

Driving Sustainable Firm Performance through Industry 5.0 Adoption and Organizational Agility in SMEs: A Conceptual Framework for Government Support

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Abstract

This study aims to examine the significant drivers of Sustainable Firm Performance (SFP) in the context of Small and Medium-sized Enterprises (SMEs) during the transition to Industry 5.0. The research is underpinned by the Dynamic Capabilities Theory (DCT) and the Natural Resource-Based View (NRBV). A conceptual framework is developed to investigate the effect of Industry 5.0 technology adoption and organizational agility on economic, environmental, and social performance outcomes. The study also aims to investigate the mediating effect of organizational agility and the moderating effect of government support in relationships. The study aims to gather primary data from SME managers using the Partial Least Squares Structural Equation Modeling (PLS-SEM) technique. The conceptual analysis reveals that Industry 5.0 technology adoption is a technological enabler for SMEs, while organizational agility is a vital bridge that enables the achievement of sustainability. Moreover, the study reveals that government support is a vital enabler that can help SMEs achieve sustainability through the adoption of technology and the achievement of agility. The study offers a holistic framework for SMEs to achieve sustainability by matching internal technological focus with external support systems in the modern digital age.

Keywords: *Industry 5.0 Adoption, Sustainable Firm Performance, Organizational Agility, Government Support, SMEs.*

1. Introduction

Social and technological studies on this issue have revealed that the adoption of Industry 5.0, organizational agility, and government support are now considered critical success factors for sustainable organizational performance in different local and global contexts, affecting how modern organizations deal with the changing dynamics of industrial evolution and sustainability. For instance, Shafique, Adeel, and Rashid (2024) have demonstrated that the technological capabilities of Industry 5.0, such as AI and IoT, have a direct impact on sustainable organizational performance, particularly in Chinese manufacturing organizations, reflecting the role of this new paradigm in promoting sustainable technological adoption with a human-centric perspective. Similarly, Kwasek et al. (2025) show that

organizational agility, as represented by fast decision-making, flexible organizational processes, and efficient communication, is vital for the sustainability of development in the context of the Economy 5.0 framework. Moreover, research on the external policy environment has shown that the support provided to green innovation and sustainability initiatives by governments is crucial in the adoption of advanced technologies in firms, hence leading to more “green” innovation outcomes (Aldawsari, 2025). In general, the above-mentioned literature tends towards the integrated importance of technological adoption, internal agility, and institutional approaches in the quest for improved sustainable firm performance in a broad range of economic settings.

Notably, a great deal of contemporary research has also highlighted the significance of Industry 5.0 technology adoption, digital transformation, organizational agility, and government support as antecedents of sustainable business performance in emerging and global markets, especially for small and medium-sized enterprises. For instance, it has been clearly established in the findings of the research that small and medium-sized organizations that exhibit organizational agility in terms of flexibility in the decision-making process, communication, and organization are likely to reap the benefits of technology adoption in the improvement of sustainable business performance (Yuen & Baskaran, 2024). Moreover, the systematic reviews of digital transformation in SMEs highlight the importance of digitalization in promoting innovation, competitiveness, and sustainability but also the need for organizational capabilities to achieve these goals (Raihan, 2024). In addition, specific studies have shown that government support in terms of subsidies and incentives has a significant impact on the adoption of sustainable technology and the relationship between technology integration and SME performance, highlighting the importance of institutional mechanisms in achieving sustainability goals in emerging economies (Talukder et al., 2025). Collectively, the literature provides a clear perspective that the integration of technology, the development of agility, and the utilization of the support structures of the government are critical success factors for the attainment of improved economic, environmental, and social performance outcomes for SMEs in the contemporary digital world (Peris et al., 2025; Saman et al., 2025).

Several studies have shown that the attainment of sustainable business success through the integration of Industry 5.0, organizational agility, and government support is associated with a number of challenges, particularly for small and medium-sized enterprises, which are characterized by structural limitations. Several studies have shown that small and medium-sized enterprises are unable to adopt technology, particularly due to financial limitations, which is a hindrance to the attainment of success through the integration of digital technology, which is critical in the attainment of success (Costa Melo et al., 2023). This has made it difficult for organizations to respond to the challenges of industrialization and sustainability (Mahshar et al., 2025). The external institutional environment is another challenge that has been identified to affect the challenges that SMEs face. This is due to the fact that although the government can help the SMEs to adopt digital technology and sustainability practices, the absence of a well-articulated policy environment and access to finance may hinder the ability of the SMEs to access the support and thus improve their competitiveness and sustainability (Clemente-Almendros et al., 2025). As such, while the theoretical benefits of incorporating advanced technologies, agility, and institutional support are clear, many SMEs face challenges that compromise their performance potential in the Industry 5.0 and sustainable innovation environment.

