

Information Technology Adoption, Organization Performance and Organizational Agility: A Study of Small and Medium Enterprises

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Abstract

This research delves into the dynamic relationship between adopting information technology (IT), organizational performance, and agility within small and medium enterprises (SMEs). With an acknowledgement of its critical role in today's business sphere, the study seeks to demystify the effects of IT adoption on both the operational and strategic levels of SMEs. Utilizing a mixed-methods approach, the research integrates quantitative data from a survey targeting SMEs and qualitative insights gathered through comprehensive interviews. It primarily focuses on the direct impacts of IT adoption on organizational performance, considering key factors such as efficiency, productivity, and financial success. Additionally, the study investigates how organizational agility functions as an intermediary variable, hypothesizing that agility may be a key conduit through which IT adoption influences overall performance. The research further examines how the enterprise's size and the market's volatility might modulate these relationships. The results indicate a positive link between IT adoption and improved organizational performance, significantly mediated by agility. This study enriches the existing body of knowledge by offering detailed perspectives on SMEs' strategic use of IT to boost performance and agility, especially in environments marked by rapid market changes. It also provides valuable strategic insights for SME managers, guiding them in developing IT strategies harmoniously aligned with their objectives for agility and enhanced performance.

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1 Introduction

In today's dynamic business landscape, organizations grapple with many challenges ranging from delivering highly tailored products/services to ensuring efficient business processes and robust supply chains. The digital realm compels organizations to undergo digital transformation to maintain competitiveness. Research by Jafvert and Gustafsson, (2019) underscores that digitally mature organizations derive greater benefits in terms of profitability and revenue augmentation compared to their less mature counterparts.

Information technology (IT), particularly in the form of computers, represents a significant and rapidly evolving technological advancement in this century, as noted by Freeman and Perez (1988). It offers businesses the potential to enhance their efficiency and effectiveness and can even provide a competitive edge, as discussed by Ives and Learmonth (1984). The literature on information systems (IS) is replete with instances showcasing the positive influence of IT on large enterprises (Levallet & Chan, 2018). In the contemporary landscape, where the cost of technology is diminishing and more potent and user-friendly microcomputers, along with standardized software packages, are emerging, even the most modest businesses can harness these advantages (Ozmen et al., 2020). Nevertheless, despite the well-established utilization of these technologies in sizable corporations, the integration of such technological advancements has been somewhat sluggish within small businesses (Roberts & Grover, 2002).

The competitive advantage of organizations rests on their capacity to innovate and deliver value-added products and services that address changing customer preferences (Jafvert & Gustafsson, 2019). A crucial aspect of this dynamic is the swift incorporation of new requirements by leveraging organizational assets, primarily in response to customer needs (Khin & Ho, 2019). In today's fast-paced business landscape, agility has emerged as a crucial factor for the survival and success of organizations, particularly for Small and Medium Enterprises (SMEs) (Kocyigit & Akkaya, 2020). The ability to swiftly adapt, innovate, and respond to changing market demands is essential. Information Technology (IT) adoption has been recognized as a key enabler of organizational agility, allowing SMEs to enhance their responsiveness, flexibility, and overall performance (Kohli & Grover, 2008).

This research aims to investigate the relationship between IT adoption and organizational agility in the context of SMEs (Eller et al., 2020). Small and Medium Enterprises (SMEs) are pivotal contributors to Pakistan's economic fabric, playing a substantial role in fostering employment, spurring economic expansion, and driving innovation (Fornell & Larcker, 1981; Ravichandran, 2018). Representing a significant segment within Pakistan's business realm, SMEs span diverse sectors like textiles, agriculture, manufacturing, and services. These enterprises serve as crucial engines of economic advancement by creating job opportunities for a wide spectrum of the populace, particularly in urban and rural areas. Despite challenges such as limited financial accessibility, technological barriers, and regulatory complexities, SMEs in Pakistan show resilience and adaptability (Freitas et al., 2017). Governmental and organizational initiatives geared towards aiding SMEs, including subsidized loans, skill development endeavors, and policy reforms, aim to fortify their growth trajectory and competitive edge (Ittner et al., 2010). The prospects for SMEs in Pakistan to further elevate economic progress remain promising, especially with sustained efforts towards fostering an enabling environment that nurtures innovation, amplifies productivity, and ensures long-term sustainability (Isik et al., 2020).

