The predictive robustness of organizational and technological enablers towards blockchain technology adoption and financial performance

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Abstract

Purpose – Blockchain technology has brought about significant transformation among organizations worldwide. This study aimed to explore the effects of organizational and technological factors on blockchain technology adoption (BTA) and financial performance (FP) in Pakistan.

Design/methodology/approach – This is a co-relational study which used the cross-sectional data. We gathered the data from the managers of Pakistan's small and medium-sized enterprises (SMEs), which functioned their industries with blockchain technology. We applied convenience sampling to identify the respondents. Finally, we based this study's findings on 274 valid cases.

Findings – We used structural equation modeling (SEM) in this study, to exert a positive and significant impact on organizational factors such as organizational innovativeness (OI), organizational learning capability (OLC), top management support (TMS) and organizational work climate (OWC) on BTA. In addition, the technological factors, such as complexity (CTY), technology readiness (TR), compatibility (CBTY) and technology capability (TC), have a positive and significant effect on BTA. Finally, this study's findings show that BTA positively and significantly impacts FP.

Practical implications – This study's findings will help policymakers and planners to design policies to adopt other blockchain technologies to improve SMEs' operations. Moreover, this study's findings will inspire policymakers and planners to actively seek new ideas, knowledge and skills through acquiring new knowledge to assist with their IT-related decisions.

Originality/value – This study empirically confirms the role of organizational and technology factors toward BTA and FP among Pakistan's SME managers.

Keywords Organizational factors, Technology factors, Blockchain technology adoption, Financial performance, Small and medium-sized enterprises (SMEs)

Paper type Research paper

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1. Introduction

Blockchain technology has emerged as a transformative force with significant implications to herald a promising future for organizations and society. It is one of the critical technologies for businesses which must grasp its nuances and be prepared to embrace it since a lack of readiness could result in severe, possibly irreparable consequences (Mamaghani *et al.*, 2022).

Blockchain has a great significance and effects on the different industries and is considered a new form of information technology that transforms technology, commerce and industry (Lee and Pilkington, 2017). These technologies have newly come to the vanguard of the research and industrial communities as these bring potential assistance for many industries and practically make them capable of solving several issues. The blockchain provides an effective way to overcome concerns using secured, distributed, permitted and shared transactional ledgers (Al-Jaroodi and Mohamed, 2019). For Industry 4.0., the blockchain technology is also valuable in fulfilling their financial transaction applications with the provision of trust. The blockchain also made dealing with foreign and fiat currency problems more accessible through controlled supply transactions (Chang *et al.*, 2020; Javaid *et al.*, 2021; Tang and Veelenturf, 2019). Moreover, blockchain technology's various enablers and drivers have countless spheres of Industry 4.0. It provides customer satisfaction, enhances the productivity of quality products and provides the utmost customer service and precise services, further making blockchain technology significantly affect Industry 4.0 (Christodoulou *et al.*, 2018; Leng *et al.*, 2020).

Over a few years, the blockchain appeared as an emerging technology, bringing a robust revolution in several industries. In 2008, since the innovation of Bitcoin (a digital cryptocurrency) (Dabbagh *et al.*, 2019), the blockchain technology is a decentralized ledger that stores all transactions made on top of a peer-to-peer network in a secure, verifiable and transparent way. Due to the considerable benefits that blockchain can bring to every industry, its significance level has been compared to the role of the Internet in the early 1990s (Makridakis *et al.*, 2018), the blockchain is revolutionizing various industries, ranging from finance (Eyal, 2017; Fanning and Centers, 2016; Gorkhali and Chowdhury, 2022; Simpson, 2018; Sazu and Jahan, 2022), Internet of Things (IoT) (Farooq *et al.*, 2015; Laghari *et al.*, 2022; Aripin and Paramarta, 2023; Ding *et al.*, 2023), reputation systems (Beinke *et al.*, 2019; Hîrţan *et al.*, 2020; healthcare (Attaran, 2022; Abu-Elezz *et al.*, 2020; Bali *et al.*, 2023; Gordon and Catalini, 2018) and supply chain management (Di Vaio and Varriale, 2020; Emrouznejad *et al.*, 2023; Gurtu and Johny, 2019).

The literature has witnessed widespread blockchain technology adoption (BTA) across various industries including supply chain management (Underwood, 2016), retail banking (Miraz *et al.*, 2020), marketing (Peres *et al.*, 2023), healthcare (Yaqoob *et al.*, 2022) and finance (Grover *et al.*, 2019). However, there remains a notable gap in the existing research concerning the applicability and impact of BTA within small and medium-sized enterprises (SMEs), where BTA holds a great potential to meet organizational objectives and to improve financial performance (FP) (Khalil *et al.*, 2022). Consequently, there is an obvious need to investigate g BTA within the organizations and, more particularly, SMEs. Previous studies have focused on various organizational factors that are anticipated to influence BTA, these include intriguing conditions, top management support (TMS), organizational work climate (OWC), security and cost concerns, organizational learning and capability (OLC), perceived trust, innovation, organizational readiness and business strategy (Clohessy and Acton, 2019; Clohessy *et al.*, 2019; Malik *et al.*, 2020, 2021; Nath *et al.*, 2022; Li *et al.*, 2022; Centorrino *et al.*, 2023). In addition, BTA is intertwined with several technology-related factors such as complexity (CTY), technology readiness (TR), compatibility (CBTY), technology capability (TC), technology efficiency, relative advantage, perceived usefulness and computer self-efficacy (Duy *et al.*, 2018; Fernando *et al.*, 2023; Li *et al.*, 2022; Afifa *et al.*, 2023). Setyowati *et al.*'s (2023) findings have contributed to this body of knowledge. Furthermore, BTA's influence extends to FP (Yousefi and Tosarkani, 2022; Ronaghi, 2022; Farnoush *et al.*, 2022; Sun *et al.*, 2022).

Despite the broad coverage in the literature, there is a significant gap in understanding the applicability of BTA within the Pakistan's SME sector. This could be a vital driver to achieving organizational objectives and improving FP. This study's overarching novelty lies in its comprehensive approach which seamlessly integrates these organizational and technological factors to comprehend and improve BTA in the Pakistan's SME sector. By synthesizing recent trends in BTA research and by addressing this context-specific research gap, this study aspires to make a significant contribution to academic discourse. Having regard to these considerations, this study aimed to answer the following research questions:

RQ1. What is the relationship between organizational and technological factors and blockchain technology adoption (BTA) in the Pakistan's SME sector?

RQ2. How does blockchain technology adoption (BTA) enhance Pakistan's SMEs' financial performance (FP)?

