

Investigating the Toe Factors Influencing IOT Adoption and SMEs Performance in Pakistan: The Mediating Role of Organization Resilience

Syeda Khadija Mubeen¹, Chin Phaik Nie^{1*}, Azlan Amran¹

¹ Graduate School of Business, Universiti Sains Malaysia (USM), Malaysia

*Corresponding Author: phaikniechin@usm.my

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Abstract: *The development of the fourth industrial revolution (Industry 4.0) suggests significant changes in the organization's dynamics. Despite its potential gains, IoT has been widely and effectively implemented by businesses, especially small and medium-sized enterprises (SMEs). In terms of IoT adoption, many developing nations are very far behind. Similarly, IoT adoption in the SME sectors of Pakistan remains in its inception. The research will apply the TOE framework, and its theoretical basis is the resource-based perspective (RBV). This study intends to investigate the impact of organizational resilience in mediating the link between IoT adoption and the performance of SMEs in manufacturing sectors. The data for this research will be collected using a questionnaire with a seven-point Likert scale from Pakistani SME owners, executives, and middle managers. On returned surveys, the Partial Least Squares Structural Equation Modelling (PLS-SEM) approach will be used. The empirical findings of this study will give managers and practitioners with helpful theoretical and practical insights for understanding the underlying variables for the effective adoption of IoT in the SME sector to improve company performance.*

Keywords: TOE Framework, Resource-based view, SMEs, IoT Adoption, Organization Resilience

1. Introduction

The development of the fourth industrial revolution (Industry 4.0) indicates huge changes in the dynamics of the organization. To gain competitive advantage and sustainable performance towards the fourth industrial revolution of market dynamics, businesses rely on a variety of resources and capabilities (Rehman & Anwar, 2019). SMEs are entitled as "the heartbeat of the sustainable strategy" (Pateli et al., 2020). Most enterprises globally are small and medium-sized enterprises. Small and medium-sized enterprises (SMEs) are of great importance to the expansion of most economies and play a vital role in creating employment opportunities and advancing worldwide economic progress (Igwe & Sunny, 2020). Although Small and medium-sized enterprises (SMEs) have greater potential for innovation in their organizational procedures and are often more adept at leveraging technology than large corporations. However, small & medium companies in the manufacturing sector may struggle to enhance their competitiveness (Naveed & Rehmani, 2022).

In Pakistan, 5.2 million SMEs were recorded according to the 2021-year statistics (Najeeb, 2021). For the following reason, current research focused on the SMEs in Pakistan. SMEs employ 78% of non-agricultural workers and make up more than 30% of the manufacturing sector (Naveed & Rehmani, 2022). Even though SMEs in developing nations generate about 70% of the GDP, Pakistan's GDP is only about 40% of that of its neighbours, lagging behind by about 30%. In addition to creating employment opportunities for unskilled, semi-skilled, and skilled workers, the manufacturing industry is a significant contributor to tax revenue. Consequently, the Pakistani government has placed greater emphasis on fostering development and growth of the manufacturing sector. Pakistan's manufacturing SMEs primarily fall into the sectors of textile, leather, surgical instruments, and sports (Kazmi 2017). In terms of revenue and employment creation and country exports, the manufacturing SME sector has been Pakistan's dominant economic driver (Raza et al., 2018). Manufacturing SMEs are confronting a variety of challenges, e.g. an unstable and uncertain environment (Garbellano et al., 2019), as well as competitive state, rapid fluctuation in market-demand, lack of resource and capability (Kiel et al., 2017), and increased competitiveness as a result of globalization and technological upgradation. For this consequence, day-to-day corporate operations have been affected, which generates unpredictability and hinders development (Chen et al., 2016).

Moreover, there are four sub-sectors within the leather industry: outerwear, accessories, shoes, and different kind of leather products (Kazmi 2017). Pakistan Tanner Association (2015) reported, about 948 million USD revenue earned from the leather exports (Khan and Ali 2020). Currently, leather exports are down 8.41%. (EconomicSurvey 2019). In addition to this, roughly 1900 small and medium surgical units employ a total of approximately 100,000 employees to make 10 to 500 different products (The Financial Daily 2018). Furthermore, 2017-2018 fiscal year, the total surgical product export was recorded to 221.7 million dollars, which significantly influence the Pakistani economy. However, the productivity of manufacturing SMEs is lower than in Asian countries Such as Thailand, Malaysia, Indonesia, and China (Ahmad et al., 2013; Vandenberg et al., 2016).

