

Analyzing the Barriers and Facilitators of Technology Adoption in Traditional SMEs Transitioning to Digital Business Models

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Abstract

Small and medium-sized enterprises (SMEs), which have traditionally operated their businesses, are under increasing pressure to shift from old and conventional practices to more digital ways of doing business because of digital disruptions. Despite awareness about the potential advantages of such changes within organizations, the adoption of technologies by many traditional SMEs remains difficult because of inertia, inadequate digital skills, and poor supporting ecosystems. The purpose of this research is to explore the factors that hinder and promote the adoption of technologies by traditional SMEs during the process of digital business model change. An empirical explanatory mixed-method design has been adopted by using data from 250 SMEs that are traditional and engaged in manufacturing and retail industries and have a history of operations of a minimum of 15 years. The quantitative data have been analyzed through the use of regression and mediation analysis and supplemented with qualitative insights from interviews regarding the implementation experience. According to the results, internal barriers are more significant in the process of digital transformation than external barriers. Resistance to change (mean = 4.32), inertia of leadership (4.18), and lack of digital competencies (4.05) are the key barriers. Resistance to change explains 29.4% of the variation in adoption speed ($\beta = -0.542$, $p < 0.001$). From the viewpoint of the facilitator, the effectiveness of external barriers, such as government subsidies and vendor ecosystem, was observed to work only via the mediator barrier of internal workforce readiness. The companies that have digitally structured training programs experienced a 34% faster adoption speed than others. Highly ready SMEs generated 28.6% more digital revenue and were 41% more operationally agile than less ready firms. There is a huge gap in the outcomes of digital transformation between the companies having the same technologies, which can be explained only by the readiness of these organizations. Thus, the study confirmed that the digital transformation of SMEs does not depend on technology acquisition but on the ability of the organization to use these technologies, its cultural alignment, and the digital literacy of the employees. Contribution to the TOE framework includes emphasizing internal readiness as an important factor of successful digital transformation.

Keywords

SME Digital Transformation, Technology Adoption BARRIERS, TOE Framework, Dynamic Capabilities, Digital Readiness, Business Model Innovation.

1. Introduction

Digital technology innovation has brought about many changes in the competitive environment in every sector. Digital technology innovation has revolutionized how the value creation process takes place in organizations. In such an atmosphere, traditional SMEs that conduct business based on the brick-and-mortar model of doing business have been forced to make changes in order to adopt a digital business approach. Digital transformation is more than an innovation initiative; it is a strategic requirement that requires SMEs to restructure themselves (Basit et al., 2024; Zheng et al., 2024).

Despite all the known benefits of digitization, the transformation itself is extremely challenging for traditional SMEs. Unlike digital natives that grow from scratch based on infrastructure and culture enabled through technology, traditional SMEs face many structural problems including lack of funds, outdated of technological infrastructure, fragmented data, and so on. Typically, these problems are compounded by cultural resistance to change, lack of digital skills among employees, IT investment uncertainty, and concerns regarding security and disruption. At the same time, the success of transformation efforts is typically facilitated by such factors as visionary leadership, involvement of employees, cooperation with the ecosystem, government programs, availability of digital workforce, and growing maturity of technology vendors.

There is no dearth of research studies that have extensively highlighted the benefits and opportunities in relation to digital transformation, but what is still missing is any clear understanding of how the relative impact and interrelationship between the barriers and facilitators play out during the process of transformation. This study intends to identify and analyze the key barriers and facilitators that affect the process of technology adoption by traditional small and medium enterprises (SMEs) moving towards digitization. It further seeks to explore the role of the interrelationships between the two opposite forces at different phases of transformation.

Key Contribution

- Discovers and examines the key barriers and enablers that affect the adoption of technology within traditional SMEs in the course of digital transformation.
- Understands how the interaction of adoption barriers and enablers varies at each stage of digital transformation.
- Helps to understand how the dynamics of conflicting forces influence SME digitization efforts.

Structure of the Paper: Section 2 introduces the literature review. Section 3 provides the proposed theoretical framework by blending the TOE framework and the dynamic capabilities view. Section 4 elaborates the research methods, such as the empirical mixed-method approach, sampling approach, and operational definition of variables. Section 5 examines the factors influencing, the obstacles to, and the transition asymmetry with. Section 6 discusses and interprets theoretical, practical, and policy implications. Lastly, section 7 concludes the main findings, statistically significant facts, limitations, and future research directions.