The development of a sustainable firm performance in the contemporary industrial landscape is a function of the interplay of government support, organizational flexibility, technology adoption, and institutional support. Literature shows that government support mechanisms, such as financial support and subsidies, play a critical role in promoting technology adoption and improving SMEs' economic, social, and environmental performance in a sustainable manner (Peris et al., 2020; Ullah et al., 2021). Further, studies have shown that organizational agility, which entails flexibility in decision-making, adaptability to change, and a responsive organizational process, enhances the relationship between digital transformation and sustainable outcomes, thereby empowering the organization to navigate uncertainty and leverage the latest technology (Hossen et al., 2024; Kwasek et al., 2025). Furthermore, the existing systematic

reviews on the digital transformation of SMEs have emphasized that the government's policymaking and support structures play a vital role in the digital adoption trajectory of organizations. This is because they have a considerable impact on the development of organizational digital orientation and capability development, which ultimately contributes to sustainable performance (Hafeez et al., 2025). In general, the literature supports the synergistic relationship between the support structures of the government and organizational agility/digital technology adoption for sustainable performance.

There is still little research on how the adoption of Industry 5.0, digital transformation, and organizational agility combine with sustainable firm performance, particularly in relation to how environmental and institutional challenges impact such a relationship, especially for SMEs. The literature reveals that SMEs often face significant challenges in their digital and sustainable transformation journey, such as financial, infrastructural, and skill constraints, which make it difficult for them to adopt new technologies that are considered effective in promoting environmental sustainability and economic development (Saman et al., 2025). In addition, the literature reveals that there are systemic barriers to organizational agility and digitalization efforts in SMEs, including resistance to change, absence of strategies, and poor alignment of digitalization strategies with the overall business model, which may impact the viability and sustainability of the organization (Kahveci, 2025). Research also emphasizes that even though digitalization can improve adaptability and innovation, competitive pressures and external factors such as market uncertainty and regulatory complexity can often limit the ability of SMEs to exploit these capabilities (Sagala & Öri, 2024). This is an important area that has been neglected in the literature with regard to the role that the interrelation of technology adoption, agility, and government support plays on sustainable performance, especially considering environmental and institutional pressures. This is an area that requires further investigation to support SMEs in the Industry 5.0 context.

2. Literature Review

2.1. Theoretical Foundation

Further building on the theory base, the Dynamic Capabilities Theory (DCT) and the Natural Resource-Based View (NRBV) offer a robust approach to understanding the complexities of Industry 5.0 and environmental stewardship (Hart, 1995; Teece et al., 1997). Although the traditional Resource-Based View is based on static resources, the DCT argues that the source of competitive advantage for the firm is the ability to integrate, build, and reconfigure internal and external competencies to deal with changing environments (Teece et al., 1997). When combined with the NRBV, it is no longer limited to economic efficiency but also incorporates the strategic imperative of managing natural constraints. NRBV implies that competitive advantage is now driven by capabilities like pollution prevention, product stewardship, and sustainable development (Hart, 1995). By combining these theories, it is possible to argue that the adoption of Industry 5.0 creates a dynamic capability, which is a technological and human-centered reorganization that enables firms to create green organizational agility. This synergy of theories implies that sustainable firm performance is not only dependent on firms possessing green assets, but also on the dynamic agility of technological innovations with environmental imperatives, facilitated by institutional catalysts like governments (de Almeida Barbosa Franco et al., 2024; Khan et al., 2020).