Some critical theoretical gaps are resulting from reviewing the literature regarding technology adoption and performance. First, prior technology adoption studies are highly concentrated on SME's overall performance (Adomako and Ahsan 2022), sustainability performance (Alraja et al., 2022), economic performance (Singh et al., 2022), operating performance (Dadhich & Hiran 2022). Although, the technology adoption has significant positive impact on SMEs performance, but researcher have paid less attention to measure the IoT impact on SMEs performance (Hussain et al., 2022). According to several scholars, SMEs have not fully examined various IoT implementation strategies, which has slowed the development of IoT (Vermanen et al., 2021). The observed gap appeared to be examined as a lack of comprehensive research to employ IoT adoption (Nagy et al., 2018). Therefore, this study proposes the framework of factors influencing IoT adoption and its impact on SMEs performance. The second focus of this research is to investigate how organizational resilience mediates the relationship between adoption of Internet of Things (IoT) and the performance (financial and non-financial) of small and medium-sized enterprises. Given the high rate of failure among small and medium-sized enterprises (SMEs) in both local and international markets, this suggested approach offers valuable insights on how to prevent such failures in emerging economies. In the past, scholars have endeavored to examine the performance of SMEs in the global market (Abed, 2020; Chowdhury et al. 2019 Qalati et al. 2021, 2020); Nonetheless, these researchers overlooked a valid and distinct indirect pathway for explaining the performance of SMEs. Third, SMEs may also be slow to adopt the Industry 4.0 plan because they frequently lack the necessary resources to adopt new technologies for society (Tarutė & Gatautis, 2014).

Based on previous studies, it is clearly visible that, in the context of IoT adoption and SMEs performance, the integration of TOE and RBV is rare. Although many researchers have combined multiple theories and model to investigate adoption and performance (Oliveira et al., 2019; Hussain et al., 2022; Sun et al., 2020; Na et al., 2022; Chatterjee et al., 2021; Rodríguez-Espíndola et al., 2022). Qader et al. (2022) integrated the IPT and RBV theories to investigate the adoption of the Internet of Things (IoT) and its impact on performance within the SME industry. Also, integration of RBV and DOI model was employed in the e-commerce adoption study to measure firm performance (Hussain et al., 2022). Similarly, Chen et al., (2020) have integrated TOE with DOI to get more explanatory results of their model. However, no studies have integrated TOE and RBV model together to investigate IoT adoption and its impact on performance specially in SMEs context.

In this current study, the TOE factors have employed, with the help of RBV theory traits towards examine the impact of TOE factors of IoT adoption on SMEs performance. The TOE framework is more efficient in demonstrating capabilities and resources (Qalati et al., 2021). To ensure the theoretical validity of the study's TOE hypotheses and the purposive selection of the decision framework, a careful review of similar studies was conducted. This research enhances the current literature which based on SMEs performance in Pakistan context. The proposed framework investigates the role of organisational resilience in mediating the relationship between IoT adoption and SMEs' performance. In fact, the research adopts an integrated approach by looking at the direct impact of TOE factors of IoT adoption on SMEs performance. Consequently, this paper intends to achieve the following specific questions.

RQ.1: Do the dimensions of TOE influence toward IoT adoption?

RQ.2: Does the IoT adoption influence toward SMEs performance in manufacturing sector of Pakistan?

RQ.3: Does organizational resilience (adaptive resilience) positively mediates the relationship between IoT adoption and SMEs performance in manufacturing sector of Pakistan?

2. Literature Review

2.1 SMEs' Performance

The primary objective of any SME is performance, in order to stay competitive in the world market (Carr & Pearson, 1999). Performance is defined as the capacity of an entity, individuals, or organisation to pursue up a specific purpose thru a sequence of actions (Ramdan et al., 2022). In addition, Performance could be described as the extent to which an organization achieves its objectives (Qalati et al., 2022). Firm performance may be investigated from financial and non-financial aspects. The previous research demonstrated the most firms are more likely to provide depth information about their overall success of the business (Salam et al., 2019; Zhu et al., 2004). According to Daoud, et al. (2021), financial performance as defined a business's ability to generate revenue from assets and other sources of commerce. On the opposite side, Non-financial performance, involves long-term objectives that emphasise the importance of maintaining attracting new customers, customer loyalty as well as enhancing the firm's reputation and brand (Dobrovic et al., 2018; Hasan et al., 2021). However, this study defines SME performance as the organization's capacity to execute stated goals in order to evaluate its performance by financial and non-financial performance indicators (Agyapong et al., 2020; Ahani et al., 2017; Bhatiasevi & Naglis, 2020, 2020; Mei et al., 2019; Mubarik et al., 2020).