By focusing on Pakistan's SMEs, where the dynamics of BTA are distinct from larger enterprises, this study aims to answer to these questions and, in turn, make a significant contribution to the existing body of knowledge. While the previous studies have explored the factors that influence BTA, this study delves into uncharted territory by honing the interplay of organizational and technological factors in the unique context of Pakistan's SMEs. The novelty lies in the contextualization through shedding light on previously unexplored challenges and opportunities faced by Pakistan's SMEs in relation to BTA. Since the Pakistan's SME sector is relatively uncharted terrain, this study's findings aim to enrich the literature in understanding BTA's potential to improve economic outcomes. In a unique and evolving business landscape, the novelty is bridging the gap between BTA and FP. By offering actionable insights for economic development and stability in Pakistan, this study's findings aim to provide empirical evidence that can inform policymakers and SMEs and about the tangible financial benefits of BTA.

In addition to the introduction, this paper is structured as follows: Section 2 is the literature review and the development of the hypotheses. Section 3 details the methods used in this study. Section 4 is the analysis. Section 5 details the discussion and conclusion, Section 6 is this study's implications. Section 7 is the limitations of this study. Finally, section 8 is the recommendations for future research,

2. Literature review and development of the hypotheses

2.1 Blockchain technology adoption (BTA)

The wide-ranging literature on BTA focuses on its contribution to, for instance, organizational trust, which has emerged as a critical determinant of OI and an ethical culture that plays a significant role in shaping behavioral, strategic and innovative processes (Ellonen *et al.*, 2008). An encouraging environment fosters innovation and knowledge management (Chen *et al.*, 2010) since both supply chain integration and competitive performance benefit from the operational capabilities of BTA (Li *et al.*, 2021). Leadership is instrumental in directing BTA's orientation, design and effectiveness for OLC (Turi *et al.*, 2020). Organizational bricolage is highlighted to enhance a company's resilience in market and technological disruptions (Santos *et al.*, 2021). Moreover, several factors that affect BTA, such as perceived risks, standards uncertainty and competition intensity, have been identified (Malik *et al.*, 2021). Previous studies' findings show that relative advantage, TMS and OR positively influence BTA intentions (Lu *et al.*, 2021), while, in different contexts, unfavorable TMS and a lack of technical competence pose challenges to BTA (Fernando *et al.*, 2021). The degree of innovation is closely associated with the level of BTA success (Millson, 2013). Regarding TR, previous studies' findings underscore its significant influence on individual innovation and cryptocurrency adoption (Bubou and Job, 2022). In the

logistics industry, opportunities for BTA necessitate TR, information sharing and trading (Dobrovnik *et al.*, 2018), while in smart learning environments, compatibility plays a pivotal role in promoting BTA (Ullah *et al.*, 2021). Also, the impact on business and FP are prominent themes, whereby BTA potentially enhances production processes, reduces expenses and improves asset turnover (Pan *et al.*, 2020). BTA has a positive effect on the development of FP (Kumar *et al.*, 2022) since, in the specific contexts, digital business strategies correlate with process innovation and financial success (Khalil *et al.*, 2022). Moreover, BTA is recognized for more than its role as a cryptocurrency foundation through facilitating fluid value networks, rapid product development, enhanced customer connections and streamlined web and cloud-based integration (Ahram *et al.*, 2017). Various features of BTA, including traceability, reliability, transparency and tokenization can support the circular economy (Kouhizadeh *et al.*, 2023). The interplay of organizational culture and coordination is not overlooked, with some previous studies' findings highlighting in the context of humanitarian organizations their significance in cyber supply chain risk management (Mutebi *et al.*, 2020; Etemadi *et al.*, 2021). Furthermore, the sector-specific insights show that BTA is more prevalent in large companies. In this respect, TMS and TR emerge as significant predictors, while the perception of simplicity plays a crucial role in BTA intentions (Clohessy and Acton, 2019; Sun *et al.*, 2021). This comprehensive overview of the findings of previous studies contributes to a deeper understanding of the multifaceted landscape surrounding BTA and its diverse impacts across the different sectors and organizational contexts.

2.2 Gaps in the literature

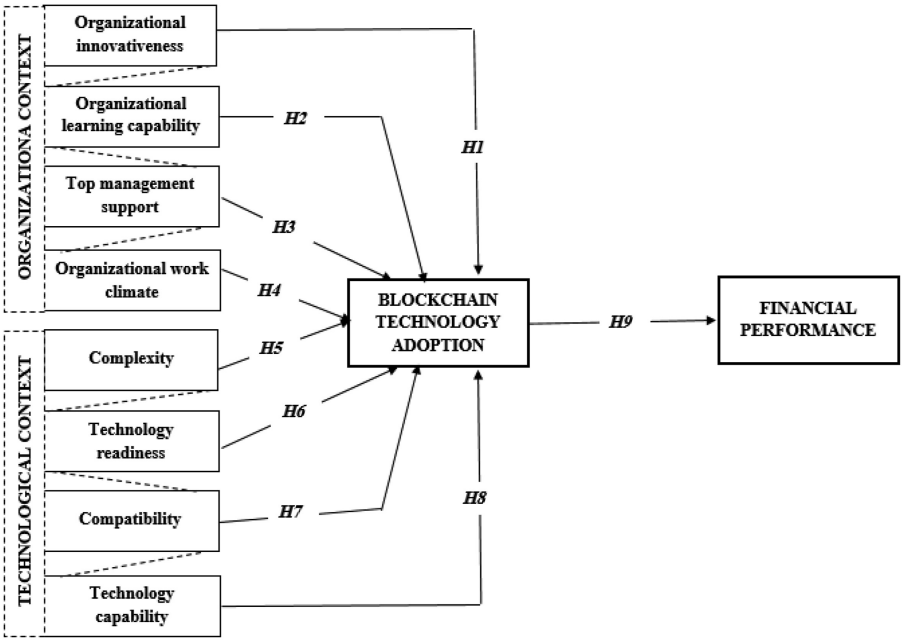
The review of vigorous domain literature highlights both the existing knowledge and the gaps in the contextual research about BTA that warrant further attention. First, there is a significant gap in the current knowledge because the previous studies need to sufficiently concentrate on developing a comprehensive model that could effectively integrate the myriad organizational and technological factors influencing BTA. While individual studies explored these factors in isolation, there needs to be more in the existing research landscape of a holistic model that unifies these elements into a cohesive framework. Therefore, this gap calls for a more integrated approach to understanding BTA, whereby a unified model considers the interactions and interdependencies among organizational and technological factors are considered in (Clohessy and Acton, 2019; Allen *et al.*, 2020; Malik *et al.*, 2021; Hamdan *et al.*, 2022; Kumar *et al.*, 2023; Lin, 2023).

The second gap is contextual and specifically concerns the Pakistan's SME sector. While the existing literature provides valuable insights into BTA across various industries and regions, more investigation of the Pakistan's SME sector is needed. This gap is particularly relevant given the SME sector's unique challenges, opportunities and implications for economic development. Consequently, this study needs to investigate how BTA can be effectively extended to include Pakistan's SMEs (Khalil *et al.*, 2022).

We developed a model (Figure 1) for this study to address these identified gaps. This model aims to bridge the knowledge gap by providing a holistic framework that integrates organizational and technological factors and addresses the contextual gap by focusing on the specific dynamics of the Pakistan's SME sector.

