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Understanding Blockchain Adoption in SMEs: A Mixed-Method Study of Digital Transformation, Resilience, and Senior Leadership Support

Debarun Chakraborty, Abhishek Behl, Ismail Golgeci, and Asif Nazrul

***Abstract*—This study examines the adoption of blockchain technology (BCT) by small and medium-sized enterprises (SMEs), with a focus on the interplay between digital transformation, market volatility, and organizational resilience. The goal of this research is to assess how perceived usefulness and perceived ease of use shape SMEs' intention to adopt BCT. This research integrates the Technology Acceptance Model with the Dynamic Capabilities Theory to explore how perceived usefulness, ease of use, and resilience influence SMEs' adoption intentions, considering the boundary condition of senior leadership support (SLS). Conducted in India from November 2023 to February 2024, a mixed-method approach combining qualitative insights from interviews and case studies with quantitative analysis from survey data is employed to provide a comprehensive understanding of the factors driving or hindering BCT adoption. The findings also underscore the critical role of SLS in fostering resilience and guiding SMEs through the digital transformation process, highlighting the need for tailored strategies to support BCT integration in resource-constrained environments. This research contributes to bridging the knowledge gap on the impact of BCT on SMEs, offering practical implications for entrepreneurs seeking to leverage BCT for a competitive advantage amid volatility. This study reveals that the successful adoption of BCT by SMEs hinges not only on perceived usefulness and ease of use but also on the strategic alignment of digital capabilities with resilience-building efforts, particularly under strong SLS.**

***Index Terms*—SMEs; Intention to adopt; Blockchain technology; Digital transformation; VUCA**

I. INTRODUCTION

BLOCKCHAIN technology (BCT) has the potential to revolutionize small- and medium-sized enterprises (SMEs) [1]. In resource-scarce yet hypercompetitive environments typical of SMEs [2], BCT can enhance efficiency by streamlining transactions and fostering trust through transparent, decentralized record-keeping systems [3, 4]. This can result in greater efficiencies and cost savings [4], particularly through the use of smart contracts that facilitate automated agreements and payments without intermediaries, thereby lowering transaction costs [5]. BCT also replaces intermediaries with transparent systems [3, 4], thereby increasing transaction trust. Yet, do the benefits of enhanced trust and reduced business costs from BCT extend to SMEs? As knowledge spreads and participatory tools become more accessible, significant opportunities emerge for SMEs to incorporate BCT into their operations [6]. BCT may transform SME operations by addressing challenges and improving efficiency [1]. However, the complexity of implementing BCT and the related regulatory ambiguities may deter some SMEs, especially those lacking the necessary skills [7]. While BCT implementation can be challenging and regulatory uncertainties exist, proper use can strengthen SMEs in complex scenarios. Tools to boost competitiveness through efficient operations are available. For instance, perceived usefulness and ease of use under SLS may influence the adoption of BCT. Thus, SMEs can drive economic development through innovation. That said, today's volatile, uncertain, complex, and ambiguous (VUCA) environment presents serious challenges for SMEs, particularly in maintaining competitiveness and operational efficiency. Global digital transformation necessitates further research on how small and medium-sized enterprises (SMEs) adapt to uncertainty, particularly regarding the adoption of Business Continuity and Technology (BCT), as it has vital implications for their long-term sustainability. Given these broader global trends, it is essential to examine how small and medium-sized enterprises (SMEs) in specific emerging countries, such as India, navigate the challenges and opportunities associated with Business-to-Consumer (B2C) and Business-to-Consumer-to-Consumer (B2C2C) transactions (BCT adoption).

The growth of the Indian economy heavily depends on SMEs, which contribute nearly 30% of the GDP and 45% of total exports. While BCT has the potential to double the productivity of SMEs, adopting such emerging technologies remains nearly impossible due to a lack of financial resources, insufficient digital infrastructure, and an unclear regulatory environment. With government initiatives such as Digital India and Start-Up India, Indian SMEs can enhance transparency and efficiency while simultaneously boosting their competitiveness in the rapidly digitizing global economy. However, Indian SMEs, unlike those in developed economies, exhibit a unique structure that leads to equally unconventional technology adoption

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patterns, warranting more profound research. This analysis highlights crucial aspects of Indian SMEs, focusing on the factors that enable and restrict BCT adoption, particularly in emerging markets, while providing evidence-based recommendations to industry leaders, policymakers, and technology providers.

However, a significant gap exists concerning the impact of BCT on SMEs, a sector vital to many economies [8]. While existing research has largely concentrated on large corporations, the unique challenges and opportunities that SMEs face in adopting BCT remain underexplored [9]. This research is crucial for SMEs seeking long-term survival strategies that leverage BCT to enhance operational efficiency, reduce costs, and gain a competitive advantage [10]. Understanding the factors influencing BCT adoption, including hurdles and potential benefits, is crucial for policymakers, industry players, and entrepreneurs considering new technologies [7]. Additionally, as BCT evolves to a more advanced level, this study has practical implications for developing tailored solutions and support mechanisms that enable SMEs to adopt BCT effectively. Consequently, this research underscores the significance of BCT for SMEs, as it fosters innovation, economic growth, and resilience within the SME sector.

Additionally, a substantial research gap remains in comprehending the interaction between an organization's degree of digital transformation, resilience, perceived usefulness, ease of use, and intention to adopt BCT. Previous studies have examined various factors that hinder BCT adoption. Yet, no research has investigated how far an organization's level of digital transformation can influence its resilience and likelihood of adopting BCT. Furthermore, the impact of market pressures and the role of senior leadership support (SLS) in moderating the relationship between perceived usefulness, ease of use, and adoption intentions have not been sufficiently explored.

This study integrates user acceptance elements from the Technology Acceptance Model (TAM) and residence and digital transformation characteristics from the Dynamic Capabilities View (DCV) to address the above gaps and provide a comprehensive understanding of the factors influencing BCT adoption at both individual and organizational levels. TAM aids in assessing the behavioral dimensions of BCT adoption, while DCV offers a framework for examining how SMEs navigate disruptive innovations in unpredictable circumstances. We employ a mixed-methods approach to capture the multifaceted nature of BCT adoption among SMEs, allowing for data triangulation that enables findings from qualitative research to be validated and enhanced by quantitative results, and vice versa. Given the complexity of BCT and the diverse contexts in which SMEs operate, the comprehensive methodological framework we adopt addresses both the breadth and depth of the phenomena under investigation. Hence, the research questions are:

RQ1: How do perceived usefulness and perceived ease of use influence SMEs' intention to adopt BCT?

RQ2: How does an SME's level of digital transformation and resilience impact its capability to adopt BCT in volatile business environments?