Due to their distinct characteristics, Small and Medium Enterprises (SMEs) encounter unique challenges in adopting IT technologies, mainly due to their limited resources and the inherent

complexities of digitalization, particularly in developing countries (Ghobakhloo & Ching, [2019](#)). Recognizing SMEs' pivotal role in employment generation and their interconnectedness within supply chain systems alongside larger enterprises, developing countries strive to establish financial services to support domestic SMEs notably, even if a large organization digitizes its own operations (Bokša et al., [2020](#)). Given the intrinsic role of SMEs within broader value chains, collaboration and coordination with enterprise partners are imperative, often amid constraints in financial and human capital. Given these constraints, grasping the phases of IT digital transformation is essential (Blatz et al., [2018](#)). The sparse research presents mixed findings on the impact of IT adoption; for example, Wroblewski ([2018](#)) indicates that the performance of established organizations in adopting IT does not always exceed that of their less mature counterparts.

Hence, this study seeks to elucidate how IT adoption influences the performance of SMEs, offering crucial insights for managers, especially in organizations with lower digital maturity levels (Becker et al., [2009](#); North et al., [2019](#)). Additionally, it aims to explore the potential moderating role of organizational agility in the relationship between IT adoption and performance, given the varied and inconclusive findings from previous research, which suggest the presence of factors that may impact this association (Blatz et al., [2018](#)). The main goal of this study is to thoroughly examine the relationship between small and medium enterprises' (SMEs) performance and their use of information technology (IT), covering several important areas (Boksa et al., [2020](#)). First and foremost, it seeks to assess and examine how IT adoption affects SMEs' overall performance in various industry sectors (Chin, [1998](#)). Second, by clarifying the consequences and advantages of IT adoption in improving SME performance, the research hopes to provide managers—especially those in organizations with lower degrees of digital maturity—with insightful information and expertise (Ali et al., [2019](#); Büyüközkan & Güler, [2020](#)). Additionally, the study investigates how organisational agility could moderate the association between SME success and IT adoption (Bouranta et al., [2009](#)). Finally, by explicitly analysing the relationship between IT adoption and SME performance, the study seeks to close gaps in the literature by elucidating the underlying causes, effects, and difficulties related to digital transformation in these businesses (Calli, [2012](#)).

To address these objectives, the research presents several pertinent research questions (Hair, [2009](#)). Firstly, it seeks to determine the precise impact of IT Adoption on the overall performance of SMEs, considering multifaceted aspects such as operational efficiency, productivity, and competitive positioning in the market (Henseler et al., [2012](#)). Secondly, the study explores how organizations categorized as digitally less mature either benefit from or confront challenges in implementing IT Adoption and how these impact subsequent performance outcomes (Haffke et al., [2016](#); Ustaoglu, [2019](#)). Thirdly, it aims to ascertain how organizational agility moderates the relationship between IT Adoption and SME performance (Ali et al., [2019](#); Guo et al., [2020](#)). Additionally, the research aims to delve into the key antecedents, implications, and obstacles encountered in IT digitization within SMEs. Finally, it endeavours to compare and contrast the performance of SMEs regarding IT Adoption against that of their digitally mature counterparts, seeking to uncover potential divergences or similarities in their resultant outcomes (Gold et al., [2001](#)).

2 Literature Review

As per Haffke et al. ([2016](#)), the genesis of organizational performance initiatives typically originates from functional domains such as sales & marketing, operations, or customer services (Ustaoglu, [2019](#)). Recent trends indicate an expansion in the scope of IT digital initiatives. These concepts bear nuanced differences despite the common interchangeability of digitization, digitalization, and digital transformation (Haffke et al., [2016](#); Jafvert & Gustafsson, [2019](#)). According to Sandberg et al. ([2019](#)), IT digitalization is converting analogue operations into digital ones without changing their underlying architecture. On the other hand, digitalization entails using

digital technology to change and reorganize company procedures. According to Jafvert and Gustafsson, (2019) this transformative process necessitates a thorough reevaluation of how technology is used within the company, emphasising the integration of various digitization initiatives across all business aspects to reshape operational paradigms fundamentally. In line with McKinsey's viewpoint, digital transformation refers to the basic restructuring of business models, technological architectures, and operational procedures to generate novel value propositions while dynamically adjusting to the quickly accelerating speed of technological advancement (Ulas, 2019; Yiğitöl et al., 2020).

