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Sustainable organizational performance through blockchain technology adoption and knowledge management in China

Yunpeng Sun[a,*], Mohsin Shahzad[b], Asif Razzaq[b,c]

[a] School of Economics, Tianjin University of Commerce, Tianjin, PR China
[b] School of Economics and Management, Dalian University of Technology, Dalian, PR China
[c] Department of Business Administration, ILMA University, Karachi, Pakistan

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ABSTRACT

Global competition encourages all industries to attain cutting-edge performance by continuously developing their goods and processes; knowledge is the most effective and powerful weapon for long-term sustainability and growth. Effective blockchain adoption (BCA) and better supply chain visibility (SCV) via organizational and production knowledge management (KM) have emerged as the most powerful instruments for improving sustainable organizational performance (SOP). Therefore, drawing on the resource-based view and technology acceptance model, this study seeks to underline the empirical relationships among KM, BCA, SCV, and SOP in a developing country context of Chinese manufacturing, as research in this sector is still nascent encompassing these constructs. Data were collected from 289 respondents (senior, middle, and junior) level staff members from manufacturing industries and analyzed by a novel approach; partial least square structural equation modeling (PLS-SEM). The empirical analyses indicated that KM significantly impacts BCA. BCA also positively affects SCV. Besides BCA, the KM also positively impacts SOP. The mediation effect analysis revealed the significant serial mediating impact of BCA and SCV on the relationship of KM to SOP. This study enriches the inadequate literature and throws light on BCA from an organizational resource perspective. The study deepens our understanding and delivers valued insights to the managers and policymakers of manufacturing industries concerning the role of KM, BCA, and SCV in achieving SOP.

Introduction

The rapid growth of technology provides opportunities for new enterprises, hastens global rivalry, and reduces corporate lifecycles. Scientific and technological improvements are driving the demand for new management practices and, as a result, altering organizational structures (Aslam et al., 2021; Sun et al., 2022). Blockchain technologies are often disruptive and fundamentally transform the corporation and supply chain Kim & Shin (2019). Though larger organizations have an adequate level of information technology infrastructure to assimilate their supply chain, domestic firms struggle to oppose many supply chain intricacies that compel the development of an agile and responsive supply chain Irfan et al. (2020). Blockchain technology adoption (BCA) can boost supply chain visibility (SCV), integration, and organizational sustainability (Khan et al., 2022). Immutability of information, transparency, and smart contracts are just some of the advantages that BCA offers to encourage connectivity and reliability, which are critical for SCV (Kim & Shin, 2019). Every supply chain has the potential to reap the benefits of BCA in a variety of ways, including the maintenance of quality, the avoidance of counterfeiting and fraud, and cost savings (Irfan et al., 2020; Khan et al., 2022). The SCV and sustainable organizational performance (SOP) are both improved due to BCA. Moreover, it may assist in increasing integration among members in the supply chain, making supply networks more visible and traceable to improve their sustainable performance (Munir et al., 2022). Because the supply chain operations are so important in getting the product to the end customers, companies need to have a green orientation in their supply chains, which will ultimately result in green supply chains (Yousaf, 2021). Organizations are paying close attention to sustainable and green supply chain initiatives for SOP in light of the triple bottom line (TBL), highlighting economic, environmental, and social issues (Lim et al., 2017; Quarshie et al., 2016). Recently, sustainability has emerged as the dominant research area, which deals with environmental

* Corresponding author, School of Economics, Tianjin University of Commerce, Tianjin, PR China
E-mail addresses: tjwade3@126.com (Y. Sun), mohsin@mail.dlut.edu.cn (M. Shahzad).

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protection laws, adoption of green technologies, regulatory pressure, and responsive supply chain initiatives (Geng et al., 2021; Jin et al., 2022; Shahzad et al., 2022a).