2.2 SMEs and IoT adoption in Pakistan

In Pakistan, there is no widely recognized definition of SMEs. The State Bank of Pakistan (SBP) given definition "number of workers less than 50 (small-sized enterprise) and not less than 250 (medium-sized enterprise), kind of enterprise such as manufacturing, services and trade, annual net sales value, and quantity of capital". The business journey to Industry 4.0 presents a shape of technological, organizational, and environmental challenges especially, SMEs. Similar to large organizations, SMEs also lack the same opportunities. However, they have certain benefits, notably "lower expected profitability" and a simpler organization structures (Horvath & Szabo, 2019). Studies have indicated that SMEs do not employ all the resources, capabilities involved with Industry 4.0; they frequently limited to the Internet of Things (Yu & Schweisfurth, 2020). Their primary obstacles are a lack of knowledge and an absence of a deliberate strategy (Stentoft et al., 2019). The "catalytic" influence of employing modern technologies encourages the sustainability of SMEs (Chege & Wang, 2020), IoT technologies are regard as a "universal panacea" (Zhang et al., 2020), a "power that have capability to transform the conventional approach of life into a sophisticated approach to life" (Kumar et al., 2019), a tactic for SMEs to survive and grow in a competitive sustainable planet (Hansen & Bogh, 2021). IoT is a concept that is being employed more and more, which has decided to make researchers more participate in it (Nistor & Zadobrischi, 2022; Sorri et al., 2022; Talero-sarmiento et al., 2021).

Numerous studies have highlighted that the IoT helps SMEs to do business efficiently (Carcary et al., 2018), since it improves the resource management and create more resilience to adapt the changes in the environment (Benson et al., 2018), and it also helps to retain businesses efficiency and competitiveness (Jabbour et al., 2020). SMEs are more susceptible to use IoT if they have a relative advantage, good security and privacy, management support, pressure from competitors, support from trading partners, and, finally, support from the government.

2.3 Underlying Theories

The present study is grounded on the TOE framework and resources-based view (RBV) theory. TOE framework has been tested empirically as a useful tool for understanding the implementation of IT development, particularly industry 4.0, within SMEs (Lutfi et al., 2023). Prior studies have employed the TOE framework to investigate various factors have identified that TOE factors are significant for many knowledge approaches (Cho et al., 2022). This study investigates the influence of IoT adoption on the performance of SMEs by using the TOE framework with integrated RBV theory. According to Tornatzky & Klein, (1982), the TOE framework is superior at predicting industry 4.0 adoption. The factors influencing the adoption of industry 4.0 may influence the decisions of SMEs regarding the use of industry 4.0 technologies such IoT (Gui et al., 2020; Kulkarni & Patil, 2020; Salimon et al., 2021). According to past research, there are significant positive influences on their performance (Alkateeb & Abdalla, 2021).

2.4 Research Framework and Hypotheses Development

Industry 4.0 is a broad, multifaceted concept. It has been frequently utilised in the manufacturing industry, where it was first introduced, but it has also sparked the curiosity of researchers in other fields, including economics and management (Mittal et al., 2018). The rapid growth of the IoT provides a solid technological foundation for Industry 4.0 (Yu & Schweisfurth, 2020). Industry 4.0 has strong capability for the development of economies and the importance of economic benefits for businesses (Effendi et al., 2020). Accordingly Brah & Lim (2006) stated that industry 4.0 technologies are rapid and crucial elements for the organization's advancements. The finding revealed that technology is an important fact in

optimizing an organization's performance. Maroufkhani et al. (2022) found that numerous technological challenges have a harmful pressure on SMEs performance and revealed a significantly positive association between technology and SMEs performance in Iran.