This measure serves as an indicator of the level to which IT has integrated into the business, for businesses using minicomputers, the count of terminals is used as a basis to estimate an equivalent number of microcomputers, providing a standardized measure of IT adoption. Kohli and Grover (2008) identified agility as a key capability for competitive markets, highlighting its role in fostering new product development and embracing new technologies. Agility, in this context, is characterized by adaptability, rapid operational changes, and IT of processes, thereby supporting IT capabilities crucial for responding to new digital technologies and improving digital business performance (Freitas et al., 2017). Eller et al. (2020) emphasized how important IT is to increasing company success, particularly for small and medium-sized businesses (SMEs) via boosting social media platform consumer involvement. Niemand et al. (2020) discovered that utilizing IT in the banking industry efficiently requires the fusion of an entrepreneurial mindset with a strategic vision. Al-Ansari et al. (2013) showed that innovation has a major impact on company performance and that there is a high correlation between technology orientation and innovation among SMEs in Dubai. Lavallette and Chan, (2018) emphasized that in order to successfully support managerial improvisation with IT skills, it is crucial to cultivate an inventive culture and uphold a flexible organizational structure.

Information and communication technologies (ICT) are critical in assisting small and medium-sized firms (SMEs) in overcoming the challenges presented by the COVID-19 pandemic, as noted by Guo et al. (2020), Lonial, and Carter, (2015). The study found that SMEs can perform better and weather public crises with the aid of IT. Khin and Ho, (2019) suggest that an organization's IT concentration can augment its capacity for digital innovation, hence bearing on its commercial viability. According to Tariq et al. (2019), technology orientation is a moderating factor in the relationship between various organisational capacities and the success of small and medium-sized firms (SMEs). When it comes to the link between technical IT capabilities and organizational agility, Gao et al. (2020) suggest that there can be a negative association between IT integration and business spanning capacity.

In Turkey, research connecting digital maturity and performance has largely been theoretical or based on literature reviews (Aggrey et al., 2022; Baki & Serdar, 2020; İmamoğlu et al., 2021; Nuroğlu & Nuroğlu, 2018; Özmen et al., 2020; Pakdemirli, 2019; Yıldırım, 2020) discussed how Industry 4.0 influences organizational agility, suggesting a pivotal role for digital transformation in improving agility (Rojko, 2017). Ustasüleyman (2008) identified that drivers of agility significantly influence business performance, with competitive capacity affecting agility. Turkish research has also delved into various facets of organizational agility, examining its relationship with social capital (Işık, 2020), strategic leadership (Çetinkaya & Akkoca, 2021), visionary leadership (Özçelik et al., 2018; Özeroğlu, 2019), dynamic capabilities (Akkaya et al., 2019), and organizational structure (Koçyiğit & Akkaya, 2020; Rindova & Kotha, 2001). Sağır and Gönülölmez, (2019) explored how organizational agility mediates the relationship between structural capital and operational efficiency, while Eryılmaz (2024) suggested a link between digitalization and organizational agility. The effects of supply chain practices on firm performance and agility were examined by Aggrey et al., (2022), and the influence of organizational agility on competitive advantage and firm performance was investigated by Coşkun (2019) and Uğurlu et al.

(2019), respectively.

2.1 Hypothesis

- **H1:** *There is a positive relationship between the adoption of Information Technology (AIT) and organizational performance (OP) in SMEs.*
- **H2:** *There is a positive relationship between the organizational agility and organizational Performance (OP) in SMEs.*
- **H3:** *Organizational agility mediates the relationship between IT adoption and organizational performance in SMEs.*