This study integrates the Technology Acceptance Model (TAM) and the Diffusion of Innovations (DOI) theory to analyze Business Continuity Training (BCT) adoption in Small and Medium Enterprises (SMEs) through the lens of personal and organizational factors. It first examines from the TAM perspective how perceived usefulness and perceived ease of use affect SMEs' intention to adopt BCT, considering decision-making as both a rational and behavioral process. This is further enhanced by DCV, which explores how an SME's digital transformation and level of resilience influence its ability to adopt BCT in a turbulent business environment, focusing on the adaptive capacity to meet technological and regulatory demands. While TAM elaborates on the behavioral aspects of adoption, DCV describes the digital maturity and resilience necessary for a firm to implement BCT effectively. The relationship suggested by these theories is that perceived usefulness and ease of use may influence the intent to adopt; however, an SME's ability to navigate VUCA and harness dynamic capabilities will ultimately drive successful adoption and implementation. Thus, by integrating TAM and DCV, this study provides a holistic framework that captures behavioral drivers of BCT adoption while emphasizing the vital role of resilience in supporting digital transformation efforts within SMEs.

SMEs face challenges that hinder the adoption of BCT. Factors such as resilience, digital transformation, perceived usefulness, market pressures, and ease of use significantly influence decision-making in volatile environments. This research merges these elements to deepen the understanding of BCT adoption, its ties to digital maturity and resilience, and organizational preparedness. It also examines the significance of BCT in transforming power dynamics across various industries. Moreover, this research focuses on SLS as a moderator between perceived usefulness, perceived ease of use, resilience, and adoption intentions. The latter addresses the most challenging questions related to adapting business practices and implementing BCT through this study. Ultimately, this research provides actionable insights for SMEs, policymakers, and industry leaders by identifying the key enablers and barriers to BCT adoption, highlighting the pivotal role of SLS in promoting resilience in rapidly evolving markets.

II. BACKGROUND LITERATURE

This research is guided by two theories, TAM and DCV, which provide a theoretical foundation for understanding the various factors affecting BCT adoption within SMEs. From the TAM perspective, the user's perceived usefulness and ease of use determine whether there will be technological acceptance. However, DCV goes beyond TAM by explaining how organizations can enhance their capacity to absorb new technologies, such as BCT, amid uncertainties caused by digital disruption. Therefore, a comprehensive approach is presented, which considers both individual and organizational drivers for

adopting BCT among SMEs experiencing turbulence. This also highlights the complexity involved in situations where changes are anticipated with certainty. Nonetheless, some environmental shifts may be expected regarding the adoption of BCT applications by SMEs under such circumstances.

Many SMEs struggle to afford BCT software applications due to their limited budgets [7]. BCT can be quite complex for SMEs with limited resources due to the initial implementation, maintenance, and the need for highly specialized knowledge. As a result, many perceive BCT as complicated, especially given its regulatory uncertainties. Nonetheless, these costs are justifiable when considering long-term benefits, such as reduced transaction costs by eliminating intermediaries, enhanced efficiency, and improved supply chain credibility through its inclusion [8]. Alternatively, there are other avenues, such as public investment paired with government grants or utilizing BCT-as-a-service models for those who cannot manage it independently. In other words, if we make BCT affordable or free at the entry level, even smaller players can leverage its transformative potential without facing immediate financial burdens.

A. VUCA in Business Environments

VUCA is widely recognized and utilized in fast-paced business environments [11]. It stands for Volatility, Uncertainty, Complexity, and Ambiguity [12], describing dynamic markets that continually change and are difficult to predict. This framework also encompasses another aspect, namely, the volatility induced by rapidly evolving business landscapes, where economic events lead to market shifts or technological disruptions [13]. Conversely, when uncertainty prevails, situations become more challenging for firms because they are unsure of what lies ahead [14]. Therefore, organizations should focus on adaptive strategies rather than long-term planning, as the turbulent environment necessitates frequent reassessment of their goals [15]. However, this understanding of VUCA is incomplete. Additionally, it offers hope for those who are unfortunate enough to navigate the myriad challenges they face [16]. Still, cultivating an agile innovation culture and embracing flexible adaptation remain critical competencies that enterprises must develop to thrive, particularly in highly volatile market conditions, even though these scenarios can be exceedingly ambiguous.

VUCA (Volatility, Uncertainty, Complexity, and Ambiguity) can pose challenges for SMEs to comprehend. SMEs typically have fewer resources compared to larger organizations, making them vulnerable to intense competition and market fluctuations, as well as unforeseen disruptions. As a result, such environments demand flexibility and speed from SMEs [11]. Often, difficulties related to decision-making hinder the adoption of new technologies [12]. This adaptation would enable SMEs to prosper during turbulent times characterized by VUCA. In these situations, SMEs need agile capabilities to adjust swiftly within a dynamic marketplace and foster innovation while remaining competitive in unpredictable business settings [14].

As a result, SMEs in these areas should grow more robustly to navigate uncertainty without sacrificing profits [17]. It is essential for SMEs to instill certain competencies in their employees to avoid wasting time adapting to new changes. Such institutions confront challenges directly and seize any opportunities that arise during uncertain times. Therefore, adopting a VUCA mindset represents a crucial time for SMEs to prepare for disruptions and achieve long-term growth despite shifting business environments [16].

Utilizing BCT, SMEs can successfully tackle VUCA environments. A notable example is BCT, which introduces certainty into transactions and supply chain management through clear, decentralized, and immutable systems [15]. This also enhances trust among various stakeholders. Nonetheless, the implementation of BCT is significantly influenced by the VUCA operational environment. SMEs considering the introduction or adoption of such innovative technology during unstable economic conditions or an unclear legal framework face considerable challenges, ranging from potential risks to benefits [16]. However, despite the difficulties these organizations encounter regarding BCT implementation, it will empower them to develop survival strategies and improve their ability to manage uncertainties and cope with crises often present in complex corporate scenarios.

B. Technology Acceptance Model (TAM)

The TAM is one of the primary theories that explain how individuals accept and adopt new technologies into their lives [18]. According to this theory, users are more likely to adopt a technology if they perceive it as valuable and easy to use [19]. Conversely, perceived usefulness assesses whether one expects the technology to enhance performance and help achieve specific goals [20]. Additionally, perceived ease of use refers to the simplicity or complexity of understanding and applying technical skills [21]. These perspectives influence whether a user is willing to utilize this type of technology. TAM's straightforwardness and emphasis on the end-user have led to its widespread acceptance as a model for technology acceptance in various contexts [22]. Developers and designers can leverage these insights when creating user-friendly technologies that fulfill common needs [23]. By making the technology intuitive and user-friendly and effectively communicating its value, developers facilitate its integration into users' daily routines [24].