2.3 Organizational innovativeness (OI) and blockchain technology adoption (BTA)

Blockchain technology adoption (BTA) has gained a reputation due to its benefits for almost in every organization. In organizations, BTA is possible through TMS, compatibility, relative advantage, firm size and organizational readiness (Li *et al.*, 2022). Innovation and its emergence have become the main foundations for improving BTA (Holotiuk and Moormann, 2018). As more than ever economies become increasingly digitalized, organizations need to



Source(s): Authors own conceptualization

Figure 1.
Conceptual model of the study

accept digital innovation. In SMEs, factors, such as organizational readiness and TMS, are the powerful enablers of BTA (Clohessy and Acton, 2019). In music, technological innovation, such as BTA, radically transforms the value creation process and business strategy. In addition to financial transactions, it successfully handles operational and business issues and significantly influences both the creation and distribution of value within the supply chain (Centorrino *et al.*, 2023). Perceived trust, TMS, innovation and capacity all impact on the supplier companies' intentions to implement blockchain technology in supply networks (Nath *et al.*, 2022).

In the context of Pakistan's SMEs, the existing literature has explored the positive relationship between OI and BTA. However, this connection requires further confirmation since the distinctive challenges and dynamics within the Pakistan's SMEs may introduce variations in this relationship. Therefore, in this specific context, it is essential that this study validates OI's influence on BTA. Therefore, we formulated the following hypothesis:

H1. OI contributes both positively and significantly to developing BTA.

2.4 Organizational learning capability (OLC) and blockchain technology adoption (BTA)

IT organizations create their digital innovation by developing a conducive organizational learning environment (Johnson, 2019). According to Malik *et al.*'s (2021) framework, organizational factors, such as OI, OLC and TMS, have an excellent reputation in respect of intentions to adopt blockchain technology. In Malik *et al.*'s (2020) view, OI, OLC, competitive intensity, government backing and trading partner readiness all impact on how widely blockchain technology is adopted within an organization. Using the innovation theory, Clohessy *et al.*'s (2019) findings demonstrate that environmental and organizational factors, such as TMS, organizational readiness and organizational support, enhance BTA. In the food

industry, the technical, organizational and technology acceptance model factors, such as the perceived benefits and perceived ease of use, have a positive and significant effects on BTA. Moreover, compatibility and the upper management support, CTY and education and training affect BTA (Hamdan *et al.*, 2022). Likewise, in the healthcare system, a deep learning approach enhances the individual's intentions toward BTA (Kumar *et al.*, 2023).

Consequently, the amalgamation of these studies' findings substantiates the argument that OLC is a crucial driver of BTA across various organizational and industrial contexts. OLC facilitates the acquisition, assimilation and application of knowledge related to the blockchain technology. This makes it a critical determinant of an organization's readiness to embrace BTA. The combination of evidence from multiple studies underscores OLC's pivotal role in shaping BTA and highlights its potential as a focal point for strategic decision-making in organizations. However, since there is a need to investigate this further in relation to Pakistan's SMEs, we formulated the following hypothesis:

H2. OLC contributes positively and significantly to developing BTA.

2.5 Top management support (TMS) and blockchain technology adoption (BTA)

The top management support (TMS) has great potential in developing SMEs' BTA and business sustainability (Wong *et al.*, 2020a, b). Lu *et al.*'s (2021) findings demonstrate that in the elderly care industry corporate social responsibility (CSR), organizational readiness and TMS positively affect BTA. Similarly, Hashimy *et al.*'s (2023) findings indicate that, on the one hand, TMS, competence, competitive pressure and relative advantage play substantial meaningful roles in shaping *BTA*. From a supply chain perspective, factors, which are responsible for upgrading BTA, are supply chain integration, green and lean practices, supply chain risk, TMS, performance expectancy and innovation capability (Nayal *et al.*, 2023). On the other hand, among IT professionals, management support cannot develop *BTA* in a positive manner (Turhan and Akman, 2022). In the food supply chain, the positive predictors of *BTA* are TMS, knowledge management, skilled personnel, high investment and technology hardware readiness (Singh *et al.*, 2023). In the organizational context of the Taiwanese maritime industry, the most critical enablers of BTA are TMS and knowledge absorption capability (Lin, 2023).

In the findings of the abovementioned literature, which are consistently confirmed across multiple constructs, TMS emerges as a robust contributor to BTA. Nevertheless, in the existing literature where technology factors are paramount, there is a need for more empirical evidence. Therefore, we formulated the following hypothesis:

H3. TMS contributes positively and significantly to developing BTA.

2.6 Organizational work climate (OWC) and blockchain technology adoption (BTA)

The creation of an organizational culture makes it possible to achieve long-term corporate objectives, economic success and sustainable performance (Younus and Raju, 2021). Turhan and Akman's (2022) findings demonstrate that an organization's IT infrastructure makes a positive and significant contribution to the development of BTA. In industrial dynamics, technological change, innovation and a favorable and conducive OWC are necessary elements to develop an organization's BTA organizations (Allen *et al.*, 2020). According to Saheb and Mamaghani (2021), organizational and environmental climates, top managers' ignorance of the technology, compliance and regulatory requirements and marketing noise are the most important obstacles faced by the industry in utilizing blockchain technology's full potential. As a result of the established relationships in the existing literature and the imperative to empirically validate the organizational factors influencing Pakistan's SMEs' use of BTA, we formulated the following hypothesis:

H4. OWC contributes positively and significantly contributes to developing BTA.

2.7 Complexity (CTY) and blockchain technology adoption (BTA)

BTA has gained recognition in recent years as one of the most significant emerging technologies that promises to have a very beneficial impact on both companies and society. In the SME sector, BTA is affected positively and significantly by factors such as TMS, compatibility, relative advantage and competitive pressures (Bag *et al.*, 2023). Likewise, in supporting this view, Bhardwaj *et al.*'s findings (2021) demonstrate that in Indian SMEs the significant enablers of BTA are perceived usefulness, relative advantage and technology compatibility, TMS, vendor support and TR, there are no barriers to BTA. In the agricultural industry's organizational context, CTY connects internal and external organizations (Rijanto, 2021). According to Hartley *et al.* (2022), BTA is more significant when there are legal restrictions on which products can be made, when businesses use modern cloud-based information systems, and when companies hire outside consultants. Organizations, which are faced with the challenges of BTA and CTY, are vigorously looking for evidence about their compatibility. Having regard to the relationships in the existing literature and the contextual need to confirm these associations, we formulated the following hypothesis:

H5. CTY contributes negatively and significantly to developing BTA.