2. Literature Survey

It is noted that the literature on digital transformation in SMEs always focuses on a multifaceted interaction between technology, organization, and environment that affects adoption. The most recent research notes that despite the growing availability of digital instruments, traditional SMEs still encounter numerous structural and behavioral barriers in the process of transitioning (Costa et al., 2023). In particular, the barriers associated with digital infrastructure and the limitations of existing systems have been recognized as fundamental barriers preventing the adoption of smart business models (Idemudia et al., 2023; Ghobakhloo et al., 2022). At the same time, the general theoretical analysis confirms the fact that such barriers as cultural resistance, managerial incapability, and fragmented strategic vision still play an important role in the digital inertness of SMEs (Omowole et al., 2024; Krismajayanti et al., 2024). Systematic reviews have revealed that although there are specific external facilitators such as governmental assistance and ecosystem, it can work effectively only with the organizational preparedness (Gómez & López, 2024; Loo et al., 2025).

Moreover, it is also indicated in several articles that technology alone cannot contribute much to organizational transformation (Uzule & Verina, 2023). It is seen in the case of Industry 4.0 that many researchers have revealed that the failure of SMEs is not because of the technology's unavailability but rather because of absorptive capacity and mismatch in leadership (Hansen et al., 2025; Khin & Kee, 2022). It has been suggested in the business model transformation literature that digital transformation needs to be considered as structural transformation and not just technological one (Leipziger et al., 2024; De Mattos et al., 2024). From the empirical perspective, factors like organizational learning, strategic flexibility, and skill development of employees can impact transformation (Troise et al., 2024; Scipioni et al., 2021).

In addition to this, recent studies focusing on post-COVID-19 adaptations and security issues among SMEs show how risk perceptions and uncertainties create even more obstacles in digital transformation efforts (Shaifullah & Hossain, 2025; Hoong et al., 2024). Recently, there have also been studies addressing the link between digital transformation and sustainability/circular economy transitions (Nikam & Melati, 2024; Ndoka et al., 2025).

The existing research, however, shows that there is a lack of understanding about the dynamic interaction between internal obstacles and external enabling factors in the transformation process, which the current research aims to fill by examining their relative importance and influence on digital business model success.

3. Theoretical Framework and Conceptual Grounding

The adoption of digital business models by traditional SMEs represents a multifaceted process dependent on a number of factors such as technological, organizational, and environmental contexts. To understand the above process, this research combines the Technology-Organization-Environment (TOE) model with the concept of Dynamic Capabilities. The TOE model offers an established perspective that helps to understand how technological aspects, organizational characteristics, and environmental factors influence decisions of technology adoption. On the other hand, the Dynamic Capabilities approach helps to comprehend how organizations sense and exploit opportunities as well as how they restructure their internal capabilities in response to changes in the environment.

This unified model of technology adoption sees it as a two-force process, where both barrier and facilitator forces are present at the same time. Barriers and facilitators affect the capacity of SMEs to move from traditional approaches to conducting business operations to digitally driven models of conducting business.

Dimension of Barriers

Barriers can be divided into internal and external. Internal barriers arise due to organizational aspects and management behaviors. These barriers consist of cognitive inertia, resistance to change, lack of digital skills, inadequate staff training, risk aversion in decision-making processes, and unwillingness of leaders to adopt new technologies. They tend to prevent organizational learning.

External barriers arise as a result of the external business environment and include poor digital infrastructure, restricted access to technological services, cybersecurity issues, difficulties with regulatory compliance, and differences between regions in their digital assistance systems. Such barriers raise the level of uncertainty in implementation and can act as a disincentive for SMEs to pursue digital efforts.

Facilitation Dimensions

There are facilitators that could be internal or external. The internal facilitators are transformational leadership, visionary orientation, culture of organizational learning, empowering employees and reconfigurability of resources. This increases the organization's adaptability in incorporating the new digital technologies.