C. Dynamic Capabilities View (DCV)

DCV considers three main aspects: sensing, seizing, and reconfiguration [25, 26]. Sensing involves actively recognizing emerging market shifts and potential threats that are integral to the research process [27]. The firm must seize these by efficiently utilizing its resources and developing innovative solutions [28]. Reconfiguring involves modifying existing resource bases such as skills, structures, and technologies to meet changing environmental demands [29]. Through effective management of these capabilities, firms continuously adjust to remain competitive in business; thus, they achieve long-term success [30].

D. *Integrating the Theories*

Conversely, when examining how SMEs adopt BCT, a deeper understanding of the topic can be achieved by integrating the TAM and DCV during technology adoption within organizations [13]. TAM primarily focuses on individual-level factors such as ease of use and perceived usefulness, which help assess the adaptability of new technological products without considering other relevant issues [16]. Additionally, the TAM may overlook major broader organizational influences on adoption in VUCA conditions [17]. However, combining TAM with DCV offers a comprehensive view of what drives individuals or organizations to adopt specific technologies. This means that individuals must have positive perceptions, while strategic thinking and adaptability are essential for organizations during the adoption process.

Furthermore, the personal acceptance levels within organizations based on TAM and DCV can illustrate how dynamic capabilities are influenced by these acceptance levels, despite their varying scopes. Decision-makers in SMEs should also consider whether their firms can implement and sustain this innovation when adopting BCT [10]. These theories enhance our understanding of how personal beliefs affect organizational outcomes while organizational actions shape individuals' attitudes [11]. If top management believes that BCT is valuable and user-friendly, they may decide to allocate the necessary resources for proper integration, which reflects dynamic capabilities. Conversely, an organization could foster positive employee attitudes toward new technologies if it possesses strong dynamic capabilities. One can combine TAM with DCV to explain how both individual and organizational factors contribute to technology adoption in SMEs. The definitions of all the constructs are shown in Table 1.

TABLE 1: DEFINITIONS OF CONSTRUCTS

Constructs	**Definitions**	**Sources**
Level of Digital Transformation	The level of digital transformation refers to the extent to which an organization has incorporated digital technologies into its core business operations.	[42]
VUCA	Volatility, uncertainty, complexity, and ambiguity are some components of the VUCA environment that significantly affect business activities today.	[11]
Perceived Usefulness	Assessing the extent to which individuals perceive technology as beneficial in improving their performance.	[11]
Perceived Ease of Use	Perceived Ease of Use refers to the subjective evaluation of the difficulty level in learning and utilizing a particular technology.	[11]
Resilience	Resilience refers to an organization's ability to adapt and recover effectively from various disruptions.	[42]
Intention to Adopt BCT	Examining an organization's readiness to embrace BCT.	[84], [42]
SLS	The support and resources provided by top-level management for an initiative.	[71], [72]

III. RESEARCH DESIGN

This study employed both qualitative (Study 1) and confirmatory (Study 2) research designs. Mixed-methods research provides an opportunity for researchers as it combines the benefits of qualitative and quantitative approaches [31]. The mixed methods approach provides in-depth insights into complexities that cannot be fully understood using a single technique or methodology; integrating interviews and observations with surveys and statistical analysis enhances this [32]. Researchers can utilize this method to validate their findings more effectively, thereby reinforcing their credibility and reliability. However, by doing so, they produce empirical evidence and data that can be generalized beyond the specific case under consideration. Ultimately, mixed methods were selected because, unlike other approaches, they are designed to address complex issues that arise in life, providing a more integrated perspective on answering challenging research questions. In conclusion, mixed methods research offers a comprehensive view of issues, making it well-suited for tackling complex research questions and real-life challenges. After extracting constructs from Study 1, we conducted Study 2 using the PLS-SEM technique to obtain the final results.

A. Exploratory Study (Study 1)

A.1 Research Design

Since the academic literature on SMEs' intention to adopt BCT is underdeveloped, we initially chose a qualitative approach to prepare for future developments. Data was collected through semi-structured interviews and a qualitative analysis [33]. Open-ended questions were posed during these discussions, allowing us to engage participants meaningfully on specific aspects. Participants were given time to express their thoughts in their own words. Furthermore, this technique aims to gather insights into alternative perspectives rather than simply validating existing knowledge.

A.2 Sample & Data Collection

We analyzed various reports, including grey literature, news articles, and annual reports, to identify factors influencing the adoption intentions of BCT worldwide. To understand the factors influencing global BCT adoption, we carefully examined a range of secondary data sources, including industry white papers, government policies, technical reports from leading blockchain firms, research institute publications, and market research focused on SMEs. These reports were chosen for their relevance to BCT adoption by SMEs and the credibility of their sources, including the World Economic Forum, NASSCOM, Deloitte reports, and other recently published documents from the last five years. For instance, NASSCOM's 2022 report on BCT adoption in the SME sector in India highlights regulatory challenges and scalability issues, while Deloitte's 2021 Blockchain Survey discusses cost and security as the most significant perceived barriers to adoption. These secondary data sources helped us identify the key issues for our qualitative interviews, ensuring that our primary data collection was rooted in industry discussions and observations. Using purposive sampling, we targeted managers from 22 SMEs in

India, with an emphasis on diversity. We reached out through professional networking platforms, such as LinkedIn, and social media channels, including WhatsApp, Facebook, and Instagram, focusing on specific participant categories. They were initially contacted via personal messages, phone calls, emails, text messages, or various other means of communication. Initially, we provided details about the project, including interview protocols and consent forms. The interviews, which lasted between twenty-five and forty-five minutes each, were conducted in either English or Hindi, based on the participants' preferences, over a period of two months. A structured interview schedule with open-ended questions was utilized to gain insights into individuals' experiences, motives, challenges, opportunities, and strategies in BCT. This approach employed narrative techniques to capture central themes and patterns through thoughtfully crafted questions, aiming to minimize bias and encourage authenticity.

A.3 Data Analysis & Interpretation

Translations were performed on Hindi interviews into English for verbatim transcription. To maintain anonymity, participants' demographic details were coded with numbers [34]. Grounded theory principles were applied, utilizing open, axial, and selective coding to derive the themes [35]. At this stage, open codes were identified and organized into categories specific to the context [36]. To ensure rigor and reliability, we employed practical double coding. A consensus was established among team members after several roundtable discussions to identify emerging themes. Consequently, a reliability analysis was performed by a panel of experts to confirm consistency in categorization.

A.4 Results of NVIVO Analysis

Figure 1 presents the results of the NVIVO analysis, which is based on the responses of all participants in the qualitative research. From this qualitative study, we have identified key factors, including the level of digital transformation, VUCA, perceived usefulness, perceived ease of use, resilience, and the intention to adopt BCT, which has been further examined in Study 2.