2.8 Technology readiness (TR) and blockchain technology adoption (BTA)

The technique is regarded as one of the essential industrial technologies. Business strategy, culture and product traceability, based on BTA, all displayed a medium degree of readiness (Mamaghani *et al.*, 2022). According to Wong *et al.* (2020a, b), TR, facilitating conditions, technology affinity and trust can lead to BTA. The factors such as relative advantage, uncertainty, TMS, TR, regulatory environment, competitive pressure and trust are the meaningful analysts of BTA (Seshadrinathan and Chandra, 2021). Similarly, the technological constructs, such as advantages, data security, technological readiness, coding for smart contracts, design, permissions and shared infrastructure, positively predict BTA (Setyowati *et al.*, 2023). The cost saving, relative advantage, CBTY, TMS and government support have a positive effect on BTA. On the other hand, in Chinese SMEs, TR and CBTY have no significant impact on BTA (Deng *et al.*, 2022). Based on these contradictory findings, in attempting to obtain confirmation in the context of Pakistan's SMEs, we formulated the following hypothesis:

H6. TR contributes positively and significantly contributes to developing BTA.

2.9 Compatibility (CBTY) and blockchain technology adoption (BTA)

The supplier enlargement for sustainability has a meaningful effect in moderating the connection between the several drivers, such as CBTY and TMS, which affects *BTA* (Nath *et al.*, 2022). In SMEs, the more robust predictors of BTA intentions are technology-associated factors such as technology CBTY, relative advantage and TR (Bhardwaj *et al.*, 2021). There is a positive correlation between effort expectancy, FP and BTA. Moreover, CBTY and computer self-efficacy make positive contributions to effort expectancy, the FP and effort expectancy mediates the association between trust, CBTY, BTA intentions and computer self-efficacy (Afifa *et al.*, 2023). Li *et al.*'s (2022) findings posit that, in the construction industry, compatibility plays a vitally positive role in enhancing BTA. Likewise, with exception of CTY, CBTY, there are positive correlations between, on the one hand, firm size and contract system and, on the other hand, energy efficiency and BTA (Fernando *et al.*, 2023). Therefore, we formulated the following hypothesis:

H7. CBTY contributes positively and significantly to developing BTA.

2.10 Technology capability (TC) and blockchain technology adoption (BTA)

Blockchain technology is recognized, also, as an innovative technology which features crypto currencies such as Ethereum and Bitcoin platforms. In multiple industries, the new BTA increases their capabilities (Duy *et al.*, 2018). In the agriculture sector, BTA is more helpful in resolving supply chain problems. BTA is significantly affected by green and lean practices, supply chain risks and innovation capability. Moreover, BTA has a positive effect on sustainable agriculture supply chain performance (Nayal *et al.*, 2023).

Consequently, the literature confirms the positive associations between TR, CBTY and TC and BTA. However, the CTY factor is consistently found to be either a positive or a negative analyst of BTA. Therefore, to confirm these relationships in Pakistan's SMEs, we formulated the following hypothesis:

H8. TC contributes positively and significantly to developing BTA.

2.11 Blockchain technology adoption (BTA) and financial performance (FP)

Blockchain technology is significant for the financial industry where business process innovation and firm FP are favorably correlated with digital business strategy. BTA mediates the association between FP, business process innovation and digital business strategy (Khalil *et al.*, 2022). Blockchain technology cannot solve last minute problems and cannot improve performance by itself (Naclerio and De Giovanni, 2022). In SMEs, BTA has a sizable impact on the firms' FP (Bag *et al.*, 2023). According to Chen *et al.* (2017), blockchain technology and financial technology are meaningfully responsible for enhancing FP within the financial industry. In the blockchain technology domain, the introduction of smart contracts and improvements to environmental sustainability, traceability and transparency, have a significant effect on the efficiency of the mineral supply chain (Yousefi and Tosarkani, 2022). According to Ronaghi (2022), the more directly it affects FP, the more blockchain use there is in a new company. Corporate governance influences, also, the relationship between blockchain technology and business performance. Therefore, by using blockchain technology, administrators of new firms can lay the foundation stones for sound corporate governance and improved performance. The firms, which have demonstrated their BTA intentions, develop further competitive advantages that help to increase their FP (Farnoush *et al.*, 2022). The BTA and knowledge management have a positive impact on sustainable organizational performance (Sun *et al.*, 2022). In the same way, the blockchain technology can enhance the supply chain's adaptability and improve FP. In addition, the confidence, built up through BTA, increases FP (Sheel and Nath, 2019).

Consequently, BTA is the significant predictor of FP. However, there remains a need for further evidence to confirm these organizational and technological factors in the context of Pakistan's SMEs. Therefore, we formulated the following hypothesis:

H9. BTA makes a positive and significant contribution to developing FP.

3. Methods

3.1 Research design

We used a quantitative method to deal with the statistical data since it significantly reduced the amount of time and other resources needed for this study (Daniel, 2016). This is a solid strategy (quantitative technique) because both numbers and figures are used in the data analysis (Bryman, 2001). Also, quantitative research studies are founded on statistical data, and most academics favor this method (Gorard, 2001; Connolly, 2007). Notably, by this

approach using the scientific data, it makes it possible to apply the findings (May and Williams, 1998). Given that this was a descriptive study, we based it on cross-sectional data. We adopted the same approach as in previous studies by numerous scholars such as Holotiuk and Moormann (2018), Clohessy and Acton (2019), Allen *et al.* (2020), Wong *et al.* (2020a, b), Malik *et al.* (2021), Li *et al.* (2022), Nath *et al.* (2022), Hamdan *et al.* (2022), Kumar *et al.* (2023), Hashimy *et al.* (2023), Singh *et al.* (2023) and Lin (2023) in collecting and using the cross-sectional data on BTA, FP and other technology perspectives.

3.2 Context and respondents

We focused on the blockchain SMEs of Pakistan as these play valuable roles in several fields, including marketing, industrial development, construction, manufacturing, software development, financial services, etc. According to Clutch (2023), about 340 SMEs provide various services in several sectors in Pakistan (Table 1). Pakistan has deployed blockchain technology in the banking sector for the first time to attract worker remittances. The technology made easiness in financial transactions instant and secure. Pakistan is trying to develop a massive blockchain-based system and an electronic platform for customers in baking and other sectors (Bitcoin.com, 2023). Pakistani institutes and universities also significantly promote this blockchain technology (LUMS University, 2021). Pakistan is also utilizing the benefits of blockchain technology in the real estate market. It helps in digital ledger store transactions and other relevant details across the entire network of computer systems on the blockchain. In this way, this blockchain technology enables strong data security to be a legitimate, reliable and trustworthy technology for various industries requiring a high level of cybersecurity, including significant financial transactions (Najib and Ullah, 2022). We chose the managers of these companies due to their being the leading

S. No.	Industry/SMEs	No. of SMEs
1	Information technology	53
2	E-commerce	42
3	Business service	31
4	Financial services	28
5	Education	26
6	Gaming	25
7	Real estate	24
8	Adverting and marketing	20
9	Consumer product and service	16
10	Retail	14
11	Arts, entertainment and music	9
12	Automotive	7
13	Hospitality and leisure	7
14	Media	7
15	Telecommunication	7
16	Supply chain, logistics and transport	7
17	Manufacturing	5
18	Energy and natural resources	4
19	Dental	3
20	Legal	2
21	Utilities	2
22	Non-profit	1
	Total	340