The exogenous facilitators are digitalization incentives from the government, industry infrastructure support, technological suppliers' readiness, financial support and competition pressures. This facilitates innovation. The exogenous facilitators reduce the cost of adoption, which enables the SMEs to gain access to the necessary skills and resources for implementation.

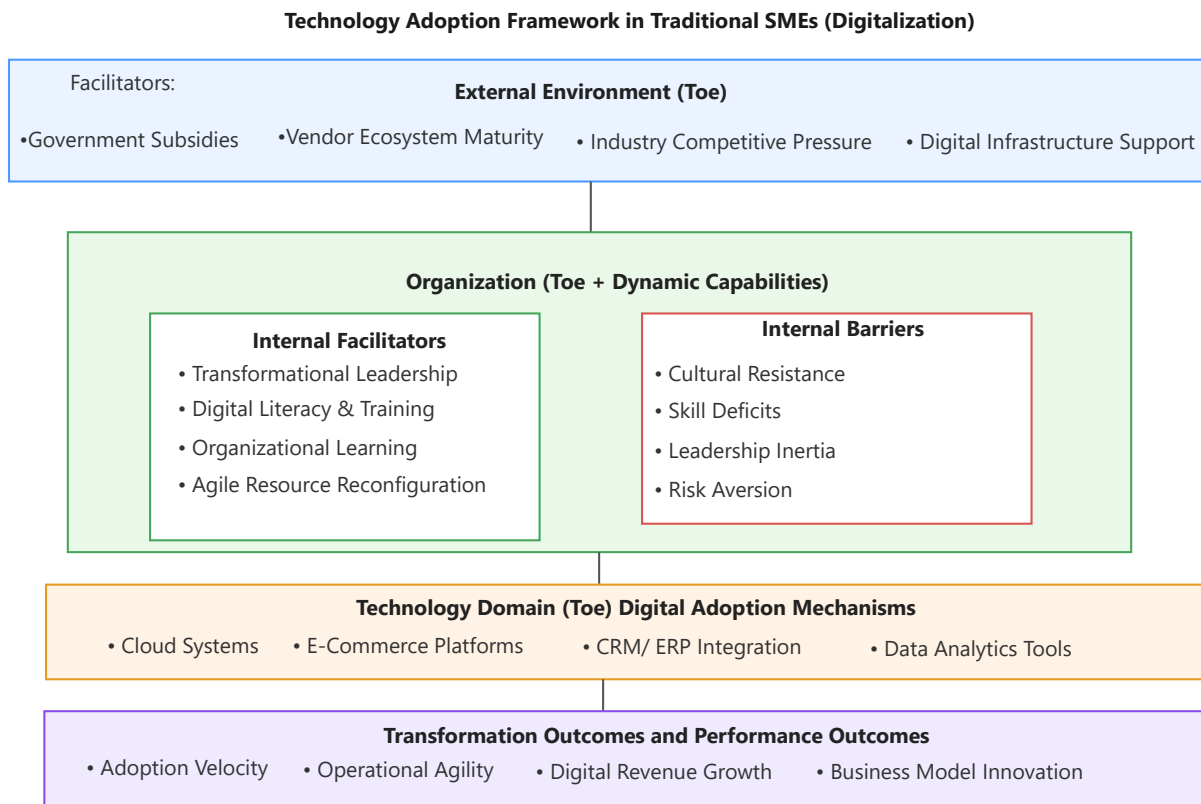


Fig. 1. Technology adoption framework in traditional SMEs (Digitalization)

Fig. 1 illustrates the digital transformation journey of traditional SMEs by blending the TOE model with the Dynamic Capabilities view. It maps how macro-level external facilitators influence the core organizational layer, where internal facilitators collide with steep internal barriers. These opposing forces dictate how effectively an SME integrates specific digital adoption mechanisms, ultimately determining the final transformation outcomes, such as adoption velocity, operational agility, and digital revenue growth.

Core Propositions

Proposition 1: Internal organizational barriers, particularly cultural resistance and leadership inertia, exert a stronger negative influence on digital business model execution than external financial constraints.

Proposition 2: The positive influence of external technological facilitators on digital transformation outcomes is fully mediated by the internal digital literacy, technological readiness, and adaptive capabilities of the SME workforce.