FIGURE 1: WORD CLOUD USING NVIVO

B. Confirmatory Study (Study 2)

B.1 Development of Hypothesis

B.1.1 Level of Digital Information

Regarding digital information, there is an abundance of diverse views on potential solutions [37]. Furthermore, regular updates for digital content are possible, enabling users to access current knowledge consistently [38]. Conversely, there are arguments against this idea, such as the risk of being overwhelmed by excessive information. Practically speaking, given the vast amount of information available, considerable effort is needed to distinguish facts from falsehoods [39]. Additionally, one can easily feel lost due to the sheer volume of data, lacking a clear starting point. Unfortunately, this is not an equal situation, as access to technology and proficiency vary significantly across different groups [40]. This results in an uneven distribution of benefits, favoring some individuals over others [41]. Therefore, we posit:

H1a: The level of digital information has a positive effect on perceived usefulness

While digital information underpins the effectiveness of information use, various factors complicate this [42]. At times, an excess of information makes it challenging to quickly locate the specific details needed for a task [43]. Additionally, navigating through complex apps or websites can be extremely frustrating, particularly when users are unfamiliar with the interface. Furthermore, as previously mentioned, the reliability of information can vary significantly [44]. Poorly written instructions or outdated content can negatively impact user experience [45]. Nonetheless, other reasons support the author's perspective. Access to well-organized, easy-to-understand informational resources can greatly enhance user experience [46]. Search engines that filter results based on user queries or intuitive interfaces that guide users through processes can markedly improve user experience [47]. Moreover, digital information can be updated frequently, ensuring people always have access to the most effective and current methods for completing tasks [48]. Thus, we hypothesize:

H1b: The level of digital information has a positive effect on perceived ease of use

Digital information has the potential to increase individual and community resilience levels [49] significantly. This wealth of knowledge prepares individuals for any eventualities in advance [50]. Through online platforms, people can easily access learning materials, emergency plans, and system alerts [51]. Consequently, individuals in such scenarios would have an enhanced ability to make informed choices when faced with challenging situations, such as disasters or other forms of humanitarian crises [52]. This accessibility enables people to form accurate opinions based on available facts [53]. The importance of this statement is supported by organizations like Save the Children, which advocate for increased access to education in the poorest communities worldwide. Additionally, modern communication technologies help establish strong social ties, which are essential during times of crisis and recovery [53]. However, many complex factors concern the impact of digital information on resilience [42]. Therefore, we often feel stressed and anxious when inundated with news and information. This is especially true when encountering harmful or deceptive content [54]. Those spreading false rumors during such moments contribute to inefficiencies in crisis

management, as situations may become more complex due to misleading information propagated online [55]. If not adequately addressed, this can hinder effective response measures during emergencies or other critical periods. Furthermore, heavy reliance on technology creates potential vulnerabilities. During crises, individuals might feel helpless as they become overly dependent on modern communication devices for everything—such as talking with friends or solving their problems—especially if the technology becomes inaccessible [56]. Therefore, we hypothesize:

H1c: The level of digital information has a positive effect on resilience

B.1.2 VUCA

In a rapidly changing world marked by uncertainty, individuals and organizations seek clear, stable, and efficient solutions [57]. During periods of volatility, access to tools and resources that can help navigate swift market shifts or unexpected events can be immensely beneficial [58]. In moments of ambiguity, it becomes increasingly vital to have information or frameworks to predict the future or make informed decisions [59]. However, the relationship between VUCA and perceived usefulness is not always straightforward. Finding practical answers to complex problems remains challenging amidst the intricacies and uncertainties of a VUCA environment [60]. With a plethora of strategies and frameworks available, individuals can easily feel overwhelmed and struggle to choose the best approach [15]. Furthermore, particular solutions can become obsolete almost immediately due to VUCA's rapid dynamism, leaving one feeling disheartened upon realizing their efforts were in vain [11]. Thus, we hypothesize:

H2a: VUCA has a positive effect on perceived usefulness

The existence of VUCA may encourage the development of more straightforward solutions that might not be feasible otherwise [11]. Designers often create user-friendly tools that require minimal training when tasked with adapting swiftly to dynamic changes and making quick decisions [15]. Additionally, the pressure to differentiate in a competitive market may heighten the focus on user experience, leading to the creation of intuitive interfaces and straightforward instructions [61]. Therefore, in such contexts, VUCA fosters simplicity in terms of user-friendliness. However, the challenges that arise from a VUCA environment may obscure this perception of simplicity [15]. As challenges evolve and new threats emerge, there may also be a necessity for comprehensive yet intricate solutions to be developed [62]. Still, these solutions can be more difficult to learn, which may deter individuals from using them due to their perceived lack of user-friendliness [15]. Moreover, the demand for quick pivots could result in launching solutions before they receive adequate user testing, potentially leading to a confusing or frustrating user experience [14]. Therefore, we hypothesize:

H2b: VUCA has a positive effect on perceived ease of use

B.1.3 Perceived Usefulness

Once individuals recognize that BCT effectively addresses their anxieties, it becomes significantly more straightforward to adopt and implement it in their endeavors [20]. BCT provides various benefits, including enhanced security for online transactions, transparency in supply chains, and efficient records management [63]. Furthermore, when people perceive opportunities to enhance efficiency, security, or trust in a specific area, they are generally more inclined to adopt BCT [64]. However, the connection between adoption and perceived usefulness is not always clear-cut. Numerous factors can often hinder the adoption of valuable technology [20]. A primary concern is the novelty of BCT. Individuals may feel hesitant to try it due to a lack of technical skills and difficulty utilizing it in practical situations [65]. Additionally, BCT can be complex, filled with technical jargon, and a rapidly changing landscape that may overwhelm newcomers [66]. Therefore, we hypothesize:

H3: Perceived usefulness has a positive effect on the intention to adopt BCT

B.1.4 Perceived Ease of Use

BCT appears to be user-friendly for individuals, and even those without extensive technical knowledge are more likely to consider adopting it [64]. This is reflected in aspects such as user-friendliness, clear instructions, and the availability of support [67]. If BCT is perceived as easy and user-friendly, it is likely to encourage individuals to explore its potential benefits for their work areas [19]. To help users quickly understand how BCT functions, suggestions have been made for developers to focus on creating interactive interfaces that offer continuous learning opportunities [68], [69]. Therefore, we hypothesize:

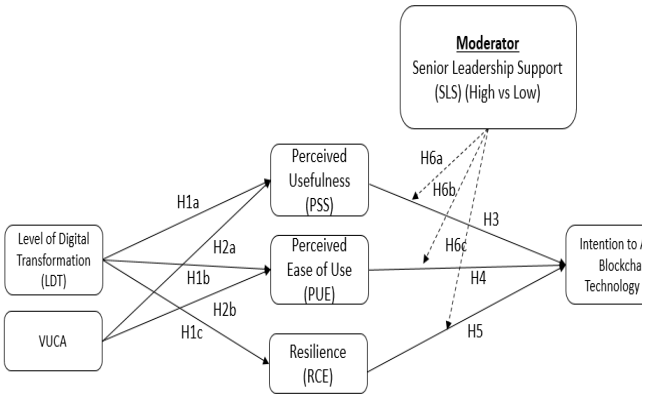
H4: Perceived ease of use has a positive effect on the intention to adopt BCT