Source(s): Clutch (2023), https://clutch.co/pk/developers/blockchain

Table 1.
Pakistani SMEs with blockchain technology

individuals within their SMEs and have a massive role in the economic development and stability of the country (Gimenez and Tachizawa, 2012; Soomro *et al.*, 2019; Rahman and Bakar, 2019). Pakistan is experiencing rapid technological growth through the country's admittance to worldwide production networks (Szirmai and Verspagen, 2015). Nevertheless, Pakistan faces severe problems such as firms' low production capacity, lack of innovation and issues with BTA replacing the traditional modes of production in several SME sectors (Mangla and Din, 2015; Khalil *et al.*, 2022). *BTA* enhances transparency and traceability for supply chain management with product authenticity (Khan *et al.*, 2021). *BTA*'s robust security features, including decentralization and cryptographic encryption, are highly advantageous for Pakistan's industries, like healthcare and finance, which possess sensitive data (Hassan *et al.*, 2023). Moreover, BTA supports Pakistan's circular economy by tracking product lifecycles; promoting recycling and reuse and reducing waste (Hassan *et al.*, 2023). *BTA* helps Pakistan's SMEs to gain insights to sustainability and supply chain practices and align with the country's sustainable development goals (Khan *et al.*, 2021). In addition, BTA can enhance financial technology particularly in the SMEs (Rehman *et al.*, 2023).

Pakistan's SMEs' *BTA* can significantly help the managers to make their firms more successful through being mindful of all the processes which improve the SMEs' effectiveness (Hassan *et al.*, 2023). While BTA is a relatively new concept in Pakistan, it is recognized that, after a few years, it robustly supports SMEs to measure their *FP* (Rabbi *et al.*, 2021; Khan *et al.*, 2021). Therefore, as suggested by Maroufkhani *et al.* (2020), we used the three leading indicators of customer retention, sale growth and profitability to measure the SMEs' *FP*.

3.3 Reliability and distribution of survey tools

The most common method used in social and management sciences is the survey questionnaire because it is a cost-effective means to gather the data. It is inexpensive and allows quick responses and nationwide and foreign population coverage (Young, 2016). In addition, using an online questionnaire is advantageous for data gathering, visualization, storage and teamwork.

By using 32 samples, we conducted a pilot study to validate the accuracy and relevance of the items in our questionnaire. We used Cronbach's alpha to measure the reliability of the questionnaire and its internal consistency. This was recorded as 0.865 (excellent). Next, we ran factor loadings to identify the relationships between the grouping's elements. With the help of the opinions of the experts and research participants, we validated the questionnaire. Thereafter, before sending the questionnaire to this study's participants, we carefully edited the questionnaire's contents. To ensure the accuracy and appropriateness of the questions, we translated the questionnaire from English to Urdu (the native tongue) (Taherdoost, 2016).

We used the questionnaire to assemble the data with great legitimacy and to make it simpler for the participants (Wilson and McClean, 1994). Also, it takes little time and money to conduct the questionnaire and to gather the findings performance (Nayak and Narayan, 2019).

We used convenience sampling because, according to Masud *et al.* (2016), it was quick, affordable and simple to reach a wide range of Pakistani SMEs. We distributed this helpful questionnaire with a covering letter personally to the study participants whom we had contacted through both personal meetings and online. We informed the participants about the goals and purpose of this study and sought their permission to send the questionnaire to them. We distributed 500 questionnaires and received 274 on which we based this study's findings. This represented a 54% response rate.

3.4 Common method bias

Since we had obtained the data from a single source we followed, Kock and Lynn's (2012) and Kock's (2015) advice about removing the possibility of common method bias. We used this

technique to regress each construct against a common variable. For instance, there is no bias from the single-source data if the VIF is less than 3.3. Table 2 indicates that all VIF values for the inner model are less than 3.3. Therefore, single/source bias is not a significant problem with the data.

3.5 Measures

We adapted the items of all the constructs from the existing literature. We applied a five-point Likert scale starting from strongly agree = 1 to strongly disagree = 5. Table 3 below provides the overall details of the responses to the questionnaire.

4. Analysis

4.1 Demography

As regards the demographic constructs, we applied three constructs: namely, destination, nature of the business activity and blockchain technology experience. We found most of the participants (43.79% or $n = 120$) were middle-level management' 30.66% ($n = 84$) were top management and 25.55% ($n = 70$) were at the junior management level. Turning to the nature of the business activity, most respondents were financial service providers (18.98% or $n = 52$), while a few (5.11% or $n = 14$) were from the automotive industry. Finally, most respondents (72.26% ($n = 198$) possessed 1–5 years' experience in using blockchain technology; 14.60% ($n = 40$) had less than one year's experience and 13.14 ($n = 36$) had six years or more experience (see Table 4).

4.2 Measurement model

We applied structural equation modeling (SEM) to assess the relationships between independent and dependent variables by using the AMOS IBM version 26.0 software to analyze the moment structures. The fundamental reason why we prefer AMOS over other software (such as PLS) is because it is better in dealing with ideal factor-based models, conducting confirmatory research and providing better insights into the model (Hair *et al.*, 2019). AMOS is a widely used tool in social science research for confirmatory factor analysis (CFA) and SEM (Ong and Puteh, 2017). It offers a versatile platform for analyzing complex data structures and relationships in the fields such as management (Mia *et al.*, 2019), disability and human development (Shek and Yu, 2014) and other social science domains. Researchers often opt for AMOS due to its suitability for advanced statistical analyses (Afthanorhan, 2013). Initially, because we had adopted the items from the existing literature, we conducted CFA to gauge the items' reliability and convergent validity. Again, we confirmed the

Construct	VIF
Organizational innovation [OI]	1.873
Organizational learning capability [OLC]	1.303
Top management support [TMS]	2.003
Organizational work climate [OWC]	1.738
Complexity [CTY]	1.093
Technology readiness [TR]	2.038
Compatibility [CBTY]	1.113
Technology capability [TC]	2.092
Blockchain technology adoption [BTA]	1.253
Financial performance [FP]	1.492