In the modern, fast-paced, and technologically-driven world, the companies run their operations in a knowledge economy that is supported by extensive knowledge activities that play a vital role in both the production and service divisions (Shah et al., 2013; Shahzad et al., 2020a). Companies have realized the significance of knowledge management (KM) as an operational tool for gaging the competitiveness of their organizations (Ooi, 2014). Information gathering, dissemination, and use for the purposes of the benefit of organizations is the most important factor that determines the performance of businesses (Darroch, 2005). Top management of various multinational organizations, such as Tesla, Nike, Matsushita, and Unilever, among others, could use the knowledge obtained from numerous stakeholders to develop a strategy to generate more revenue and other opportunities and help them accomplish green and sustainable aims (Cui et al., 2020; Davenport et al., 2019; Shahzad et al., 2020b). Among the other component of organizational success, such as sentiment of partnership, mutual agreement, support from the top management, the effective exchange of knowledge and communication is the most substantial element in reinforcing the buyer-supplier relationship (Song et al., 2020). Sharma et al. (2014) highlighted that a good relationship between the buyer and supplier through effective information sharing avoids expensive returns and void warranties. Further, Aslam et al. (2021) acknowledged that inefficient collaboration with the suppliers leads to ineffective design of new parts and development (Shahzad et al., 2022b). Therefore, acquiring and applying relevant knowledge to the stakeholders in the supply chain assists in creating trust and identifying the best practices that accelerate product development, align, and integrate the process and requirements of the industry clients for future success and competitive edge (Khan et al., 2022; Munir et al., 2022). Many scholars have investigated the characteristics that influence SOP in this area, where competition rises with every passing day. Shahzad et al. (2019) found that knowledge acquisition significantly affects CSR and sustainable performance in the Asian region. Further, Awan et al. (2020) acknowledged that knowledge acquisition and sharing play a substantial role in attaining green and sustainable organizational outcomes. It was discovered that KM, organizational learning, supply chain cooperation, transparency, and communication all significantly impact a business's environmental, economic, and social sustainability (Lim et al., 2017; Tseng et al., 2017). With the integration of BCA and SCV for SOP, KM is still in its infancy in developing countries (Aslam et al., 2021; Gupta & Barua, 2018; Khan et al., 2022). Detailed research focusing on implementing BCA backed by KM for SCV and SOP in developing countries is desperately needed. Even though various empirical researches have tried to address these challenges using samples from developed and developing nations, no study focuses on China (Ding & Shahzad, 2022; Ding et al., 2021). Local organizations recognize the significance of KM and technological spillovers in meeting the severe international trade and investment standards. As a result, the current study focuses on the impacts of the KM BCA and SOP; further, the effect of BCA on SCV and SOP improves the manufacturing industries' sustainable growth. To the best of our best knowledge, scholars have given significantly less intention to this complex phenomenon. This study aims to diminish the uncertainty around these interactions by combining the following research questions in an encompassing model:

- Does KM improve BCA and further enhance SCV for SOP?
- How do BCA and SCV mediate the relationship between KM and SOP?

The investigation of these research issues adds to the literature in various ways. First, the proposed theoretical model examines how KM directly influences BCA and SOP; moreover, the link of KM to SOP via BCA and SCV was estimated using structural equation modeling (SEM). Secondly, this research sheds light on an essential concept of BCA and SCV that increases SOP, which is currently understudied in the Chinese context. This research also helps managers and policymakers to implement BCA initiatives supported by KM in organizational processes to increase SCV sustainable performance in the long run. In the following parts, a review of the relevant previous literature is examined. This is then followed by a discussion of the methodology, the results, and the conclusions. Finally, the research is brought to a close with some suggestions for the future.

Theoretical footing and hypotheses development

Theoretical footing

Resource-based view/ knowledge-based view

One of the bases of this research is the resource-based view (RBV) put forward by Barney, which circulates around the notion of achieving a competitive edge by improving the ability to use the available resources (Barney et al., 2011). However, the organization can only address the demands of a dynamically changing environment given that it possesses the required capabilities. The two fundamental components for RBV are the capabilities and resources, both intangible and tangible, and capabilities being the subset of that organization, which is mainly nonsalable and supports the throughput enhancement of associated resources (Savino & Shafiq, 2018). Broadening the spectrum of RBV to include the business analytic capability for optimum performance, the resources ought to be valuable, inimitable, rare, and non-substitutable (VIRN) (Andersén, 2021). The knowledge-based has, in turn, been increasingly interested in both information and processes, strategic management, innovation management, and literature (Lee et al., 2013; Sun et al., 2021). Further, the innovative capabilities have always yielded sustained achievement over more extended periods (Barney et al., 2011).