It becomes apparent, therefore, that whereas support systems from the outside world may indeed be necessary, sustainable digital transformation is far more likely to depend upon the abilities of the organization itself, which will have to take advantage of such opportunities. Thus, organizational readiness is the key factor that links the external world and the digital business model.

4. Methodology

Research Design

This research utilizes the empirical research design, which utilizes the mixed-method approach in studying the barriers and facilitators affecting technology adoption within traditional SMEs that are shifting towards digitization. The use of mixed-method research is well suited for this research since digitization is a multi-faceted phenomenon within the organization, as it entails both the tangible results and the experiential

aspect of the management. Through quantitative analysis, the impact of the various barriers and facilitators on the adoption process is determined, while through qualitative insights, it will be possible to comprehend the role played by these variables within the process.

Sample Selection and Data Profile

The target population of the present research consists of traditional SMEs which operate in the manufacturing and retail industries, being involved in digitalization projects. Purposive sampling was employed for recruitment of the participants who would meet all requirements of the research. Specifically, firms should have been operating not less than 15 years in accordance with the traditional model of functioning and develop their physical networks for the delivery and provision of services before digitalization is implemented. There are 250 SMEs in the sample which implement digital transformation and employ various types of technologies, including e-commerce, cloud enterprise solutions, digital payments, CRM software, and data analysis tools. Interviews were conducted with the owners, managers, executives, and other individuals involved in the technology adoption process. Apart from the survey responses, semi-structured interviews were also held with the selected managers about the organizational experience of the implementation.

Measurement of Variables

Independent variables that will be used include the level of barriers and facilitators experienced by SMEs as they undertake the digital transformation process. Variables associated with barriers are change resistance, organization inertia, lack of skills, risk aversion, infrastructural issues, and regulatory issues. These are some of the variables associated with facilitators; they include transformational leadership, organization's capability for learning, employee digital preparedness, government incentives, vendor maturity, and competition. Each of the constructs' variables has been sourced from relevant literature on digital transformation and innovation adoption using a five-point Likert scale.

The main outcome variable used in the research is the extent of transition to a digital business model. The extent of transition of the digital business model is determined by how much companies have incorporated digital technologies into their activities related to value creation, customer interaction, operations, and revenue generation. Other outcome variables that will be used are the rate of adoption, which will be evaluated through the speed of adoption process; post-transition agility, which will be evaluated through responsiveness to change; and digital revenues, which are the percentage of total organizational revenues coming from digital platforms.

Research Contribution

The methodology contributes greatly to entrepreneurship and digital transformation research because of the evidence it gives regarding the comparative role of internal and external factors in the digitalization process of SMEs. The integration of quantitative and qualitative data gives a complete perspective on how the challenges and facilitators interact in the transformation process. From the findings of this study, a practical framework can be designed to assist traditional SMEs in making transformation investments.

5. Empirical Results and Analysis

Barrier Matrix Analysis

The empirical study has shown that internal organizational barriers had a much stronger effect on the outcomes of digital transformation compared to external barriers. The standardized impact scores for the main barriers affecting the adoption of new technologies by traditional SMEs can be seen in table 1. It can be stated that cultural resistance is the most powerful barrier, having a mean impact score of 4.32. This is followed by leadership inertia with an impact score of 4.18 and digital skills deficiency of employees with an impact score of 4.05.

Table 1: Barrier matrix analysis

Barrier Factor	Mean Impact Score	Relative Rank
Cultural Resistance	4.32	1
Leadership Inertia	4.18	2
Digital Skill Deficits	4.05	3
Legacy System Friction	3.94	4
Risk Aversion	3.81	5
Regulatory Complexity	3.56	6
Infrastructure Constraints	3.41	7
Financial Constraints	3.27	8

It can be noted that problems in project delays and failure to implement were more connected with organizational behavior and management attitude rather than a lack of finances. Using regression analysis, this study has found out that cultural resistance alone accounted for 29.4% of the variance in adoption speed ($\beta = -0.542$, $p < 0.001$). Also, organizations that indicated having a high level of leadership inertia had a longer period of implementation and lower levels of digital business model adoption. Thus, the research has confirmed Proposition 1.