B.1.5 Resilience

Organizations that value resilience are encouraged to adopt BCT, as it reduces risks and increases adaptability [70]. In the VUCA environment, key features such as immutability, transparency, and distributed ledger systems provide significant benefits for businesses utilizing BCT [71]. Consequently, BCT enhances visibility and traceability in supply chains, making it easier to identify disruptions and respond accordingly [63]. Moreover, this attribute maintains data integrity while protecting against cyber-attacks, thereby improving overall organizational resilience against cyber threats [72]. Finally, organizations must thoroughly evaluate the specific use case and weigh its potential benefits against implementation hurdles, ensuring they have the necessary resources to deploy such technologies [63] effectively. The implementation and integration of BCT can only occur when a thorough understanding of the concept of resilience is achieved [73]. Therefore, we hypothesize:

H5: Resilience has a positive effect on the intention to adopt BCT

FIGURE 2: HYPOTHESIZED RESEARCH MODEL



[Notes: Theoretical Bases: *VUCA in Business Environment; Perceived Usefulness & Perceived Ease of Use* draw on the TAM; *Level of Digital Transformation, Resilience, & SLS* draw on the DCV]

B.1.6 SLS as a Moderator

Leaders who are dedicated to the cause highlight its significance and strengthen subordinates' confidence that it is an effective tool for the organization's advantage [74]. The expectation is that this enhanced sense of usefulness will create a greater desire to incorporate BCT into daily business operations [75]. Ultimately, SLS for BCT primarily contributes to its perceived usefulness, which, in turn, affects the decision to adopt it [76]. For it to be effective, this moderation must involve clear communication, address concerns, and deliver tailored messages to various stakeholders within the firm [77]. Thus, we hypothesize:

H6a: SLS has a moderating effect on the association between perceived usefulness and intention to adopt BCT

Organizations can promote a more positive perception of BCT by addressing employees' concerns and offering training opportunities on how to use the technology [78]. SLS is essential in shaping users' perceptions of the ease or difficulty of using BCT [79]. However, this approach will only be effective if technological complexities are addressed and user training and support systems are readily available [80]. Creating an environment that recognizes potential challenges and equips employees with the necessary skills allows senior leaders to strengthen the connection between perceived ease of use, adoption intention, and BCT [77]. Hence, we hypothesize:

H6b: SLS has a moderating effect on the association between perceived ease of use and intention to adopt BCT

Senior leaders greatly influence employees' and stakeholders' attitudes toward BCT, as they are especially dedicated to building organizational resilience [11]. There is a high likelihood of BCT adoption when the strong connection between it and resilience is recognized [11]. Therefore, SLS is essential in connecting organizational durability with a readiness to adopt BCT [80]. However, for this moderation to succeed, it must be executed with a detailed plan that shows a clear understanding of how BCT enhances resilience over time [81]. By doing so effectively, senior leaders can help others recognize this connection while aligning efforts with the broader goals of resilience, as noted by several authors such as [82]. Consequently, we hypothesize:

H6c: SLS has a moderating effect on the association between resilience and intention to adopt BCT

Hence, Figure 2 describes the hypothesized model.

B.2 Methodology

We have conducted a confirmatory study to gain a deeper understanding of the intention to adopt BCT. The model has been applied using quantitative analysis. The time frame spanned from October 2023 to March 2024. The participants comprise managers at various levels (senior, middle, and junior) from different small and medium-sized enterprises (SMEs) in India. Participants were selected based on specific screening criteria. The questions for selecting the respondents are provided below: Q1. Are you currently employed as an SME manager? Q2. Do you have any knowledge about BCT SMEs? Q3. Could you please provide me with the contact details (email/WhatsApp) of any of your peers or relatives who are currently employed as managers in SMEs? (Optional)

A comprehensive online survey was distributed to 1,632 participants from various cities across India via email, LinkedIn, Facebook, and WhatsApp. During the data collection phase, 456 responses were obtained from different participants. The KMO test was used to assess sampling adequacy, indicating that the sample was sufficient. The measures were derived from previous studies on the intention to adopt BCT.

We selected a sample of more diverse and representative participants to enhance sampling adequacy and minimize potential biases in the study. We achieved this by ensuring that various demographics, including gender, management level, and educational background, were represented in proportion to their actual prevalence. This approach addresses the overrepresentation of certain groups, such as middle-aged males, in management and contributes to a more balanced perspective on BCT adoption. Furthermore, including SMEs from different regions and industries across India will improve the overall applicability of the findings. We prioritized the anonymity of responses to minimize biases and ensured that survey questions were carefully constructed to avoid leading influences on respondents' answers. Lastly, we conducted pre-survey testing with a diverse pilot group and adjusted the questionnaire based on their feedback. This process helps identify and address potential sources of bias before the full-scale data collection begins.

Thorough analysis and adjustments were based on initial feedback from 23 individuals, including managers and academics. The items were assessed using a seven-point scale ranging from 1 ('strongly disagree') to 7 ('strongly agree'). Most SMEs analyzed were 15 years old or younger. Male participants constituted 67.54% of the sample. A significant number of individuals hold diplomas (43.2%) and work in middle management positions (37.94%) (Table 2). The SLS is high among the SMEs.

TABLE 2: DEMOGRAPHIC DETAILS

Demographic Measures	Category	(n=456)	
		Frequency	Percentage
Organization Age	Less than or equal to 15 Years	259	56.80%

	More than 15 years	197	43.20%
Gender	Male	308	67.54%
	Female	148	32.46%
Profile of employees	Junior Manager	167	36.62%
	Middle-level Manager	173	37.94%
	Senior Manager	116	25.44%
Education	Diploma	197	43.20%
	Graduate	147	32.24%
	Post Graduate	112	24.56%
Senior Leadership Support	High	320	70.18%
	Low	136	29.82%

B.3 Analysis and Results

Our study employed PLS-Structural Equation Modeling (PLS-SEM) using the SmartPLS package for analysis. This method is gaining popularity among researchers due to its ability to address complex research questions. A key feature of PLS-SEM is its ability to manage models that include multiple variables and relationships, unlike other SEM procedures. Consequently, this is beneficial for unraveling the factors that contribute to the phenomenon under investigation. Moreover, a focus on predictive accuracy aligns with studies aimed at identifying crucial elements that lead to specific outcomes. Unlike other SEM techniques, PLS-SEM does not strictly require normality assumptions when analyzing data, offering greater flexibility [6]. Thus, PLS-SEM proves extremely valuable for interdisciplinary researchers seeking to understand the intricate connections between various academic fields and use them to predict or accurately forecast future events.