The strength of the TOE factors varies depending on the technology, organizational, and environmental aspects (Maroufkhani et al., 2022). In accordance with earlier research using TOE, the authors have classified the factors in a two-step approach (Gillani et al., 2020). First, the most important factors have determined based on the most cited publications. In the second phase, this study analysed previous research on technologies and, based on the characteristics of the technological, selected the relevant factors to the technology context from the factors identified in the first step. In terms of technological dimensions, relative advantage, compatibility, security and privacy, and cost-effectiveness are considered the most significant factors (Gangwar, 2018; Lai et al., 2018; Verma and Bhattacharyya, 2017). Among the organizational dimensions, top management support, organizational resources, and innovativeness are considered the most relevant factors (El-Haddadeh et al., 2021; Ramanathan et al., 2017; Wang et al., 2016). Finally, the environmental dimensions, trading partners support, competitive pressure, competitive intelligence, and government supports have chosen based on their significance to industry 4.0 technologies (Lai et al., 2018).

2.4.1 Technological dimensions

A wide range of technological innovations generate technology-driven changes in the organizations and marketplaces. IoT is recognisable whereas they completely change market conditions, industry architectures, and how individuals behave (Langley et al., 2021). The underpinnings of industrial revolution are being rethought in light of the IoT impact on operational practices and procedures, cost arrangements, and quality service. As a result of the connectivity between sensors and control systems, the IoT adoption is currently paving the way for smart systems in industry. These changes are not just evolutionary, but rather revolutionary, implying that smart systems would integrate all internal and external activities (Pizam et al., 2022)

Relative advantage is define the superiority of an industry 4.0 or innovation across an existing system (Shahzad et al., 2021). Relative advantage is defined as "the extent to which a particular innovation is estimated to provide more benefits than the alternative." SMEs in developing countries demonstrate a tendency to adopt technology when they perceive a relative advantage associated with it (Alrousan et al., 2020; Chandra & Kumar, 2018; Sallehudin, Kebangsaan, et al., 2020). This factor suggests that the business is satisfied with the improved performance driven from the adoption of industry 4.0 (Hamm & Klesel, 2021). Compatibility is the degree to which an innovation is in line with the current value systems, prior experiences, and interests of prospective adopters (Saedi and Iahad, 2013). According to Venkatesh et al. (2003) described compatibility is operationalized to embrace the characteristics of technological/or organizational in the process of removing obstacles to adoption. Using a dataset of 1415 firms from six major European nations. In research on industry 4.0 in worldwide contexts, Zhu et al. (2006) discovered compatibility had a positive impact on post-adoption in European organizations. Previous research stated that, compatibility have positive significant correlation with technology adoption (Bhatiasevi & Naglis, 2020b; Chau et al., 2021a; Sallehudin, Aman, et al., 2020; Sallehudin, Kebangsaan, et al., 2020) . Wang et al. (2010) used the TOE framework to perform research on the adoption of RFID in the manufacturing industry in Taiwan, utilizing the TOE framework. Their findings indicated that the crucial determinant of RFID adoption was compatibility. The degree to which new technology is more constructive and useful in relation to its cost is referred to as cost-effectiveness. This aspect of industry 4.0 adoption is

regarded as one of the most significant in current literature (Qalati et al., 2020). Furthermore, from an IoT viewpoint, businesses may participate in timely and direct connection at a lower cost, with a higher degree of efficiency as compared to conventional methods (A. Raza et al., 2017). Though, IoT offers an interactive infrastructure essential to SME adoption and use. (Parra & Guerrero, 2020), with various characteristics investigated 210 SMEs and concluded that the adoption of social media by SMEs has been shown to lead to reduced costs, faster time-to-market, and increased product adoption. It is worth noting that companies that offer physical products are more likely to adopt innovative strategies that are cost-effective (Sikandar Ali Qalati et al., 2020, 2021, 2022). Accordingly, it is predicted that cost effectiveness will have a negative influence on manufacturing SME to adopt IoT. Moreover, all industry 4.0 technologies preserve the security and privacy of user information and data (Dewi et al., 2018). According to a previous study, enhanced degrees of security and privacy have a beneficial impact on industry 4.0 technologies adoption (Amini, 2016). This research proposes the following hypothesis based on this theoretical background:

H1a: Relative advantage has positive impact on IoT adoption.

H1b: Compatibility has positive impact on IoT adoption.

H1c: Security and privacy has positive impact on IoT adoption.

H1d: Cost-effective has negative impact on IoT adoption.