2.2 Theoretical Model

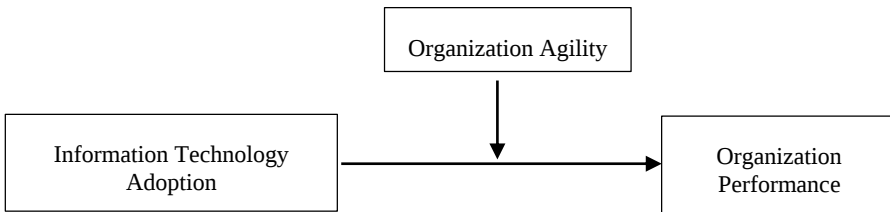


Figure 1: Theoretical Framework

3 Research Design

3.1 Data collection

The research engaged with employees from Small and Medium Enterprises (SMEs) in Pakistan. Our team liaised with the HR managers of these SMEs, detailing the necessity for employee involvement in our study. We stressed that the responses would be exclusively for research purposes and ensured strict confidentiality. In cases where an HR department was absent, we coordinated with the relevant contact person. Questionnaires were distributed to employees according to schedules provided by the HR managers or the appointed contact person. To facilitate the process of electronic submission, we utilized Google Forms. The data, collected from various sources, was meticulously organized in an Excel spreadsheet, setting the stage for further analysis through (PLS SEM). Out of the 165 responses received, 4 were incomplete, resulting in a final sample size of 143 participants. The study's evaluation of Adoption of Information Technology (AIT) employed a 3-item scale, adapted from Moore and Benbasat, (1991). Organization Agility (OA) was measured using a 6-item scale, adopted from Goldman et al. (1995). Moreover, Organizational Performance (OP) was assessed with a 14-item scale, adapted from Gold et al. (2001). A convenience sampling technique was used to gather data from the target population.

4 Results

For a thorough two-stage analysis, we used Partial Least Squares Structural Equation Modelling (PLS SEM) in our work. This included both an Assessment Model and a Measurement Model, following the guidelines provided by Hair et al. (2011) and Henseler et al. (2009). According to Henseler et al. (2009), the Measurement Model carefully links items/variables with the indicators that correlate to them in order to evaluate validity with a focus on both discriminant and convergent validity (Sarstedt et al., 2022). Confirmatory Factor Analysis (CFA) is used to assess these factors, and Composite dependability—which is thought to be more reliable than conventional Cronbach Alpha—is used to measure dependability (Starkweather & Hames, 2012). We examine the concept validity of our research by evaluating its convergent and discriminant validity. Every construct's composite reliability is carefully analysed, and a baseline item loading threshold of 0.50 is used in compliance with Hair et al. (2013) guidelines. The factor loadings for each item in Table 1 of our analysis all exceed the 0.50 standard, indicating that the composite reliability in our dataset is

really credible. Items that don't satisfy this cutoff are eliminated, and the loadings are then reevaluated. Our report's Figure 1 shows the model and the factor loadings that go along with it, and Table 1 explains the consistency of the items—all of which have consistency values over 0.7, indicating a high degree of dependability. Following the guidelines provided by Bagozzi et al. (1991), we carefully consider discriminant and convergent validity, which are essential components of construct validity. Convergent validity is established using the Average Variance Extracted (AVE), with the validation threshold set above 0.50 as suggested by Fernandes (2012), Hair et al. (2013), and Hair et al. (2009, 2011). Our AVE values, which are 0.814, 0.793, and 0.521, as shown in Table 1, all surpass the necessary threshold, supporting the convergent validity of our study.

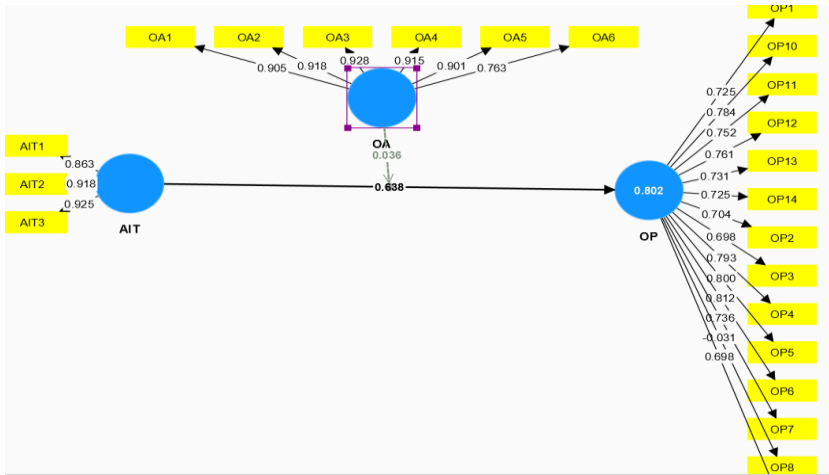


Figure 2: Measurement Model

Table 1: Reliability & Convergent Validity

Construct	Variable Item	Loading	Cronbach's alpha	Composite reliability (rho_a)	Composite reliability (rho_c)	Average variance extracted (AVE)
Adoption Technology	AIT1	0.863	0.886	0.889	0.929	0.814
	AIT2	0.918				
	AIT3	0.925				
Organization Agility	OA1	0.905	0.947	0.95	0.958	0.793
	OA2	0.918				
	OA3	0.928				
	OA4	0.915				
	OA5	0.901				
	OA6	0.763				
	OP1	0.725				
	OP2	0.704				
	OP3	0.698				
	OP4	0.793				
	OP5	0.8				
Organizational Performance (OP)	OP6	0.812	0.918	0.935	0.933	0.521
	OP7	0.736				
	OP8	-0.031				
	OP9	0.698				
	OP10	0.784				
	OP11	0.752				
	OP12	0.761				
	OP13	0.731				
	OP14	0.725				

Following the guidelines set by Hair et al. (2011), discriminant validity is defined as the degree to which constructs are distinct and uncorrelated. To assess discriminant validity in our study, we utilized the HTMT ratio, as proposed by Henseler et al. (2015), is employed in our study. The results of the HTMT test are outlined in Table 2.