The model's performance in the SLS context was assessed in three stages of the study. Important insights are derived from comparing estimated path coefficients. Our analysis primarily involves evaluating measurement and structural models, as well as conducting multi-group analyses. We perform preliminary checks on the results obtained before the primary analysis stage to ensure reliability. These checks include examining the normality of data and identifying any potential common method biases.

Common Method Bias (CMB) must be considered in studies where a single source measures both independent and dependent variables. This study employed a procedural approach to address CMBs. This approach is more effective than statistical methods because it addresses methodological issues before data collection. Therefore, testing for multicollinearity was necessary before hypothesis testing. To detect significant multicollinearity, all VIF values were assessed against established criteria [83]. A VIF of five or less indicates that no multicollinearity exists. No significant multicollinearity concerns were identified, as VIF values remained below the threshold of 83. Thus, this alleviated concerns, allowing the authors to proceed with hypothesis testing confidently. In other words, the absence of a standard method indicates evidence of bias.

Before analyzing the structural model, we established the measurement model by confirming both convergent and discriminant validity. Convergent validity is typically achieved when the loading and composite reliability (CR) are above 0.7, and the average variance extracted (AVE) is more significant than 0.5. The results of the convergent validity test for the science and social science programs. Based on the provided data, it is clear that the loading, AVE, and CR values all exceed the designated thresholds. Specifically, the loading and CR values are above 0.7, while the AVE values exceed 0.5. The presence of convergent validity has been confirmed in this study.

Establishing discriminant validity is crucial in any research framework, as it demonstrates that a construct differs from other constructs based on empirical evidence. For the discriminant validity to be considered valid, the heterotrait-monotrait (HTMT) ratio values must remain below 0.9. The results of the HTMT analysis showed that all values were below the specified threshold. The study has successfully established discriminant validity, confirming the distinctiveness of each construct within the research framework.

The results presented in Table 3 provide strong support for all hypotheses except two in the complete sample. The findings from each category sample closely align with the overall sample. Notably, all hypotheses are significant, except for two in the overall sample. After hypothesis testing, the model's ability to explain the data is assessed. The R-squared (R^2) values for the endogenous variables are 33%, 17.7%, 50.3%, and 31.8% for PSS, RCE, IBT, and PUE, respectively. The study's predictive relevance was determined by analyzing Q-squared (Q^2) values. The values for the endogenous constructs, PSS, RCE, IBT, and PUE, are 0.319, 0.17, 0.337, and 0.311, respectively, indicating varying levels of predictive relevance across the samples. Understanding the impact of independent variables on the dependent variable is crucial for grasping the magnitude of their effects. Effect sizes of 0.02 are considered small, 0.15 medium, and 0.35 significant [85]. SLS significantly moderated the relationship between SLS and RCE, but had no moderating effect on the relationships between SLS and PSS and SLS and PUE. The model fit values are SRMR = 0.046 and NFI = 0.855, demonstrating a solid fit for both time frames.

TABLE 3: HYPOTHESIS RESULTS

Hypothesis Relationship	**Beta**	**T value**	**p-Value**	**2.50 %**	**97.50 %**	**f-square**	**Decision**
H1a: LDT -> PSS	0.3	5.668	0	0.185	0.396.6%	0.085	Supported
H1b: LDT -> RCE	0.421	9.349	0	0.325	0.501	0.215	Supported
H1c: LDT -> PUE	0.291	5.993	0	0.193	0.384	0.079	Supported
H2a: VUCA -> PSS	0.341	6.571	0	0.237	0.439	0.11	Supported
H2b: VUCA -> PUE	0.339	7.446	0	0.247	0.427	0.107	Supported

H3: PSS -> IBT	0.208	3.785	0	0.1	0.317	0.039	Supported
H4: PUE -> IBT	0.181	3.477	0.001	0.079	0.282	0.031	Supported
H5: RCE -> IBT	0.479	9.52	0	0.379	0.573	0.269	Supported
H6a: SLS x PSS -> IBT	0.073	0.713	0.476	-0.123	0.276	0.001	Not Supported
H6b: SLS x PUE -> IBT	0.094	1.114	0.265	-0.077	0.258	0.003	Not Supported
H6c: SLS x RCE -> IBT	-0.237	2.028	0.043	-0.466	-0.02	0.015	Supported

Before conducting a Multi-Group Analysis (MGA), establishing measurement invariance is essential to determine the most suitable type of MGA to employ. The Measurement Invariance of Composite (MICOM) method in Smart PLS was specifically designed to accommodate the unique characteristics of Smart PLS [86], distinguishing it from covariance-based Structural Equation Modeling (SEM) techniques. The MICOM method consists of three key steps: assessing configural invariance, evaluating compositional invariance, and ensuring equal means and variances (Table 4).

TABLE 4: MEASUREMENT INVARIANCE ASSESSMENT (MICOM)

MICOM Procedure		Configural Invariance	Compositional Invariance		Partial Invariance Established	Equal Mean Assessment		Equal Variance Assessment		Full Variance Established
			Original Correlation	Permutation p-Values		Original Difference	Permutation p-Values	Original Difference	Permutation p-Values	
Senior Leadership Support (High vs Low)	PSS	Yes	0.999	0.345	Yes	-0.075	0.452	0.08	0.654	Yes
	RCE	Yes	1	0.894	Yes	0.07	0.49	0.484	0.026	No
	IBT	Yes	1	0.603	Yes	-0.11	0.297	0.193	0.265	Yes
	LDT	Yes	0.999	0.605	Yes	0.011	0.926	-0.109	0.496	Yes
	PUE	Yes	1	0.61	Yes	-0.025	0.782	-0.136	0.275	Yes
	VUCA	Yes	0.999	0.518	Yes	-0.131	0.195	0.227	0.131	Yes

Partial measurement invariance is established after completing the first and second tests, allowing meaningful comparisons between different groups. When all three steps are fulfilled, comparisons can be made both between groups and for the entire group, achieving complete measurement invariance. Through careful analysis, we ensured that the indicators, data treatment, and algorithm settings remained consistent across both groups. The study successfully passed this initial step of configural invariance, thanks to the meticulous and systematic recording and treatment of data. An analysis using MICOM was conducted for steps two and three, as outlined in Table 5. From the findings, we determined that compositional invariance was present. Based on the permutation p-values, we concluded that the original correlation for each variable did not significantly differ from 1, as the p-values were more significant than 0.05. Furthermore, in the third step of the study, full measurement invariance was successfully achieved. It was evident from the permutation p-value for the confirmation construct that it exceeded 0.05. No notable distinctions exist in SLS, whether high or low. Consequently, the study achieved complete invariance, enabling a comprehensive comparison across the group.