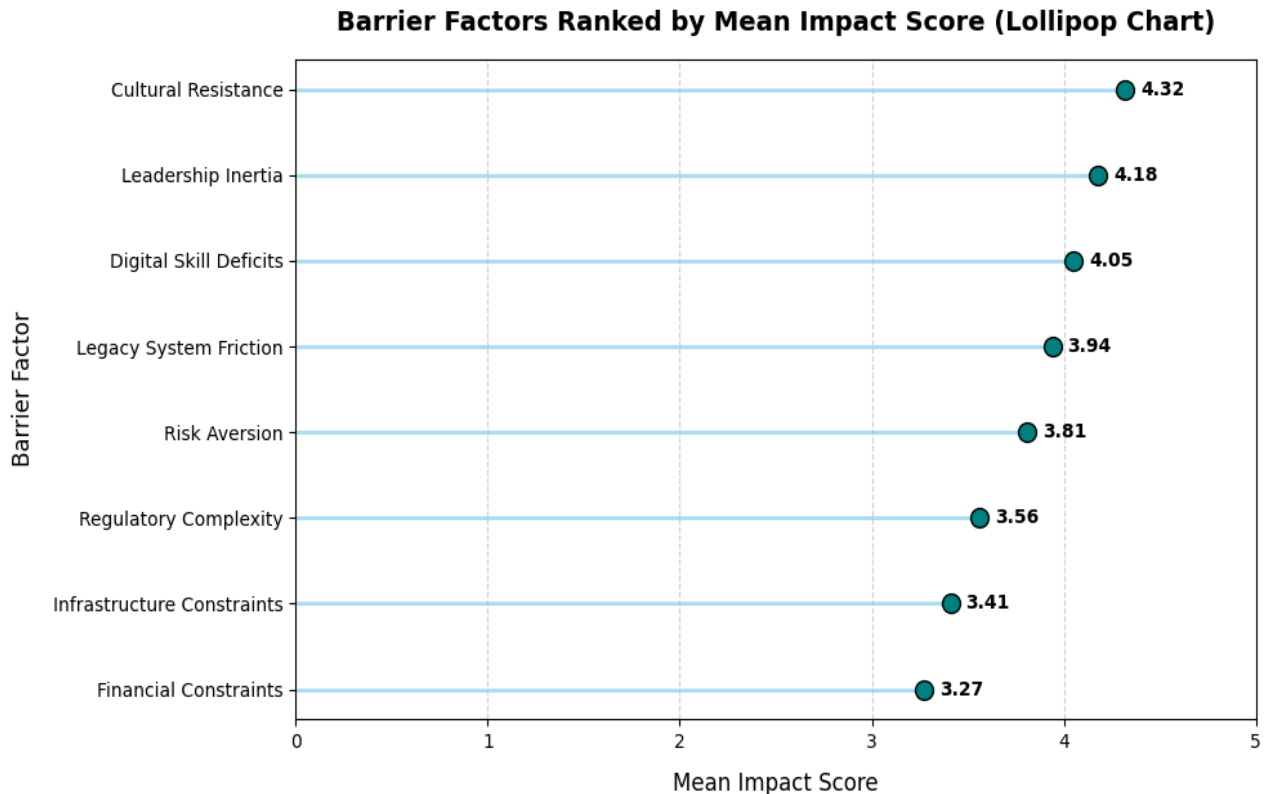


Fig. 2: Barrier factors ranked by mean impact score

A breakdown of the key blockers to SME digital transformation – from worst to best, is shown in fig. 2. Importantly, internal barriers such as ‘cultural resistance’ (4.32), and ‘leadership resistance to change’ (4.18) have a stronger ‘weighting’ score compared to the financial inhibitors such as ‘lack of financial resources’ (3.27).

Facilitator Impact Path

The facilitator analysis indicated the existence of various approaches that were effective in reducing the level of organizational resistance to change and accelerating the digitalization process. Digital training of the workforce was found to be the most important facilitator, while transformational leadership and external consulting services were the second most important facilitators.

It is evident from mediation analysis that there would not be any significant results without sufficient internal capability due to the existence of external facilitators. Government subsidies and vendor-provided technical assistance enhanced the level of adoption performance through increasing workforce capability and organizational readiness for adoption. Organizations that have been receiving training and consultation services have achieved a 34% higher adoption velocity score compared to those organizations that have made investments in technologies.