2.4.2 Organizational dimensions

The organizational context represents the second aspect of the TOE framework, which refers to the comprehensive assessments of the business, including its functional scale, size, and management, as well as its special characteristics and resources. Prior research has found that obtaining support from top management is critical in the successful adoption and implementation of new technologies or products, especially those that require long-term commitments and extensive communication to thrive (Baiyere & Salmela, 2013; Grover & Goslar, 1993). Top management support impacts organization awareness of technological use and based evidence (Awa et al., 2015; Chan et al., 2012; Daoud et al., 2021). Furthermore, Alshamaila et al., (2013) examined the technology adoption processes of 115 SMEs and service providers in the United Kingdom using the TOE framework as a theoretical lens. The study's findings revealed that top management support was one of the most significant elements in the technology adoption process. Additionally, organization innovativeness may be described as an organization's willingness and openness to incorporate new and novel concepts regardless of the best represented with them (Malik et al., 2021). Small and medium-sized enterprises (SMEs) are more likely to adopt new technologies if they are open to experimenting with something innovative (Alshamaila et al., 2013). In the context of "uniqueness and emergent new products, services or processes as the ability to convert knowledge into value through the implementation of innovation in products, processes, and systems," innovativeness is defined as "the ability to convert knowledge into value through the implementation of new or improved products, processes, and systems" (Urban & Matela, 2022). Moreover, Florida et al. (2001) also asserted that businesses that are constantly evaluating, developing, and exploring for organisational innovations consider it rather simple to incorporate environmental concerns into their developing products and manufacturing processes. In other words, the more continuously innovative a business is, the more prospects it has and the more likely it is to opportunities. Moreover, the readiness of an organization to adopt technology is determined by the availability of the necessary organizational resources (Iacovou et al., 1995). The readiness of a firm to implement industry 4.0 technology depends on a number of internal elements, most notably its financial situation. As such, these are essential aspects that play a key role in measuring organizational readiness (Idris, 2015). Therefore, SMEs require more resources such as technical, human, and economical resources (Chatterjee et al., 2021; Chau et al., 2021;

Johnk et al., 2021; Nair et al., 2019; Zhu et al., 2004). If a firm is not equipped a new system, such as IoT, employees may feel constrained in their use of the new technology, and they may not understand how to utilise the new technology. Based on this theoretical foundation, this study proposes the following hypotheses:

H2a: Top management support has positive impact on IoT adoption.

H2b: Organizational Innovativeness has positive impact on IoT adoption.

H2c: Organizational readiness has positive impact on IoT adoption.

2.4.3 Environmental dimensions

The environmental dimension, the third component of TOE, is "the arena in which an organization does its activity." TOE's environmental dimension includes market structure, regulatory environment, service provider subsistence in technological areas, and competitive levels. The combination of these factors influences the decision to acquire technology (Baker, 2012). Competitive pressure in the context of industry 4.0 refers to the degree of pressure experienced by an organisation from its rivals, and is acknowledged as a key factor in the adoption of innovation (Cruz-Jesus et al., 2019). Additionally, it is a strategic requirement to adopt emerging technologies in order to compete in the market, and competition in the industry is typically considered to positively influence the IT adoption (Gangwar et al., 2015). Moreover, Badi et al., (2021) have identified external pressure, competitive pressure as significant antecedent to the adoption of technology by organizations. Additionally, Competitive intelligence can be considered a critical component in gaining a competitive advantage and is sometimes regarded as a product or a system. The process of competitive intelligence involves collecting, analysing, interpreting, and disseminating strategic information that aids in making informed decisions (Acharya et al., 2018). Prior study by Hassani & Mosconi (2022) shown the significance of competitive intelligence (CI) in terms of technology adoption and suggested that CI be considered in dynamic market environments. Thus, it has been demonstrated that competitive intelligence is a crucial component of a company's decision-making process in order to enhance performance and remain competitive (Chen et al., 2015). Previous research stated that today's highly competitive global environment makes obtaining a position of high performance challenging, especially without competitive intelligence to give important information on new possibilities and risks when developing technological innovation like social media marketing (Samat et al., 2018; Zhu et al., 2006). Furthermore, trading partner support indicates to an organization's partners' knowledge and awareness of the need to integrate new technologies (Malik et al., 2021). Competitive pressure typically arises from rivals, while trading partner support is usually obtained from collaborators or partners in the supply chain (Iii et al., 2019). As, technology adoption and its potential are most valuable when multiple trading partners use them. (Iacovou et al., 1995). Besides, Malik et al. (2021) found that government support such as policies, programmes, and incentives to promote technology adoption has been seen in multiple domains. According to earlier research, it promotes technology adoption and found a strong influence of government support, so as key driver of industry 4.0. These studies showed that organisations are confident with the Australian government's industry 4.0 activities (Malik et al., 2021). (Kim et al., 2017) have identified the government support is a key factor in influencing a firms' behaviour to adopt industry 4.0. Moreover, prior researchers have reported that government support is a critical factor in facilitating the adoption of Industry 4.0 technologies (Effendi et al. 2020; Katebi et al. 2022; Ng et al. 2022 and Ocloo et al., 2020). Therefore, the following hypotheses are proposed:

H3a: Competitive pressure has positive impact on IoT adoption.

H3b: Competitive intelligence has positive impact on IoT adoption.

H3c: Trading partner support has positive impact on IoT adoption.

H3d: Government support has positive impact on IoT adoption.

2.4.4 Relationship between IoT adoption & SMEs performance

IoT refers to as the "internet of things," however, its formal definition is a system that integrates computing devices and can therefore transfer data via a network independently (Sehgal, 2022). IoT is a profoundly revolutionary technology because it permits the establishment of new industries and the reinterpretation of current ones. (Islam et al., 2020). For contrast, modern technology is essential for the success of emerging strategies that promote customer participation in product development and creation (Effendi et al., 2020). Firms that have adopted IoT solutions have a better chance of surviving open and decentralised technology innovation. Internet of Things (IoT) technologies affect all facets of business, offering numerous advantages that may boost a firm's productivity and efficiency (Ehie & Chilton, 2020). Thus, IoT enhances process and product monitoring, while automation may be used for many organisational operations. Therefore, it is apparent that implementing IoT will provide companies a competitive benefit in terms of effectiveness, distinctiveness, and creativity. It is important to gain a deeper comprehension of how using IoT technology can enhance a company's performance, particularly with the emergence of new digital tools that allow for a transition from traditional to digital processes. Hence, the proposed hypothesis is given below:

H4: There is a positive impact of IoT adoption on SMEs performance.

2.4.5 The Mediating Effect of the organizational resilience between IoT adoption & SMEs performance.

Consistently, literature demonstrates that characteristics of technology adoption have a significant influence in SMEs (Abed, 2020; AlSharji et al., 2018; Commer et al., 2021; Eze et al., 2018; Usman et al., 2019). The adoption of IoT is believed to have a significant relationship with the performance of SMEs (Haseeb et al., 2019, 2019; Ricci et al., 2021; Talero-sarmiento et al., 2021). Additionally, RBV argues that resources and capabilities result in performance. Despite several performance studies indicating that technology is connected to business performance (AlSharji et al., 2018; Chatterjee et al., 2021; Cruz-Jesus et al., 2019), including financial performance (Chowdhury et al., 2019) and nonfinancial performance (Xu et al., 2017). However, the effects of adaptive resilience on SMEs performance in a post-disaster environment have not yet been determined by many research. Chowdhury et al. (2019) have explored that adaptive resilience is composed of both tangible and intangible resources, such as, top management support, quick decision making, and innovativeness intelligence. It is an internal resource that helps organisations to bounce back instability or undesirable event and it provide opportunities to enhance organization performance. According to Rocchetta & Mina (2019), adaptive resilience has a significant influence on the overall economic performance of a country's regions. Based on the resource-based view theory (Barney, 1991), an organization's competitive advantage is obtained from its distinctive internal competences such as its tangible and intangible resources (Wernerfelt, 1984). As a result, the organisation places a high value on these resources in order to improve its efficiency and overall performance (Jogaratham, 2017).

In addition, the concept of adaptive resilience can be considered as a capability that establishes an effective internal navigation system for analysing and making decisions within an organization when confronted with unexpected situations (Aidoo et al., 2021; Nilakant et al., 2014). Strong top-level management support is associated with practises like long-term strategic planning and the cultivation of organisational innovation and competency development via continuous contribution to establishing organisational resilience (Chowdhury

et al., 2019). These practices have a positive impact on performance outcomes, including both financial and non-financial measures (Avery & Bergsteiner, 2011). When looking at the agriculture and farming industry, a previous study indicated that farms experiencing drought conditions could achieve better performance outcomes by practicing resilience through prudent spending and diversifying their enterprises, compared to farms that did not exhibit resilience. (Lawes & Kingwell, 2012). Based on the above discussion, this study proposes the following hypothesis:

H5: Adaptive resilience positively mediate the relationship between the IoT adoption and SMEs performance.