The results for both groups revealed no significant differences when we examined the Multiple Group Analysis (MGA) outcomes. Using PLS-MGA, we investigated disparities by applying the MGA test to data from both categories. Table 5 illustrates the variations in path coefficients between the two datasets. Except for one, none of the hypotheses for MGA were supported. Consequently, the results did not provide evidence in favor of the hypotheses, except for one. Table 7 outlines the variations in path coefficients observed.

TABLE 5: MULTI-GROUP ANALYSIS

Relationship	PLS MGA		Decision
	Difference (SLS_H - SLS_L)	P value (2-tailed)	
PSS -> IBT	-0.087	0.408	Unsupported
RCE -> IBT	0.272	0.013	Supported
LDT -> PSS	-0.134	0.197	Unsupported
LDT -> RCE	-0.002	0.967	Unsupported
LDT -> PUE	0.086	0.396	Unsupported
PUE -> IBT	-0.137	0.101	Unsupported
VUCA -> PSS	0.035	0.729	Unsupported
VUCA -> PUE	-0.098	0.299	Unsupported

IV. Discussion

As SMEs navigate the complexities of digital transformation, BCT has emerged as a promising yet challenging innovation. Despite its potential to enhance transparency, efficiency, and security in business operations, SMEs often struggle with its adoption due to concerns about usability, regulatory uncertainties, and resource constraints. This study aims to bridge the gap by examining the key factors influencing SMEs' intention to adopt BCT, thereby providing a comprehensive

understanding of this phenomenon. Specifically, we explore how digital transformation and VUCA environments shape perceptions of BCT's usefulness, ease of use, and resilience-building potential. Additionally, we investigate the moderating role of SLS in facilitating BCT adoption, shedding light on whether strong leadership can enhance an SME's capacity to leverage resilience for digital transformation. This research examines these relationships to provide valuable insights into the strategic and technological factors that drive or hinder the adoption of BCT. It offers both theoretical advancements and practical guidance for SMEs, policymakers, and technology providers in emerging and resource-constrained markets. The first hypothesis we test in this study concerns the impact of digital information on perceived usefulness in the context of BCT implementation in SMEs (H1a). In today's fast-paced business world, SMEs rely on easy access to real-time digital information to make informed decisions [87]. Having abundant digital details at one's disposal can significantly enhance its perceived usefulness by fostering more informed decision-making. People can carefully compare options based on their needs by relying on data sources and understanding how this technology can improve their lives. This process instills greater confidence in users that the device will be valuable.

Similarly, digital information enhances the perceived ease of use of BCT for SMEs considering its implementation (H1b). With clear instructions and real-world examples, users gain confidence in learning about and navigating these systems, particularly in contexts where business transactions are recorded using BCT and uncertainty is significant. Furthermore, digital information enhances the resilience of SMEs adopting BCT (H1c). Digital information addresses the pressing need for SMEs to acquire up-to-date knowledge about market trends, regulatory changes, and emerging technologies [88], equipping people to be better prepared for anticipated disruptions and thereby increasing their resilience. Access to current information, historical trends, and proven practices enables individuals or entities to identify potential pitfalls, anticipate substitutes or better practices, and learn from past experiences, which offers various options based on robustness, such as developing digital skills among staff or improving flexibility.

Furthermore, VUCA environments prompt firms investing in BCT to reevaluate how they perceive value creation, fully decoding complexities like the uncertainties surrounding BCT utility (H2a) [11]. SMEs encounter significant challenges in maintaining competitiveness and flexibility in the VUCA world [89]. In such an environment, traditional approaches may become ineffective, driving individuals and organizations to seek guidance during implementation stages while supporting personnel in managing uncertainty. This ultimately makes them more open to the potential benefits of newer technologies, which boosts their appeal for gaining a competitive edge or enhancing stability.

Similarly, the VUCA environment has a positive influence on SMEs' perceptions of the ease of using BCT (H2b) [11]. The complexity of a VUCA world may heighten the perceived ease of use in adopting new technologies. In a VUCA environment, customers may favor technologies that are easy to understand and adapt to. Thus, developers can be encouraged to enhance more intuitive graphical user interfaces with the provision of appropriate training resources [87].

Moreover, SMEs' perceived usefulness of BCT enhances the intention to adopt it (H3). When individuals recognize how BCT can effectively tackle their issues, boost productivity, or offer other advantages such as secure transactions and transparent supply chains, they are more likely to invest time and resources in implementing it [90]. BCT is increasingly sought after as it ignites organizations' desire to integrate it into their operations.

The extent to which SMEs believe that BCT is easy to use also contributes to the intention to adopt it (H4). Viewing BCT as friendly, with simple user interfaces and readily available training resources or support from robust communities, encourages consideration of its acquisition [91]. This alleviates doubt while reinforcing the inclination to allocate funds for training alongside learning what is necessary to execute any blockchain-related plans, thus boosting the determination of firms' management teams to embrace this innovative concept.

Furthermore, the level of resilience has a significant impact on SMEs' intention to adopt BCT (H5). BCT enhances resource allocation processes, streamlines operations, and mitigates fraud risks, enabling firms to address challenges more efficiently and recover more effectively. Therefore, organizations that prioritize resilience are highly likely to adopt BCT.

However, SLS may have little relevance to the relationship between the perceived usefulness and intentions to adopt BCT in SMEs (H6a). SLS does not condition the impact of perceived usefulness. Additionally, SLS may not have a significant impact on the relationship between perceived ease of use and SMEs' intention to adopt BCT (H6b). Firms tend to focus more on individuals' ease of using technology rather than SLS. While SLS may be crucial in fostering a supportive environment for embracing technological advancements, it may not directly moderate the influence of perceived ease of use on the intention to adopt BCT. Employees might still find it challenging to adapt or even make progress despite strong SLS. In SMEs, where resources are limited and expertise is scarce, the ease of using BCT may hinge more on an individual's familiarity with digital tools and the technology's simplicity rather than top-down SLS. Thus, while leadership affects resource allocation decisions in SMEs, it does not necessarily shape personal perceptions regarding how easy a particular technology is to use.

However, SLS significantly strengthens the role of resilience in the intention to adopt BCT among SMEs (H6c). Firms with high SLS are better positioned to leverage their resilience in adopting BCT. Consequently, strong SLS is essential for encouraging SMEs to adopt BCT. SLS helps employees feel secure enough to navigate obstacles, such as resistance to new ideas, resulting in a positive shift in attitude toward innovation. This showcases a confident and proactive approach, fostering a sense of assurance among employees. Such leadership and resilience are critical in guiding the BCT adoption process. What sets SLS's role in fostering organizational resilience apart is that how leaders engage and promote technology adoption significantly strengthens the role of resilience in BCT adoption. As such, SLS is vital during the implementation of BCT in SMEs.