Similarly, positioning knowledge as a powerful factor for economic success has led to the company's enlargement of a knowledge-based view (KBV) (Shahzad et al., 2020a). The KBV of the firm is widely recognized as a recent extension of the RBV (Shahzad et al., 2021; Xie et al., 2018). This theory views knowledge and expertise as its most valuable strategic asset; in that sense, this viewpoint is an extension of the firm's RBV. Further, KBV is typically challenging to replicate since they exist inside specialized persons. Various knowledge resources and capabilities are the primary competitiveness foundations that improve long-term success (Dangelico, 2017; Ooi, 2014). These knowledge resources help understand the external competitive environment and how organizations can employ BCA and SCV to boost SOP.

Unified theory of acceptance and use of technology (UTAUT)

Many types of research have been conducted to predict the adoption and utilization of technology. Venkatesh et al. (2016) presented a Unified Theory of Acceptance and Use of Technology (UTAUT) framework for new technology adoption. This theory progresses by combining the dominant structures of prevailing models, from human nature to computer science. There are four key factors: performance and effort expectancy, facilitation conditions, and social influence, that affect the intention to practice information technology (Venkatesh et al., 2003). Despite UTAUT's widespread acceptance, three additional constructs were added (Venkatesh et al., 2016): hedonic motivation, price value, and habit proposed in UTAUT2. In comparison to the UTAUT, the new constructs put forward in the UTAUT2 brought essential improvement in the adjustment of behavioral intention (56 to 74%) and technology use from 40 to 52% The relationship between perceived usefulness and usage behavior was substantially more substantial than perceived ease of use, indicating that perceived ease of use could be a causal precursor to perceived usefulness (Jahanshahi et al., 2020).

The global sustainable economy is undoubtedly restricted by escalating hazardous emissions and pollutants threatening environmental degradation and climate change (Khan et al., 2021). Green innovative and novel technologies and monitoring policies are imperative to regulate and encourage sustainable performance (Li et al., 2020). Many academics modeled the essential factors of blockchain technology adoption for improved decision-making, which are further expanded in the UTAUT model, and confirm the rationality of their qualities (Zhao & Bacao, 2020). Based on the selected variables' literary theories and literature review, we propose the following theoretical model in Fig. 1 for the consequent empirical investigation.

Hypotheses development

Knowledge management and blockchain adoption

KM has been extensively acknowledged as a primary tool for improving organizational performance (Darroch, 2005). Depending on the features which are available in the structure of the life cycle the process can begin with the concept and formation of the knowledge and can be continued to benefit the situation for the distribution and utilization of the knowledge (Foo et al., 2018). Communication between people and societal systems generates knowledge, defined as "a set of defensible beliefs that could facilitate an individual action" (Nonaka, 1994). Various features of the KM have been used in previous research investigations (Darroch, 2005; Ooi, 2014; Shahzad et al., 2019). We used two KM dimensions following these researches: knowledge acquisition and application. Knowledge acquisition includes gaining new and enhanced knowledge from various stakeholders to certify continuous improvement in every organization (Shahzad et al., 2020a). Application of knowledge includes utilizing and sharing the information gained from clients and other stakeholders among staff to improve the firm's processes all the way up to the final product (Cui et al., 2020).