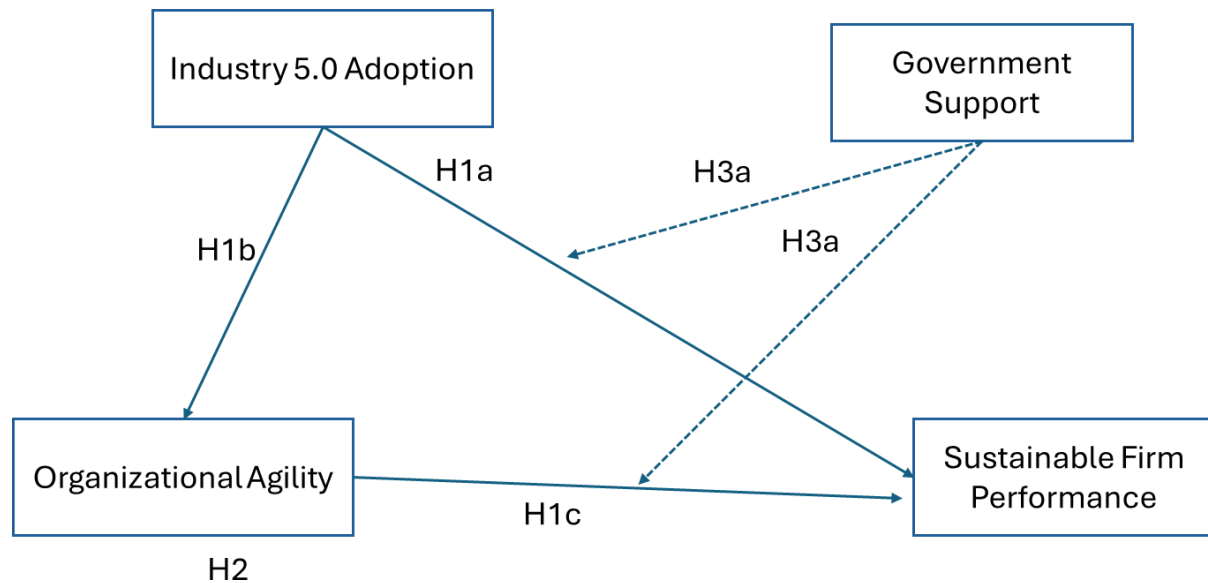


Figure 1. Conceptual Framework.

2.2. Industry 5.0 Adoption, Organizational Agility, and Sustainable Firm Performance

The anticipated impact on the results of sustainable firm performance, following the adoption and implementation of Industry 5.0, is positive, considering the integration and application of advanced technology, including IoT, AI, and human-centric technology, can facilitate the improvement of economic, environmental, and social results of firm performance in accordance with the principles of sustainability and the needs of the current industry revolution. The latest empirical results show that the technological capabilities of Industry 5.0 directly impact sustainable performance results through the support and application of circular economy principles and the strategic integration of digital innovations, validating the significance of the adoption and application of advanced technology in achieving the success of the firm (Elghany et al., 2026; Kwasek et al., 2025). The use of Industry 5.0 is also considered to have a positive impact on organizational agility because the use of digital technology in the organization promotes flexibility and adaptability in the decision-making process, which helps the organization respond effectively to the dynamics of the market and the uncertainties of the environment; this is according to a study that proved that the use of digitalization has a positive impact on organizational agility (Jannat et al., 2025; Zhang et al., 2025). Organizational agility is hypothesized to have a positive effect on sustainable performance, considering that agile firms are more likely to integrate sustainability initiatives and strategic resources, and to implement adaptive practices that support continuous improvement in all dimensions, with literature establishing a positive link between agility and performance in volatile and competitive contexts (Kwasek et al., 2025; Fazal et al., 2023).

H1a: Industry 5.0 Adoption has positive impact on Sustainable Firm Performance

H1b: Industry 5.0 Adoption has positive impact on Organizational Agility.

H1c: Organizational Agility has positive impact on Sustainable Firm Performance

2.3. Mediating Effect of Organizational Agility

Organizational agility would thus have a positive mediating effect on the relationship between Industry 5.0 adoption and sustainable firm performance since it is through organizational agility that the effects of technology adoption are realized in terms of sustainability. Various studies on digital transformation and performance have shown that organizational agility is a critical mediator of the relationship between technology adoption and performance. For instance, various recent studies on digital transformation have shown that organizational agility acts as a mediator of the relationship between transformational leadership and performance (Zvirgzdina et al., 2026). Moreover, the existing literature in digital transformation

studies has indicated that organizational agility plays a significant mediating role in the relationship between digital technologies and performance, emphasizing that more agile organizations are better positioned to leverage the adoption of digital technologies to achieve sustainable competitive advantages, as they are more adaptable to modify their structures and processes according to the dynamic sustainability requirements (Gong & Ribiere, 2025; Zulfikri, 2025; Peris et al., 2021). Therefore, the mediating role of organizational agility assumes critical importance in understanding the manner in which and the reason for which the adoption of Industry 5.0 helps in achieving high sustainable firm performance.