The HTMT Ratio values are shown in Table 2 and are assessed using the standards put out and Watson et al. (1995). These standards imply that the HTMT ratio should preferably be less than 0.85 ($HTMT < 0.85$) in order to achieve adequate discriminant validity. According to Gold et al. (2001), a threshold of less than 0.90 ($HTMT < 0.90$) can be considered appropriate in some circumstances. Our analysis, however, shows a different picture, with every HTMT result in Table 2 surpassing the 0.90 threshold. This result implies that our notions may overlap and that there is a lack of discriminant validity, which is different from the suggested criteria given by Gold et al. (2001).

Table 2: Heterotrait-Monotrait Ratio (HTMT)

	AIT	OA	OP
AIT			
OA	0.404		
OP	0.845	0.713	
OA x AIT	0.047	0.036	0.119

In our study, we assessed the presence of multicollinearity by examining the values of the variables under consideration. Generally, a value exceeding 5 in any variable is indicative of multicollinearity. However, according to the data presented in Table 3, all variable values are below this threshold. This finding suggests that multicollinearity is not a concern in our study.

Table 3: Multicollinearity VIF

	AIT	OA	OP
AIT			1.161
OA			1.159
OP			
OA x AIT			1.002

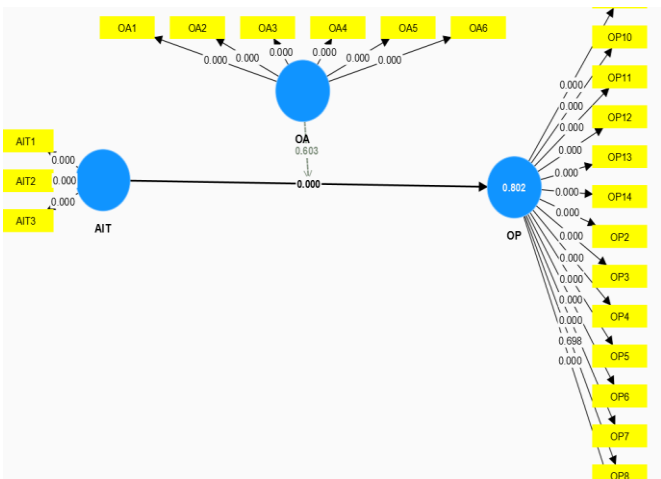


Figure 3: Structural Model

Table 4: Path Analysis

Hypothesis	Relation	Beta	SD	T value	P values	LL	UL	Decision
H1	AIT -> OP	0.638	0.038	16.594	0	0.559	0.7	Supported
H2	OA -> OP	0.428	0.036	12.088	0	0.357	0.492	Supported
H3	OA x AIT -> OP	0.053	0.069	0.521	0.03	0.053	0.194	Supported

The relationships between the variables in our study are explained in this section. Table 4 presents the results of the route analysis using SEM PLS, providing a thorough summary of the proposed correlations between these variables. With a path coefficient (β) of 0.638 and a t-value of 16.594, the findings show a substantial correlation between the adoption of information technology (AIT) and organisational performance (OP); the lower limit (LL) is 0.559, and the upper limit (UL) is 0.7. This strong association supports the first hypothesis (H1). Additionally, a significant correlation between Organisational Agility (OA) and Organisational Performance (OP) is found, supporting Hypothesis 2 (H2) with β of 0.428, t-value of 12.088, and confidence intervals (LL = 0.357, UL = 0.194).

Furthermore, the study finds a statistically significant correlation between organisational performance (OP) and information technology (AIT) use. A t-value of 0.521, a path coefficient (β) of 0.53, and confidence intervals with an upper limit (UL) of 0.053 and a lower limit (LL) of 0.03 all support this association. These findings support Hypothesis 3 since they meet all necessary requirements (H3).