The manufacturing organization uses an advanced machine monitoring system for maintenance operations. The real-time performance information can be pushed to all the nodes in the blockchain. KM advanced organizational practices for integration and verification can ease the utility of blockchain technology in the system (Aslam et al., 2021). Thus, the knowledge can be transferred to a database based on the blockchain infrastructure, which can then be transparent and accessible to the authorized nodes available within that blockchain network (Khan et al., 2022). The information has flowed simultaneously to all the parties, and upon the acceptance protocol, the block is updated, and the knowledge is transferred. The knowledge in the form of data is entered in the BC at a specific time. After a successful encryption procedure on the updated block, the newly added information is made available to the users (Kim & Shin, 2019). The acquired knowledge through the organizational system must be shared with the right audience for its proper utilization and advantage. Blockchain facilitates the feature of transparency and immutability, which is supported by knowledge management for its sharing and transmission (Rehman et al., 2015). Despite the fact that some academics have discovered a negative association between KM and organizational performance, they nevertheless encourage investing in R&D to generate new ideas for novel technology adoption (Chavoshi & Hamidi, 2019). The constant acquisition and development of the knowledge base make it easier for the organization to adopt and merge disruptive technologies and maintain an agile response to the flexible market needs using forefront technologies such as blockchain Lim et al. (2017). Further, Shahzad et al. (2020b) highlighted that KM strongly affects sustainable organizational practices. Hence on the ground of the above study, we propose that:

H1: Knowledge management positively affects blockchain adoption

H1a: Blockchain adoption mediates the relationship between knowledge management and sustainable organizational performance.

Blockchain adoption and supply chain visibility

The supply chain is an organizational network with internal and external stakeholders to manage activities, supplies, and information to effectively transform the raw materials into end products for the users (Del Giudice et al., 2020). The previous studies highlighted the major handlers in the network responsible for transforming the supply chain are hyper-segmentation and production of the goods that need to be transparent to provide full control over the production and requirements (Tseng et al., 2016). The decisive steps to manage the supply chain with greater visibility and control may include the structured ordering of the parts and products, purchasing, and logistics management of the manufactured products into a single manageable and traceable platform (Tseng et al., 2017). The blockchain-based systematic approach can offer a complete end-to-end visible supply to ease off the complexity and eradicate any double-spending. The BCA-based supply network system incorporates the cryptography and public key substructure with the modeling used on the peer-to-peer network in a decentralized agreement to synchronize the distributed database without any centralized authority (Munir et al., 2022).

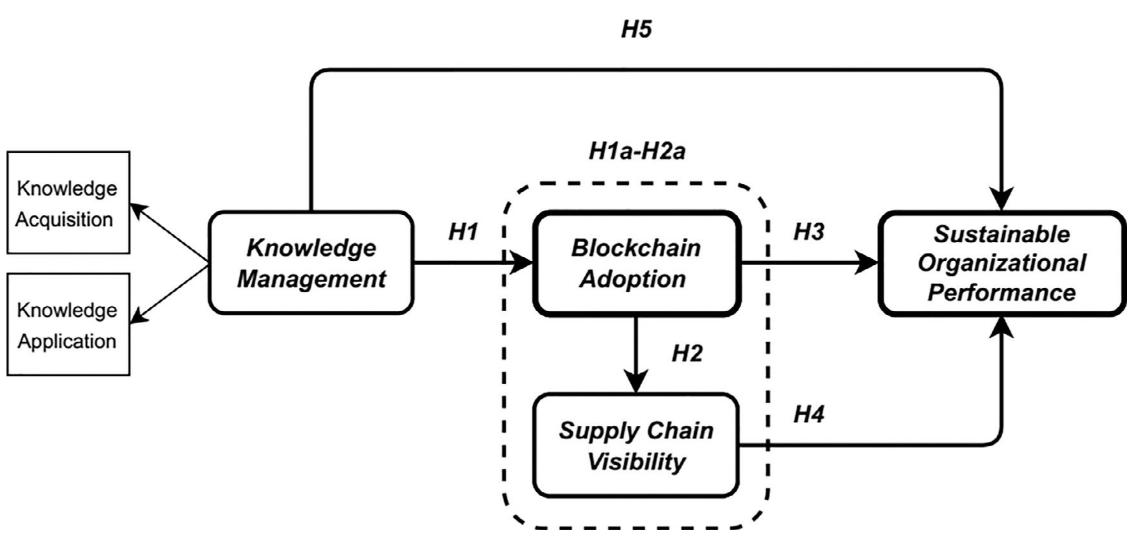

Fig. 1. Research model of the study.