H2: Organizational Agility positively Mediates the relationship between Industry 5.0 Adoption and Sustainable Firm Performance

2.4. Moderation Role of Government Support

Government support is postulated to have a positive moderating effect on the relationship between Industry 5.0 adoption and sustainable firm performance. Empirical research has demonstrated that when institutional support, such as government backing in terms of infrastructure and subsidies, is high, firms are likely to benefit from the adoption of new technology, thus resulting in better performance outcomes, especially in a sustainable context where resources and institutional support are essential enablers. For instance, in research on the adoption of e-business technology, it was demonstrated that perceived government support increases enabling conditions, thus amplifying the effect of facilitating conditions on technology use outcomes (Ahmed et al., 2025; Hasanat et al., 2020). Likewise, research on Southeast Asian firms has found that government support increases the impact of technological capabilities on organizational performance (Shaban et al., 2025). Thus, in the Industry5.0 environment, government support is proposed to increase the impact of technology adoption on sustainable organizational performance.

H3a: Government Support positively moderates the relationship between Industry 5.0 Adoption and Sustainable Firm Performance

Government support is also expected to have a positive moderating effect on the relationship between organizational agility and sustainable firm performance because government support in terms of external institutional resources may add value to the agility capabilities in achieving performance outcomes. Organizational agility helps organizations to perceive and react to changes in the business environment, but the external environment, particularly government support in terms of policy initiatives, training, and funding support, may offer the required resources and legitimacy to agile organizations to scale up their responses to adapt to sustainable performance goals(Shaban et al., 2025). Previous studies on SMEs indicate that government support has a significant positive effect on the amplification of internal capabilities to achieve performance outcomes, such as innovation and sustainability measures, which provide evidence that government support in terms of policies and infrastructure helps agile organizations to achieve their adaptability goals to sustainable performance outcomes more effectively (Apidana et al., 2024; Mong & Thanh, 2024) .

H3b: Government Support positively moderates the relationship between Organizational Agility and Sustainable Firm Performance

3. Methodology

This section presents the proposed methodology for the collection and analysis of the primary data in the present study, which focuses on the impact of the adoption of Industry 5.0, organizational agility, and government support on sustainable firm performance in SMEs. For the present study, the primary data would be collected using structured questionnaires to be filled out by employees or managers of SMEs, which is in line with the existing survey methodologies used in SME studies (Alkhasoneh et al., 2025; Hoxha & Aliko, 2023). After data collection, Partial Least Squares Structural Equation Modeling (PLS-SEM) analysis will be carried out using SmartPLS because it is appropriate for handling complex models

involving mediating and moderating factors, as well as handling small sample sizes that are typical in survey research (Putu Gede Subhaktiyasa, 2024; Widaryanti et al., 2025). The analysis procedure will be informed by a two-stage procedure, whereby the measurement model will be assessed for reliability and validity, while the structural model will be utilized for testing the relationships and examining the moderation and mediation effects, in line with recent practices of PLS-SEM in the sustainability and SME performance literature (e.g., sustainable growth and SEM usage) (Alkhasoneh et al., 2025; Soomro et al., 2024). The procedure is likely to yield robust results regarding the combined effect of internal capabilities and external support mechanisms on sustainable firm performance.

For the sampling plan of the current study, it is going to apply the stratified random sampling strategy. This implies data collection among SME owners/managers and other senior staff of industries operating in Bangladesh, particularly in major industrial areas such as manufacturing, trading, and services. At least, the target sample size will not be less than 300 participants, a suggestion that is compatible with the ten times rule suggested for conducting a PLS-SEM study in the management field (Hair et al., 2022; Widaryanti et al., 2025). Multi-item scales will be used for measuring all the constructs. For instance, the indicators to measure the construct “Industry 5.0 Adoption” have been derived from Shafique et al. (2024) and Elghany et al. (2026), while “Organizational Agility” is based on indicators taken from Zhang et al. (2023). Government support will be measured based on indicators by Ahmed et al. (2025) and Shaban et al. (2025), whereas the measure for “Sustainable Firm Performance” will be generated using economic, environmental, and social indicators of Shafique et al. (2024). In this respect, a Likert scale will be used whereby all the variables will be scored from 1 (strongly disagree) to 5 (strongly agree) depending on the five-point rating scale, which is commonly used in sustainable SME research studies (Alkhasoneh et al., 2025; Soomro et al., 2024). In order to collect data, an online questionnaire will be administered to the selected firms through email and social media sites, including LinkedIn. The pre-test of the instrument will also be undertaken using a pilot sample of 30 SMEs prior to conducting full-scale testing in order to validate the survey questions. Common method bias will be controlled using procedural measures such as anonymity of the respondents and separation of the measure items alongside the use of statistical measures such as the Harman’s single-factor test (Kahveci, 2025; Sagala & Öri, 2024).