4.1 Coefficient of Determination (R2)

According to Henseler et al. (2009), the R-squared (R2) value measures the percentage of variation in a dependent variable that can be predicted from the independent variables. This measure determines how well a model can predict the future. Henseler et al. (2009) and Hair et al. (2011) state that R2 is the percentage of the dependent variable's total variation that the independent factors explain. Ittner et al. (2010) have highlighted that other criteria for R2 have been recommended. Chin (1998a) and Cohen (1988) have suggested that values of 0.02, 0.13, and 0.26 indicate poor, moderate, and strong explanatory power, respectively.

Moreover, in structural equation modelling (SEM), the coefficient of determination (R2) is a crucial measure of model efficacy. According to Chin (1998a) who defined R2 values of 0.25, 0.50, and 0.75 as representing poor, moderate, and high explanatory capacities, respectively, this assessment follows accepted standards.

Table 5 in our study presents the R2 values for the analyzed constructs. The data indicates that the constructs "Adoption of Information Technology (AIT)" and "Organizational Agility (OA)" jointly explain 80.0% of the variance in "Organizational Performance" (OP), underscoring a substantial explanatory power within the model.

Table 5: R-Square of Construct

Construct	R ²	Effect
Organization Performance (OP)	0.802	Strong

5 Discussion

The anticipation that the level of IT adoption in SMEs would significantly enhance organizational performance stems from IT's capacity to enable organizations to promptly react to both opportunities and threats. This study substantiates the role of IT and organizational agility as drivers in augmenting firm performance. Our findings resonate with the research conducted by Guo et al. (2020) and Zhou and Wu (2010) which also highlighted a positive influence of IT on firm performance. Nonetheless, it is crucial to acknowledge that IT alone may not be adequate for

performance improvement. This viewpoint is supported by Niemand et al. (2020), who argued that technology must be integrated with strategic vision and entrepreneurial capabilities to yield true effectiveness. Ekuobase and Olutayo, (2015) further emphasized that the benefits derived from ICT adoption are not solely determined by the extent of its adoption.

However, conflicting opinions can also be found in the literature. For instance, Wroblewski (2018) found no discernible effect of IT on business performance, but Al-Ansari et al. (2013) observed just a little influence of technology orientation on corporate performance. In a study restricted to large companies and centred on Turkey, Ustasüleyman (2008) found that agility drivers—such as changes in information technologies—positively affected corporate performance. These contradicting findings show how complex the relationship is between IT and organisational success. They suggest that the advantages of using IT may vary depending on several factors, including the corporation's size, the industry, and the company's strategic goal.

5.1 Implications

This research contributes significantly to the academic discourse on IT and organizational performance in SMEs. Demonstrating the crucial role of IT in enhancing SME performance through organizational agility broadens the existing theoretical framework of IT adoption. Notably, it introduces organizational agility as a vital mediating variable, offering a more nuanced understanding of IT's impact on organizational performance. This integration marks a meaningful advancement in comprehending the dynamics between IT implementation and organizational agility within the SME context.

It emphasizes the need for a dual focus: investing in IT and fostering an agile organizational culture. The research suggests that SMEs should prioritize flexible IT solutions capable of rapid adaptation to evolving business environments. Furthermore, it underscores the importance of staff training in IT and agile methodologies. By doing so, organizations can maximize the benefits of IT adoption, ensuring that their workforce is well-equipped to utilize these technologies effectively. This approach can lead to a more responsive, efficient, and ultimately more successful SME in the face of changing market demands.

5.2 Limitations and future research

While this research offers valuable insights to its field, there are areas where future studies could expand and refine the work. The utilization of convenience sampling in data collection may constrain the representativeness and generalizability of the results. Additionally, data sourced from multiple sectors often yield more broadly applicable outcomes than those obtained solely from a single sector. The challenge encountered in this study was the assessment of diverse sectors with a limited sample size.

In our study, the exclusion of items that did not meet specific reliability thresholds may have resulted in a partial understanding of the respondents' perspectives. Given that emerging area of research in Pakistan, with few empirical studies available, future research addressing these gaps is crucial for validating the adapted scale utilized in this study. Moreover, this research examined the collective impact of various dimensions. Future studies could delve into dissecting the independent impacts of these sub-dimensions within organizational agility.

Constraints in achieving a larger sample size in this study were primarily due to time and budget limitations. Carried out without financial backing, data collection primarily relied on traditional methods, including visits to organized industrial zones, as respondents were unavailable for online surveys. Future research could benefit from securing financial support from various institutions and leveraging online surveys, thereby facilitating access to a broader sample base.

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