Source(s): Conducted by the authors

Table 2. Full collinearity testing

S. No.	Variable	Items' details	Source
1	Organizational innovativeness	OI1: I actively seek new ideas OI2: Like to do things in new ways OI3: Are open to taking risks	Igbaria *et al.* (1997)
2	Organizational learning capability	OLC1: Have a mechanism to store new knowledge OLC2: Encourage their employees to acquire new knowledge and skills OLC3: Employees share their work experiences, ideas, or learning with each other OLC4: Have practices to utilize new knowledge in their IT-related decisions	Muñoz-Pascual *et al.* (2021)
3	Top management support	TMS1: Our top management promotes the use of blockchain technology in the organization TMS2: Our top management creates support for blockchain technology initiatives within the organization TMS3: Our top management promotes blockchain technology as a strategic priority within the organization TMS4: Our top management is interested in the news about using blockchain technology adoption	Maroufkhani *et al.* (2020)
4	Organizational work climate	OWC1: I believe that an effective information sharing environment for developments in blockchain exists among employees in my organization OWC2: I believe that an effective information sharing environment for developments in blockchain exists among employees in my organization OWC3: I believe that a supportive environment for the usage of new blockchain exists among the workers in my organization	Bouckenooghe *et al.* (2009), Wraikat *et al.* (2017)
5	Perceived complexity	CTY1: Learning to use the blockchain technology is difficult for employees CTY2: Blockchain technology is difficult to maintain CTY3: Blockchain technology is difficult to operate	Maroufkhani *et al.* (2020)
6	Technology readiness	TR1: Our organization understands how blockchain technology can support our supply chains TR2: Our organization is dedicated to acquiring the required managerial and technical skills for implementing blockchain technology in supply chains TR3: Our organization is dedicated to ensuring that employees are regularly updated with knowledge on blockchain technology TR4: Our organization adequately understands how to utilize blockchain technology in supply chains	Bhardwaj *et al.* (2021)
7	Compatibility	CBTY1: Using blockchain technology is consistent with our business practices CBTY2: Using blockchain technology fits our organizational culture CBTY3: Overall, it is easy to incorporate blockchain technology into our organization	Maroufkhani *et al.* (2020)

Table 3.
Measurement scales

(*continued*)

S. No.	Variable	Items' details	Source
8	Technology capability	TC1: The current hardware and software infrastructure in our organization can be compatible with blockchain technology TC2: The use of blockchain technology is consistent with our organization's culture and values TC3: The changes introduced by blockchain technology are consistent with the existing practices in our organization	Bhardwaj *et al.* (2021)
9	Blockchain technology adoption	My company has used blockchain technology to . . . . . . BTA1: respond more quickly to change BTA2: Create competitive advantage BTA3: Improve supplier/customer relations BTA4: Enhance savings in supply chain management BTA5: Reduce operating costs BTA6: Reduce communication costs BTA7: Enhance employee productivity BTA8: Expand capabilities BTA9: Improve organizational structure and processes BTA10: Enable faster access to data BTA11: Improve management data BTA12: Improve trust levels BTA13: Improve transactions accuracy	Maroufkhani *et al.* (2020)
10	Financial performance	Compared with your major competitors, how do you rate your firm's performance in the following areas over the past three years . . . . . . FP1: Improving customer retention FP2: Improving sale growths FP3: improving profitability	Maroufkhani *et al.* (2020)

Source(s): Developed based on literature review

Table 3.

significance based on convergent validity such as loading, composite reliability (CR) and average variance extracted (AVE) values (Hair *et al.*, 2019). In the CFA, we found that most items fell within the accepted ranges of loadings 0.761(BTA6)–0.890(BTA1). These are above the recommended scores, such as 0.70, and regarded as excellent (Hair *et al.*, 2019) (see Table 4). However, only four items, namely, TR3, BT4, BTA7 and BTA11, did not reach the acceptable level of loadings scores (>0.70). Therefore, we omitted these unloaded items from further analysis. Next, we noted that all the AVE values were above 0.50 [0.509(FP)–0.729 (BTA)]. This certified that all latent variables shared half of the variance to their apparent measurement items (Fornell and Larcker, 1981). Next, we noted that the CR values for all the constructs of the model [0.706(FP)–0.832(BTA)] were above the cut-off values (>0.70) (Hair *et al.*, 2019). Finally, we noted the acceptable values [0.781(FP)–0.852(TR)] of the reliability of the Cronbach's alpha factors (see Table 5).

Then, we noted the multi-collinearity issues among the latent variables by using the Fornell and Larcker criterion, which is the best measure of discriminant validity (Ab Hamid *et al.*, 2017). Also, we noted that each item loaded highest on their concomitant construct. Also, the square root of each factor's AVE is higher than its association (correlation) with another factor (see Table 6).

	Category	Frequency	%
Destination	Top management	84	30.66
	Middle level management	120	43.79
	Junior management	70	25.55
	Total	274	100.0
Nature of business activity	Automotive	14	5.11
	Information technology	44	16.05
	E-commerce	22	8.03
	Real estate	23	8.40
	Advertising and marketing	26	9.49
	Manufacturing	18	6.57
	Education and training	32	11.68
	Hospitality and leisure	18	6.57
	Financial service providers	52	18.98
	Arts, entertainment and music	25	9.12
	Total	274	100.0
Blockchain technology experience [years]	<1	40	14.60
	1–5	198	72.26
	6 and >	36	13.14
	Total	274	100.0

Table 4.
Demography

Source(s): Primary data collected by researchers

4.3 Structural model

With regard to the confirmation of the hypotheses, the SEM results show that all the constructs of the organizational contexts, such as OI, OLC, TMS and OWC, have a positive and significant effect on BTA [(H1 = β = 0.329; CR = 5.367***; H2 = β = 0.528; CR = 7.018***; H3 = β = 0.425; CR = 7.590***; H4 = β = 0.601; CR = 6.672***; $p < 0.01$)]. Therefore, hypotheses H1 to H4 are accepted. Furthermore, the SEM results show that technology factors, such as PC, TR, PCT and TC on *BTA* [(H5 = β = 0.317; CR = 5.025***; H6 = β = 0.423; CR = 6.182***; H7 = β = 0.406; CR = 5.710***; H8 = β = 0.351; CR = 6.001***; $p < 0.01$)] have a positive and significant effect on *BTA*. Therefore, Hypotheses H6, H7 and H8 are accepted. However, because of its negative effect, Hypothesis H5 is rejected. Finally, BTA has a positive and significant effect on FP (H9 = β = 0.316; CR = 5.262***; $p < 0.01$) (see Table 7 and Figure 2), Therefore Hypothesis H9 is accepted.

5. Discussion and conclusion

In this study, we investigated proposed the role of the organizational and technological enablers of BTA and FP. As regards the connection between organizational factors, this study's findings confirm that OI, OLC, TMS and OWC have positive and significant effects on BTA. These findings are consistent with those of the previous studies by several scholars such as Holotiuk and Moormann (2018), Clohessy and Acton (2019), Allen *et al.* (2020), Wong *et al.* (2020a, b), Malik *et al.* (2021), Li *et al.* (2022), Hamdan *et al.* (2022), Nath *et al.* (2022), Kumar *et al.* (2023), Hashimy *et al.* (2023), Singh *et al.* (2023) and Lin (2023). These findings demonstrate that respondents actively search out novel concepts and enjoy executing tasks in novel ways. They possess, also, risk-taking attitudes. They have a system in place for keeping new information. They support their staff members in gaining new knowledge and abilities. They establish procedures for incorporating further details into their IT-related choices. Each employee exchanges ideas, learnings and job experiences with others. They recommended that their top management fostered BTA within their SMEs and build internal support for the blockchain technology projects. Each SME's top management actively