4. Discussion

Although the basic conceptual framework that has been offered in this paper can be useful in analyzing the role of Sustainable Firm Performance (SFP) with regard to environmental and technological evolution, there is much scope for further research to improve the conceptual framework and elaborate on the importance of the key elements. In addition to the elements of the conceptual framework, this article also focuses on the role of cooperation between the government and private sectors in the context of SFP, especially regarding SMEs. If the conceptual framework is tested in the future regarding the role of each construct, it will be possible to understand the role of Industry 5.0 Adoption (I5.0A), Organizational Agility (OA), and Government Support (GS) in improving the SFP and propose recommendations:

4.1. Industry 5.0 Adoption and Sustainable Firm Performance

Adoption of Industry 5.0 can aid in the sustainable performance of firms through operational efficiency, optimization of resources, and adopting sustainable strategies by firms. The adoption of AI, IoT, and smart technologies can enable firms to respond better to their environment while remaining economically competitive. Based on the DCT and NRBV, the adoption of technology allows firms to be able to align themselves better in terms of capabilities that enhance their performance in relation to sustainability.

4.2. Adopting Technologies Associated with Industry 5.0

The adoption of technologies associated with Industry 5.0 can facilitate organizational agility by way of greater responsiveness, flexibility, and decision-making ability. Digitization leads to the ability of the organization to respond to changes in market environments. Therefore, technology acts as an enabler for organizational agility.

4.3. Organizational Agility and Sustainable Performance of the Business Firm

Organizational agility makes it easier to ensure sustainable performance of the business firm because an organization will be better able to manage its environment and overcome the challenges that come with doing so. In fact, organizations capable of embracing organizational agility are in a position to engage in several practices that can contribute to the sustainable performance of the business organization.

4.4. Mediating Effect of Organizational Agility

Organizational agility is the mediating factor by means of which industry 5.0 technologies impact sustainable performance. On the one hand, technological resources provide a basis for enhanced operational capacity, while on the other hand, the effects of technological resources become evident when combined with organizational flexibility.

4.5. Moderating Influence of Institutional Support

The enablement role of institutional support is seen through the provision of financial incentives, technological infrastructure, and training. The institution factor plays a significant role in providing enablement for SMEs to use their technological and organizational resources for better sustainability-based performance.

4.6. Theoretical and Managerial Implications

The findings of this paper add value to both Dynamic Capabilities theory and NRBV by merging technological adoption and organizational flexibility with institutional support into a sustainability framework (Hart, 1995; Teece et al., 1997). Practically, SME managers should pay attention to developing organizational adaptability along with the process of digitalization, while the policy makers should create a supporting environment for sustainable technology development in SMEs.

5. Conclusion

The current research emphasizes the significance of Industry 5.0 Adoption, Organizational Agility, and Government Support in achieving Sustainable Firm Performance of SMEs. The application of human-centric technologies, including Artificial Intelligence (AI) and Internet of Things (IoT), could increase sustainable firm performance because it will enable SMEs to increase their effectiveness and become more sustainable. By applying theories including DCT and NRBV, it is important to acknowledge that adopting these technologies alone is not enough since SMEs should have the necessary agility for dealing with these changing needs. It should also be mentioned that government support would play an important role in implementing sustainable digital transformation within SMEs.

In addition, this research emphasizes the importance of government support (GS) as a moderating factor in the Industry 5.0 scenario. In a situation where the level of complexity and the cost of innovation are high, it is important for institutions to play the role of catalysts for SMEs. Government intervention not only helps in the acquisition of sophisticated technology but also validates and multiplies the capabilities of nimble organizations to effectively extend their sustainability initiatives. Finally, to attain a high level of SFP, it is necessary to adopt a holistic approach that aligns internal technological focus with external support systems. To achieve this, SMEs need to develop organizational flexibility to harness the "green" potential of digital innovations while becoming actively involved in the government's initiatives to address structural limitations. Further research might investigate each concept in detail in order to develop some specific strategies that would ensure small businesses impact the global economy for the better.