Interview findings show that organizations that achieved successful results in digital transformation formed special transformation teams, implemented ongoing employee training programs, and ensured good communication about strategic goals.

Proposition 2 is proven with the fact that workforce readiness mediates the effect of external technological support on digital transformation results. External facilitations can be effective only in the case when organizations have enough capability to adopt new knowledge.

The Asymmetry of Transition

As one can see from the mediation analysis, without having sufficient internal capability, it is unlikely to obtain any substantial results due to the presence of external facilitations. Subsidies and technical assistance provided by vendors raised the level of adoption performance due to improvement of capability and readiness of organization to adopt new technology. Organizations, which were undergoing training and consultations, obtained 34% higher scores of adoption velocity than organizations which invested in technologies.

According to the interview, organizations which succeeded in their digital transformation created special transformation team, conducted regular training for employees, and maintained good communication about the goals of strategy.

Proposition 2 can be proved by the statement that the workforce readiness mediates the impact of external technological support on results of digital transformation. External facilitations will be able to work effectively only when organizations possess adequate capability to adopt new knowledge.

In summary, the findings show that the success of digital transformation in traditional small and medium enterprises is more a result of how well they manage their internal obstacles, build skills in their workforce, and realign their resources than on digital technology adoption.

6. Discussion

In this regard, the research findings contribute to the TOE model through an enhanced understanding of the operation of transformation barriers in the case of traditional SMEs undertaking complete transformation of their business models instead of simply improving technology. Although TOE model has been extensively employed to analyze adoption readiness, this research shows that the explanatory strength of the TOE model becomes much more pronounced when factors such as cultural barrier, leadership inertia, and resource deficiency are considered as primary drivers instead of contextual variables. Dynamic capabilities model explains that digital transformation cannot be achieved merely through availability of technology; rather, firms need to constantly reconfigure their resources in face of uncertainty.

On the grounds of this research, it would be beneficial for managers of SMEs to adopt a staged model of digitalization. First of all, companies need to take care of organizational culture, leadership's involvement in the process, as well as development of their own digital competences. Organizations which miss this preparatory stage are at risk of having problems with implementation of technologies as well as poor returns on investment. From the governmental perspective, it is crucial to design programs of transformation that include not only funding. Development authorities should combine infrastructure development, specific training, and other activities in order to ensure that the organizations receive not only technology but also internal capacity for absorbing changes.

7. Conclusion

The current study attempted to investigate the barriers and facilitators impacting the adoption process within traditional small businesses adopting digital models of business operations. The study results have proved that the outcome of the digital transformation process depends more on internal than on external factors. As far as barriers are concerned, the cultural resistance barrier (mean impact score is equal to 4.32), the leadership inertia barrier (4.18) and the lack of digital skills barrier (4.05) turned out to be the three barriers with the greatest impact on the adoption process. The regression analysis proved that the cultural resistance barrier alone accounted for 29.4% of variance of adoption speed. As regards facilitators, the study revealed that the effectiveness of external enablers, such as government subsidies and vendor ecosystem, is limited solely to internal capabilities, particularly workforce digital literacy and organizational adaptability. The companies that have implemented training programs and transformational leadership had adoption velocity increases of up to 34%, whereas the companies relying only on technological solutions showed poorer adoption speed. What is more, the firms with high readiness levels performed better in terms of 28.6% higher increase in digital revenues and 41% higher increase in operational agility than firms with low readiness levels. Thus, it is evident that there is a difference in transformation outcomes, meaning that the same technologies work differently depending on organizational readiness. Theoretically, the study extends the TOE framework and confirms the idea that internal capability structures are crucial determinants of business model transformation. Practically, the study confirms once again the need for sequence in digital strategy implementation and prioritizing cultural fit and skills development prior to technological innovations. In terms of public policy, it becomes clear that the projects of digital transformation should take into account financial, technical, and human capital development. One possibility for conducting research would be to carry out a longitudinal analysis of how the digitalization of SMEs proceeds and what effect it has on capability building. Comparison of various cases within different industries and geographic locations could bring closer to understanding the impact of the context. In future research, the utilization of emerging technologies such as AI could be considered.

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