Construct	Indicator	Factor loadings above 0.5	CR > 0.7	AVE above 0.5	A above 0.7
Organizational innovation [OI]	OI1	0.866	0.764	0.558	0.808
	OI2	0.845			
	OI3	0.838			
Organizational learning capability [OLC]	OLC1	0.898	0.783	0.573	0.834
	OLC3	0.850			
	OLC4	0.859			
	OLC2	0.833			
Top management support [TMS]	TMS1	0.867	0.736	0.532	0.825
	TMS2	0.856			
	TMS3	0.858			
	TMS4	0.827			
Organizational work climate [OWC]	OWC1	0.868	0.788	0.519	0.847
	OWC3	0.839			
	OWC2	0.809			
Complexity [CTY]	CTY1	0.878	0.709	0.555	0.822
	CTY2	0.889			
	CTY3	0.846			
Technology readiness [TR]	TR1	0.849	0.794	0.632	0.852
	TR4	0.830			
	TR2	0.816			
Compatibility [CBTY]	CBTY1	0.875	0.779	0.641	0.815
	CBTY2	0.864			
	CBTY3	0.835			
Technology capability [TC]	TC1	0.834	0.730	0.618	0.782
	TC2	0.821			
	TC3	0.806			
Blockchain technology adoption [BTA]	BTA1	0.890	0.832	0.729	0.799
	BTA3	0.875			
	BTA2	0.853			
	BTA5	0.841			
	BTA13	0.839			
	BTA9	0.825			
	BTA10	0.813			
	BTA8	0.804			
	BTA12	0.789			
	BTA6	0.761			
Financial performance [FP]	FP1	0.893	0.706	0.509	0.781
	FP2	0.890			
	FP3	0.889			

Note(s): CR, composite reliability; AVE, average variance extracted; AVE for the second-order model = averaging the squared multiple correlations for the first-order indicators; all the factor loadings of the individual items are statistically significant ($p < 0.01$)
Source(s): Authors' own estimation

Table 5.
Measurement model

encourages BTA as a strategic goal. Turning to the OWC, each SME's staff members have access to helpful knowledge regarding IT developments and each SME has an efficient information-sharing atmosphere for BTA.

Contrary to the expectations, this study's findings show that there is a positive and significant connection between CTY and BTA (therefore, H5 is rejected). On the one hand, these findings contradict those of previous studies by scholars, such as Bhardwaj *et al.* (2021), Rijanto (2021) and Bag *et al.* (2023), who observed that CTY was better for enhancing BTA intentions and FP. On the other hand, this study's findings are consistent with those of Hartley *et al.* (2022), who demonstrated that CTY was unsuitable in making the SMEs more

	Factors	1 OI	2 OLC	3 TMS	4 OWC	5 CTY	6 TR	7 CBTY	8 TC	9 BTA	10 FP
1	OI	*0.809*									
2	OLC	0.392	*0.781*								
3	TMS	0.483	0.437	*0.792*							
4	OWC	0.392	0.515	0.399	*0.765*						
5	CTY	0.438	0.380	0.433	0.442	*0.756*					
6	TR	0.509	0.356	0.426	0.482	0.370	*0.777*				
7	CBTY	0.462	0.422	0.436	0.372	0.514	0.436	*0.815*			
8	TC	0.371	0.508	0.449	0.396	0.457	0.398	0.427	*0.742*		
9	BTA	0.368	0.444	0.326	0.315	0.436	0.322	0.436	0.326	*0.789*	
10	FP	0.359	0.362	0.402	0.342	0.411	0.300	0.408	0.351	0.382	*0.799*

Note(s): OI, organizational innovativeness; OLC, organizational learning capability; TMS, top management support; OWC, organizational work environment; CTY, complexity; TC, technology readiness; CBTY, compatibility; TC, technology capability; BTA, blockchain technology adoption and FP, financial performance
Source(s): Authors' own estimation

Table 6.
Discriminant validity

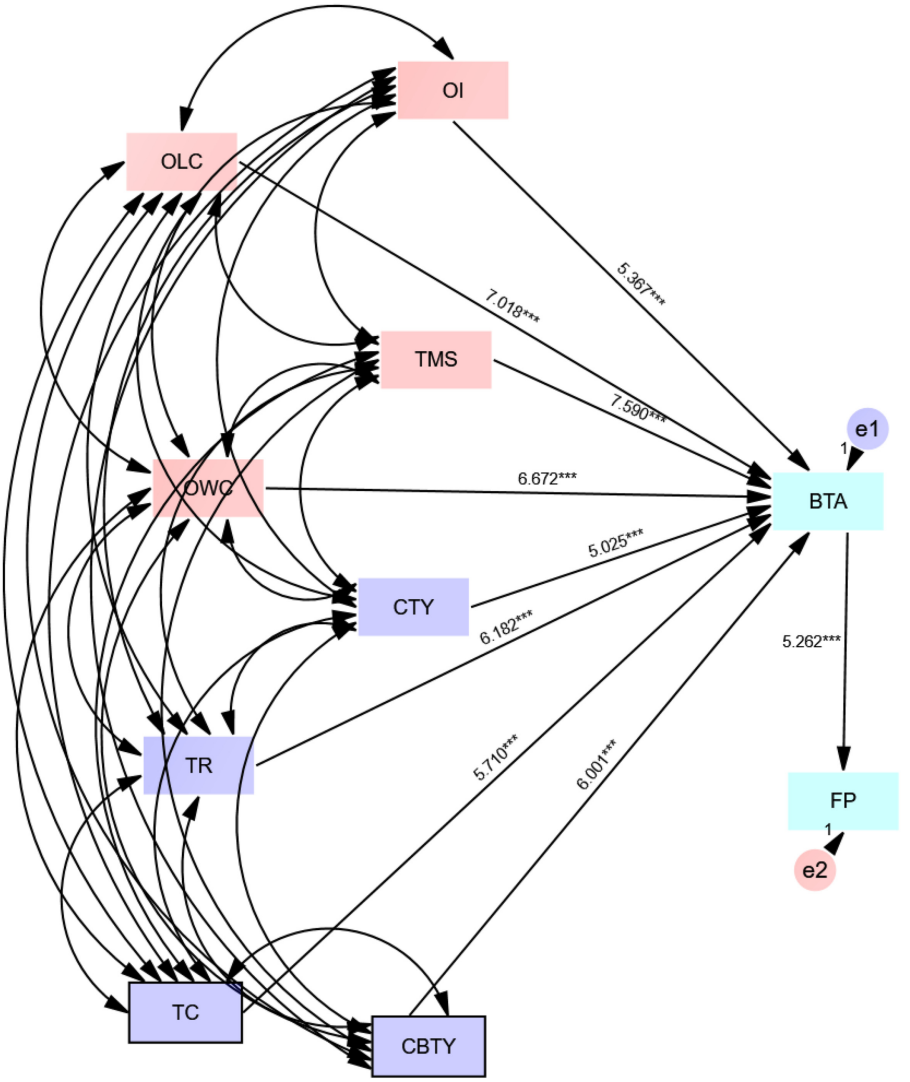
H. No.	Independent variables	Path	Dependent variables	Estimate β (path coefficient)	SE	CR (t-value)	Decision
H1	OI	→	BTA	0.329	0.029	5.367***	[√]
H2	OLC	→	BTA	0.528	0.059	7.018***	[√]
H3	TMS	→	BTA	0.425	0.067	7.590***	[√]
H4	OWC	→	BTA	0.601	0.033	6.672***	[√]
H5	CTY	→	BTA	0.317	0.292	5.025***	[×]
H6	TR	→	BTA	0.423	0.376	6.182***	[√]
H7	CBTY	→	BTA	0.406	0.419	5.710***	[√]
H8	TC	→	BTA	0.351	0.392	6.001***	[√]
H9	BTA	→	FP	0.316	0.336	5.262***	[√]