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Conflict of Interest

The authors declare no conflict of interest.

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Appendix

Industry 5.0 Adoption	Smart Manufacturing	
	SM1	The organisation effectively uses sensors, actuators, and transducers in its operations.
	SM2	Our company has SCADA (Supervisory Control and Data Acquisition) systems installed.
	SM3	Big data analytics are used by our company to make decisions and enhance procedures.
	SM4	Manufacturing Execution Systems (MES) are integrated into our production processes.
	SM5	In our activities, machine-to-machine (M2M) communication is extensively utilised.
	SM6	Process traceability is thoroughly maintained in our manufacturing processes.
	SM7	Virtual commissioning is employed to simulate and validate our production processes before implementation.
	SM8	Digital manufacturing practices are adopted in our organisation.
	SM9	Augmented and virtual reality technologies are utilised for training and operational purposes.
	SM10	Additive manufacturing (3D printing) is integrated into our production capabilities.
	SM11	Machine vision systems are used for quality control and inspection.
	SM12	Industrial robots are extensively used for automation in our organisation.
	SM13	Collaborative robots are deployed to work alongside human workers in our processes.
	SM14	An energy efficiency monitoring system is in place to track and manage energy consumption.
	SM15	The organisation has implemented an energy efficiency improvement system to reduce energy usage.
	Smart Products and Services	
	SPS1	Our smart products have connectivity capabilities that enable them to communicate with other devices or systems.
	SPS2	Smart products with control capabilities are utilised to manage and adjust processes or functions.
	SPS3	Our smart products are equipped with optimisation capabilities to enhance performance and efficiency.
	Smart Supply Chain	
	SSC1	We work with our suppliers through efficient communication and collaboration through digital platforms.
	SSC2	We use digital platforms to interact and engage with our customers.
	SSC3	Digital platforms are implemented for coordination and information sharing between different units within our company.
	Smart Working	
	SW1	Collaborative robots are deployed to work alongside human workers in our processes.
	SW2	Remote monitoring of production processes is effectively implemented in our organisation.

	SW3	Augmented reality is utilised for maintenance tasks in our organisation.
Sustainable Firm Performance	Economic Performance	
	ECP1	My company's market share has increased.
	ECP2	My company's standing in the market has improved.
	ECP3	My company's earnings have increased.
	ECP4	The return on investment for my company has increased.
	Environmental Performance	
	ENP1	My company has increased its adherence to environmental regulations.
	ENP2	My company has cut back on its energy use.
	ENP3	My company has cut its CO ₂ emissions.
	ENP4	My company has cut back on the use of dangerous materials.
	ENP5	My company creates packaging and goods that may be recycled, repaired, or reused.
	Social Performance	
	SOP1	My company has increased or improved the welfare of all stakeholders.
	SOP2	My company lessened the public risks and environmental effects.
Organizational Agility	SOP3	Employee workplace safety and health have increased thanks to my company.
	SOP4	My company has increased community rights and claims knowledge and protection.
	Operational Adjustment Agility	
	OAA1	Our organization can better meet demands for rapid-response, special requests of our customers whenever such demands arise
	OAA2	Our organization can quickly scale up or scale down our service levels to support fluctuations in demand from the citizens
	OAA3	Whenever there is a disruption in supply our organization can quickly make necessary alternative arrangements and internal adjustments
	Strategic Agility	
	SA1	If circumstances change, our organization can easily change its current plans
	SA2	our organization is prepared to react in a modified and viable manner
	SA3	our organization can control a shift in strategy
Government Support	SA4	our organization can pro-actively develop a new project
	GS1	Government policies and regulations actively promote and facilitate a supportive environment for SMEs to adopt e-business.
	GS2	My SME has adequate access to government-supported digital infrastructure (e.g., reliable internet, digital platforms) essential for e-business operations.
	GS3	The government provides sufficient financial assistance (e.g., grants, subsidies, or low-interest loans) that supports my SME's e-business adoption.
	GS4	Government-sponsored initiatives offer effective training and capacity-building programs that enhance digital skills relevant to e-business in my SME.