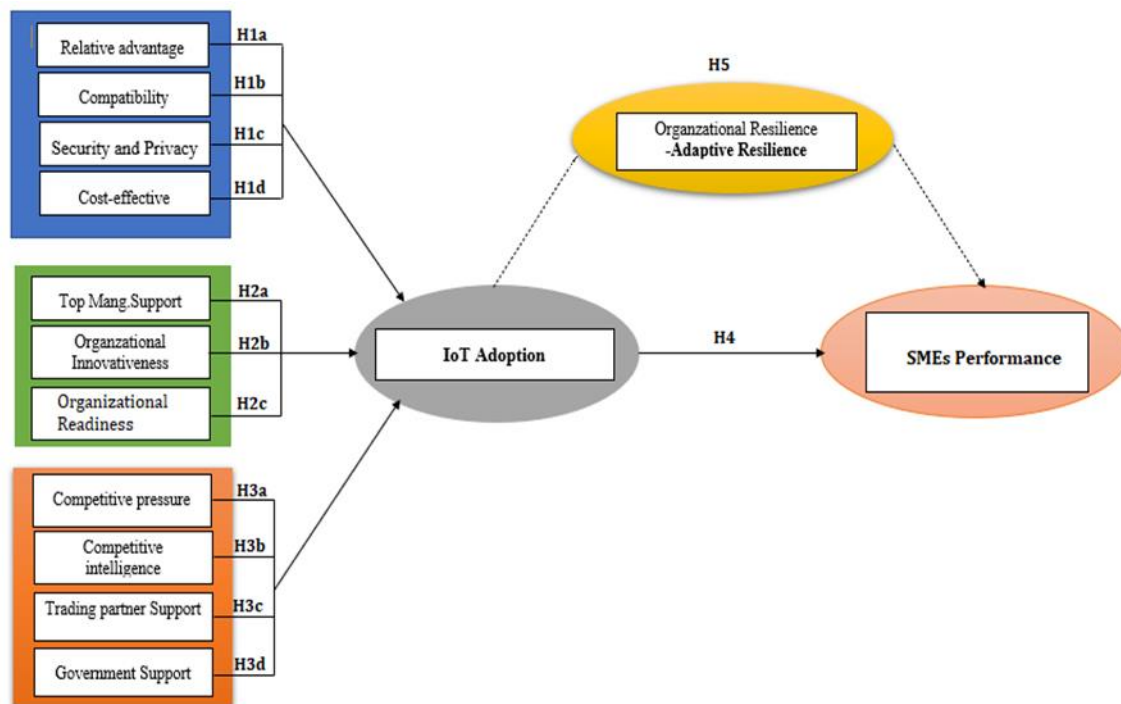


Figure 1: Conceptual Framework

3. Methodology

With the aim of determining SMEs performance among Pakistani manufacturing SMEs, the target population for the study comprises all manufacturing SMEs in Pakistan. This study adopts the purposive sampling technique; hence the target respondents will be from IOT based manufacturing SMEs owner and manager. The minimum sample size will be calculated through the G-power analysis. The survey questionnaire items will be chosen from the existing SMEs performance and technology adoption related studies. All the items will be selected for this study are reflective. Items are measured on a seven-point Likert scale (1 = “strongly disagree”, 7 = “strongly agree”). Finally, the questionnaires will be printed and distributed among the target respondents. After the required data collection, this study will employ SPSS and PLS-4 for the data analysis.

4. Conclusion

This study has effectively constructed a theoretical framework that will be useful for subsequent research in this field. According to this framework, the IOT adoption may lead to enhance the overall performance in SMEs. Although, the prior study validated that the TOE is

the most suitable model to predict technology adoption and its outcome on SMEs performance, however it is mandatory to require the empirical findings to validate these connections. As this is a conceptual work, no data has been obtained to allow further extrapolation to other countries. Additionally, the framework for this research was developed with reference to earlier literature. Therefore, by improving the use of technological innovation, SMEs performance can be improved for the business to grow and flourish.

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