Note(s): SE, standard error and CR, critical ratio. ***$p < 0.001$
OI, organizational innovativeness; OLC, organizational learning capability; TMS, top management support; OWC, organizational work environment; CTY, complexity; TC, technology readiness; CBTY, compatibility; TC, technology capability; BTA, blockchain technology adoption; FP, financial performance; [√], accepted and [×], rejected
Source(s): Authors' own interpretation

Table 7.
Path coefficients

successful and, indeed, was a significant barrier to their business activities. This study's findings show that SMEs' employees need to learn to use the blockchain technology and that it is not difficult to do so.

Moreover, in accordance with previous studies' findings by such as Wong *et al.* (2020a, b), Seshadrinathan and Chandra (2021), Mamaghani *et al.* (2022), Deng *et al.* (2022), Afifa *et al.* (2023), Li *et al.* (2022), Fernando *et al.* (2023), Nayal *et al.* (2023) and Setyowati *et al.* (2023), this study's findings demonstrate that technological factors, such as TR, CBTY and TC, play a vital role in developing BTA. These findings indicate that SMEs know how BTA can help supply networks and are committed to acquiring the managerial and technical expertise to do so. The SMEs are committed to informing their employees frequently about the blockchain technology since they consider that is compatible with their corporate ethos and how they conduct their business activities. The SMEs' employees asserted that their firms' hardware and software setups were compatible with BTA and that their firms' procedure could be modified to ensure the organizations' values were consistent with the full use of blockchain technology.



Source(s): Authors' own estimation

Figure 2.
Path analysis

Finally, this study's findings confirm that there is a positive and significant connection between BTA and FP. These findings are consistent, also, with those of many previous studies in several contexts by such as Sheel and Nath (2019), Khalil *et al.* (2022), Naclerio and De Giovanni (2022), Ronaghi (2022), Farnoush *et al.* (2022) and Sun *et al.* (2022). These findings indicate that firms have used blockchain technology to adapt quickly to change and that better supplier/customer relationships provide a competitive edge. This is due to their reducing operational and communication costs while, at the same time, improving supply chain management efficiencies. Through facilitating quicker data administration and access, such changes improve the firms' systems and procedures and, in turn, significantly increase

worker productivity though enhancing their skills and levels of confidence. Finally, when compared to their main rivals, they increase their firm's success in customer retention, sales growth and profitability.

Overall, this study's findings demonstrate that organizational factors, such as OI, OLC, TMS and OWC, are positive predictive powers in enhancing BTA. In addition, this study's findings confirm the positive and significant association between technological factors, such as CTY, TR, CBTY and TC, on BTA. Finally, BTA is the crucial factor which improves the firm's FP.

6. Implications of this study

6.1 Practical implications

The study confirmed a robust role of OI, OLC, TMS and OWC in developing BTA. More specifically, the positive confirmation of OI toward B*TA* would assist policymakers and SME authorities in extending operational improvements, strategic advantages and the capability to thrive in a dynamic and competitive business environment. Likewise, in the study results, organizations with a strong learning capability can quickly grasp blockchain technology's concepts and potential applications. This enables faster adoption and adaptation to the changing technological landscape, giving SMEs a competitive advantage. This would also encompass a holistic approach to learning, innovation, skill development and strategic decision-making, positioning organizations for success in the digital era. Moreover, with committed support from top leadership, SMEs can allocate necessary resources for BTA, align initiatives with overall business strategy, foster an innovative culture, and effectively communicate the benefits of blockchain to employees and external stakeholders. This assistance would mitigate resistance to change, accelerate decision-making and ensure the long-term sustainability of BTA, enabling SMEs to stay competitive, innovative and adaptable in a rapidly developing business context. The positive connection between OWC and BTA in the SME contexts creates a supportive environment that facilitates communication, collaboration and the development of a culture that embraces innovation and change. Similarly, confirming the positive effect of technology constructs such as CTY, TR, CBTY and TC on BTA would offer guidance in formulating effective technology adoption strategies that would robustly enhance technological capabilities to facilitate smooth blockchain integration. Technology developers would leverage this insight to design user-friendly and interoperable blockchain solutions to assist SMEs in navigating the complexities of adoption. Policymakers may use the findings to create incentive programs and regulatory frameworks that further inspire and help SMEs in espousal blockchain technology. Finally, the potential positive association between BTA and FP would support policymakers and owners of SMEs in driving a strategic move for SMEs to enhance their overall business operations.

6.2 Theoretical implications

The empirical evidence of this study would exhibit the potential theoretical implications and contributions to academic discourse. The positive effect of OI, OLC, TMS and OWC on BTA would offer paths for researchers to develop theories to consider the role of BTA in SMEs and other sectors. Besides, technological factors, i.e. CTY, TR, CBTY and TC toward BTA, offer valuable insights into understanding these constructs in SMEs. The study provides and confirms an integrated framework among SME managers. These contextual arenas would further enrich the depth of domain literature of BTA, management and technology specifically for a developing context like Pakistan. As such, this study's findings make a thoughtful and substantial impact on the theoretical landscape by fostering the growth of knowledge and understanding at the intersection of BTA, organizational dynamics, FP, and, more particularly, within the emerging markets. Finally, the study would further validate these measurement scales through a robust framework among SME managers of a developing context.

7. Limitations of this study and recommendations for future research

The limitations of this study are that it used only cross-sectional data, collected from the managers of Pakistan's SMEs, and was restricted to the organizational and technological factors related to BTA and its relationship with FP. Also, we used no concerned theory to underpin this study's model and hypotheses. We did not apply the technology acceptance model (TAM) in this study because it primarily addressed individual-level factors related to the acceptance of technology and focused on user perceptions like ease of use and usefulness (Malatji *et al.*, 2020; Alfadda and Mahdi, 2021; Won *et al.*, 2023). Finally, we based this study's findings on 274 samples.

We recommend that more longitudinal studies be conducted to further confirm this model and, more particularly in a developing context. We recommend that future studies examine other constructs such as motivation, attitudes, need for achievement, security and cost concerns and fascinating conditions toward BTA in. More specifically, we recommend that future studies examine the dark side of blockchain technology in terms of bitcoins, crypto currency, etc. In addition, we recommend that future studies consider environmental factors, such as regulatory environment, technological infrastructure, sustainability considerations, cybersecurity concerns and geopolitical factors, to predict SMEs' use of BTA. Future research should compare companies focusing on with those focusing on services. Finally, we recommend that future studies focus not only on the manufacturing and service sectors but also on the other health and education sectors.

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