforces the relevance of MSME-focused research in developing economies such as India.

Conclusion

In today's times of Industry 4.0, increased competition, pressure to become sustainable, efficiency in production, it is very important to have knowledge of the barriers to succeed at Digital transformation effort. In absence of knowledge of barriers, the government and strategists are not positioned to design better strategies for successful digital transformation implementation. Current study mentions sixteen barriers to digital transformation.

In this context, the study addressed the key research question of identifying and organizing the major barriers that influence digital transformation initiatives in MSMEs through a systematic review of existing literature.

Barriers identified and classified in the current study will help policymakers, strategists while implementing digital transformation. Current research seems to be very limited related to barriers, opportunities of digital transformation in different context. This paper presents a basic understanding of barriers for improving the possibility of the success of the digital transformation efforts. Apart from that, considering the limited number of academic research projects about the barriers to digital transformation, this research contributes by becoming a base for further research in the effort to overcome the impact of each barrier on the implementation of digital transformation. This study contributed to the area by conducting a thorough literature review and synthesising the current state of knowledge regarding the obstacles to the implementation of digital transformation.

From a practical implementation perspective, the findings of this study can help policymakers, MSME owners, managers, and digital strategy consultants in gaining a clearer understanding of the constraints that often slow down or obstruct digital transformation efforts. By recognizing these barriers at an early stage, organisations and decision makers can design more informed strategies, policies, and support mechanisms that improve the likelihood of successful digital transformation within MSMEs.

In order to aid the realisation of the digital transformation program, further research and the development of intervention solutions can be done using the initial classification results, which take the shape of a collection of barriers.

Contribution of the Study

This study makes three key contributions. First, it consolidates fragmented insights on digital transformation barriers into a coherent and theoretically grounded framework. It also presents different types of barriers through a fishbone diagram. Second, by integrating the TOE framework, the study provides a structured representation of complex barriers. Third, the frequency-based prioritization offers a novel synthesis that highlights critical barriers warranting immediate managerial and policy attention, thereby bridging the gap between descriptive literature reviews and actionable insights.

Practical Implication

This is the first step to describe the barriers in a standardized way. Before firms can begin Digital transformation journey, government need more knowledge of barriers. Digital transformation efforts can be made successful only after complete understanding of barriers. By considering identified barriers while framing digital

transformation strategies, better achievement of strategic vision can be achieved. After analysing the findings of this research from existing literature, it is understood that barriers to digital transformation are different in different context. As an example, Small and medium-sized enterprises (SMEs) are still having difficulty grasping the potential of the digital transformation (DT) and the obstacles they may encounter on their journey to transition. On the other hand, larger organizations are beginning to recognize the opportunities and obstacles of the DT (Moeuf, 2017). Some benefits that might be used in practice include:

1) To analyse which barrier is most likely to occur in which industry more specifically.
2) To analyse if strategic decision making can help in breaking down these barriers.
3) To analyse whether it is viable to develop new digital transformation strategy for an industry and a firm considering the barriers that may arise.
4) To understand which is a major barrier in case of small industry and that in case of large industry.

Limitation and Future Research Suggestions

This research is based only on literature review, and this makes it important to conduct empirical studies to validate the barriers found in this research. Additionally, these barriers were only defined in general terms; research is required to study barriers in different industry context, as per different size of the firms, different stage of growth. The current study, however, can be utilised as a base to further research about the hurdles to digital transformation.

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