V. Theoretical Implications

This study enriches the emerging literature on SMEs' adoption of BCTs [1, 2] by integrating the TAM and the DCV, providing a nuanced understanding of the interplay between technology acceptance, resilience, and digital transformation in VUCA environments. It incorporates perceptions of technology and capabilities as determinants of adoption behavior in strategy formulation. The study examines the perceived usefulness and ease of use of SMEs in the BCT context [1, 7], corroborating TAM's assertion that decisions regarding technology adoption are critically based on the benefits and resources derived from it. The conclusion aligns with previous research, noting that despite the ample information available to SMEs about BCT's potential and functionality, these firms must understand TAM as the new paradigm for early adoption. Moreover, the study refines TAM by demonstrating how, in the conditions of a VUCA world, perceptions of usefulness and ease of use become more fluid and responsive to market and technological changes. Unlike traditional applications of TAM that often emphasize individual behavioral intent, this study highlights the organizational-level drivers of adoption, emphasizing the role of VUCA environments and digital information transformation in shaping SMEs' BCT adoption. This bolsters technology acceptance literature by suggesting that the heightened need for familiarity and support with technology in the external operating environment indicates that the strategic rather than operational context of BCT is viable. This framework is further strengthened by the DCV perspective, which illustrates how enabling resilience in SMEs facilitates the integration of BCT into their processes. Unlike TAM, which emphasizes the behavioral components of adoption, DCV highlights the significance of digital transformation, market awareness, and leadership-enabled agility as crucial factors that help SMEs navigate uncertainties. This study contributes to the discussion of DCV as it pertains to BCT adoption, arguing that in high-VUCA contexts, SMEs that invest in developing dynamic capabilities such as resilience and digital transformation are better positioned to adopt BCT. This perspective is novel within existing studies; as we argue, BCT is not merely a technological innovation but also a strategic enabler, significantly enhancing process efficiency, reducing the likelihood of fraud, and increasing transparency.

Moreover, the study raises questions about traditional interpretations of SLS about technology adoption. While existing literature indicates that top-down leadership is crucial for guiding digital transformation, this study finds that SLS does not significantly moderate the relationships between perceived usefulness, ease of use of technology, and adoption intentions. However, SLS does strengthen the link between resilience and BCT adoption intentions, reinforcing the idea that strong leadership is essential for leveraging resilience amid uncertainty. This demonstrates how the DCV perspective can be refined by showing that, as the primary adopters of BCT, leaders—through resilience rather than direct perceptions of utility and usability—play a crucial role in its adoption among SMEs. These findings suggest that the role of leadership extends beyond facilitating technology deployment through influence; it also involves acting as tactical leaders to strengthen an organization's resilience in uncertain times. In advancing theoretical perspectives on technology adoption in SMEs, this study integrates both individual perceptions of technology and the firm's strategic agility through the TAM and DCV frameworks. It also illustrates how perceived usefulness and ease of use, rather than being purely subjective constructs, are influenced by the external business environment, thereby extending the TAM. Simultaneously, the study demonstrates that BCT adoption extends beyond dynamic capabilities, refining the DCV by highlighting the firm's ability to perceive technology as a valuable and usable asset. Consequently, this study provides a comprehensive explanation of BCT adoption, highlighting the need for aligned technological readiness and resilience among SMEs to drive digital transformation.

VI. Practical Implications

The findings of this study offer several crucial insights for SME managers, policymakers, and technology providers seeking to promote Business Continuity and Technology (BCT) adoption in SMEs. First, considering the significant impact of digital information on perceived usefulness and ease of use, SME managers should invest in digital literacy training and data analytics tools to enhance their decision-making capabilities. Granting employees access to real-time market trends, regulatory updates, and best practices can enhance confidence in BCT's advantages while mitigating the uncertainty associated with implementation. Furthermore, utilizing user-friendly digital platforms that deliver clear guidance on BCT applications can help facilitate the transition.

Furthermore, since perceived usefulness and perceived ease of use significantly influence BCT adoption, managers should emphasize tangible benefits, such as improved security, operational efficiency, and cost reduction, when introducing BCT to employees and stakeholders. Encouraging pilot programs or small-scale implementations can serve as proof-of-concept initiatives, helping employees and business partners experience BCT's advantages firsthand and reducing resistance to change. Moreover, investing in intuitive interfaces, simplified workflows, and customized training programs can further enhance ease of use, making adoption more seamless. Additionally, the strong link between resilience and BCT adoption underscores the need for SMEs to view digital transformation as a long-term strategy rather than a short-term trend. SMEs that proactively develop resilience by improving resource allocation, upskilling their workforce, and enhancing cybersecurity infrastructure will be better positioned to integrate BCT effectively. Managers should find ways to embed resilience into the organizational culture, ensuring that BCT adoption is sustained even during economic or technological disruptions. SMEs can also leverage the results of our study to find solutions for digital transformation and navigate uncertainty in adopting BCT. This suggests that SMEs should foster a culture of innovation and encourage employees to utilize technology daily. It also means that resilience propels SMEs toward BCT adoption. This strategy should be supported by an environment conducive to disruptive innovations, including Business-Technology Convergence (BCT). Furthermore, this research demonstrates that SLS is a key

catalyst of resilience in the adoption of BCT. This suggests that while SLS alone cannot directly drive BCT adoption, it is instrumental in fostering a resilient organizational environment that enables successful implementation. Managers can secure SLS by controlling resource allocation and providing guidance during implementation phases while addressing personnel needs and other relevant matters. Consequently, senior executives who promote creative thinking through new approaches create opportunities for translating resilience into BCT adoption, thereby fostering a shared understanding of firm objectives across different levels.

VII. Limitations and Future Research

This study offers valuable insights into the motivations behind SMEs' adoption of BCT during digital transformation and uncertainty; however, certain critical limitations should be acknowledged. First, its findings are not generalizable to other firms with differing resource capabilities, which are determined by various resource allocation methods. Second, the cross-sectional nature of the study limits the ability to test causal relationships between variables over time. Furthermore, self-reported data may introduce bias. Additionally, there is a need to include larger samples in exploratory longitudinal studies on how adoption progresses under different conditions for SMEs that tend to adopt BCT during periods of change. This approach enables qualitative researchers to understand the contextual factors influencing the purchase decision-making process among SMEs seeking to establish a business offering similar products or services, such as restaurants or clothing shops. It also highlights the need for further research to investigate how external factors, such as regulatory frameworks and industry forces, influence SMEs' decisions regarding the integration of BCT into their operations. Our understanding is that creativity comes with uncertainties.

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