The visibility that blockchain provides allows companies to reinforce their relationship with important stakeholders with full transparency. Since every block in the blockchain network represents two important pieces of information, i.e., a decentralized database and the structure of the data, which shows the list of the blocks representing the transactions, and every single block is chained cryptographically with a hash value. This smart contract enables the parties in the supply chain networks to be updated whenever the new information is updated simultaneously (Norta, 2017). Further, transparency helps the nodes understand the causes and impacts of the manufacturing and business environment choices. Accurate data acquisition, storage, and transmission enable factors to gain trusted information successfully (Irfan et al., 2020). Previous studies highlighted that BCA offers the ability to operate on a decentralized network, meaning no single person owns or regulates the framework (Khan et al., 2022). By eradicating the need for a third-party intermediaries or control, friction in all forms of value exchange can be reduced, including costs, risk, data security, and control (Bogart & Rice, 2016). An important feature of a BCA to highlight transparency is its power to bring a distributed network to an agreement on the form of data and network rules without the need for a centralized authoritative body. As a result, any user may suggest improvements to a system that is visible to all the other parties but is enforced only if all network participants agree, resulting in increased accountability and confidence. Hence on the ground of the above study, we propose that:

H2: Blockchain adoption positively affects the supply chain visibility

H2a: Supply chain visibility mediates the relationship between Blockchain adoption and sustainable organizational performance.

Blockchain adoption and sustainable organizational performance

Organizational business processes are often plagued by slowness and poor data quality (Sebhatu, 2009). Consider blockchain as a minor component of an end-to-end process that is distributed to many parties without the need for expensive infrastructure, is totally encrypted, auditable, and does not require data replication or supervision by a central mediator (Munir et al., 2022). Blockchain is based on a shared ledger (of records) shared with transacting entities. Without a central administrator, all parties exchange this knowledge through a distributed network (Aslam et al., 2021; Wang et al., 2022). Despite the fact that all of the data is stored in the common ledger, only pertinent information (encrypted) is visible to key stakeholders based on a set of business rules decided upon at the outset. Since data is stored on the immutable blockchain when it is transmitted, both parties can see the status of a transaction. As a result, many data hand-offs and various versions of data are avoided (Norta, 2017). The organizational performance is improved through data exchange, optimizing business processes with smart contracts, lowering operating costs, enhancing protection and performance, improving collaboration efficiency, and creating a trusted system. Blockchain technologies can improve operating performance and effectiveness while also contributing to social and economic growth (Mikalef & Pateli, 2017). Aslam et al. (2021) highlighted that BCA enhances supply chain management practices, further boosting sustainable performance. Furthermore, Kim & Shin (2019)) BCA also improves supply chain partnership and firm performance. Hence on the ground of the above study, we propose that:

H3: Blockchain adoption positively affects sustainable organizational performance

Supply chain visibility and sustainable organizational performance

The principle of SCV works in a cycle with other supply chain techniques to improve business outcomes in addressing various supply chain challenges (Irfan et al., 2020). Adopting the model of visibility and transparency leads to a significant effect on organizational performance (Gimenez et al., 2012). Petersen et al. (2005) stressed the position of SCV in the process of organizing events and complying with schedules. SCV is directly related to reducing inventory safety risk, and distribution efficiency is improved. The internal visibility of the supply chain assists in having a better-integrated structure between the departments varying from the production department to finance to the supply chain department (Tseng et al., 2017). The entire business execution is enhanced with the external supply chain visibility among the supply chain partners to identify supply chain members from which data is gathered, such as data from a focal firm hierarchy to classify and maximize supply (Tseng et al., 2016). Sharing knowledge among supply chain participants is critical to ensuring supply chain visibility (Chowdhury et al., 2017). This visibility means being aware of events and patterns so that more precise steps can be taken to maintain or attract clients, strengthen channel relationships, or counteract competitors. Due to a lack of visibility in the supply chain, the various members buffer inventory to mitigate risk factors. The increasing importance of SCV enables greater productivity and effectiveness, prompting businesses to invest in enhancing this capability. Effective supply chain management helps ensure the processes are not disrupted (Zhu et al., 2007). Further effective supply chain helps to promote sustainable growth (Irfan et al., 2020). Tseng et al. (2017) ensure that supply chain improvements regulate a firm's sustainable performance. Sharing data between departments and organizations allows for a holistic view of the operation. Customers are less likely to accept delivery or product defects in a competitive market. Hence on the ground of the above study, we propose that:

H4: Supply chain visibility positively affects the sustainable organizational performance

Knowledge management and sustainable organizational performance

KM is defined as a controlled arrangement to effectively manage knowledge where information development, acquisition, transformation, implementation, and security are all part of the KM process (Ooi, 2014). When the absorptive ability is present, information sharing positive impacts organizational success. Information sharing provides opportunities for a company to improve its efficiencies and gain that competitive advantage (Shahzad et al., 2019). The KM enablers such as top management hierarchy and support, intra-organizational culture and values, information technology, employees and organizational structure critically add value and improve firm efficiency (Darroch, 2005; Rehman et al., 2015). Further, Shahzad et al. (2019) found that knowledge acquisition significantly affects CSR and firm sustainable performance in the Asian region. Shahzad et al. (2020a) recognized that KM strongly affects CSR and green and sustainable innovation for organizational performance. Hence on the ground of the above study, we propose that:

H5: Knowledge management positively affects the sustainable organizational performance

Methods

Sampling and data collection

This research aims to examine the influence of KM on adopting and using blockchain to enhance organizational performance through supply chain visibility in Chinese manufacturing firms. ISO-certified manufacturing industries listed on the "Shanghai Stock Exchange" comprise the target population. This study focuses on China, considering that over 90% of Chinese manufacturing industries subsidize the overall business establishment and reasonable GDP contribution. Chinese manufacturing industries contribute 56 percent to the annual GDP with 75% of employment opportunities (Waheed & Zhang, 2020). Manufacturing has enormous potential to create economic growth and prosperity in developing countries (Shahzad et al., 2022a). The survey administration was carried out using email and e-messages to distribute and reconcile the questionnaires. Online and offline survey methods were used to obtain data from managers of various production organizations. They were invited to reply and give their thoughts on the performance of the researched factors in their company using a five-point Likert scale demonstrating 1 ("strongly disagree") and 5 ("strongly agree"). The authors surveyed only management personnel. The word "managerial personnel" is used in this study to refer to individuals who supervise the work of at least five other people. The survey asked junior, middle, and top executives from manufacturing organizations to share their perspectives on the importance of blockchain technology adoption and how these are assisting them in becoming more competitive operationally and environmentally friendly. The survey questionnaire was initially written in English before being translated into Chinese by some Chinese researchers. During the pilot testing period, however, language and industry experts double-checked the wording of the questions. Precisely, a valid response rate of 41% was achieved after receiving 289 effective feedback from 700 professionals who confirmed taking part in the survey. Demographic details are given below in Table 1. For sample size, this study adopted the ten times rule, which Hair et al. (2016) authorized: "10 times the largest number of structural paths directed at a particular latent construct in a structural model."

Construct measurements

The constructs used in this analysis were primarily derived from previous research studies, with modifications made to meet the needs of the information-sharing literature. First, knowledge management was derived and developed from the literature of Darroch (2005), Wang et al. (2008). These measures were related to acquiring and utilizing the effectiveness of knowledge within the right time with the right people. Second, the measures on blockchain adoption were derived and modified from the studies of Janssen et al. (2020), Venkatesh et al. (2020). We used these measures to ask the correspondents about the adaptability of blockchain to streamline manufacturing operations. Third, measures of supply chain visibly were adapted from the research of Gosain et al. (2004), Morgan et al. (2018). These measures were supposed to ask the respondent about the supply chain visibility and the impact on the firm's performance. Lastly, the constructs on sustainable organizational performance were taken and adapted from Le (2022), Wang (2019) studies. These measures were intended to inquire the respondent about the operational performance.

Data analysis and results

Partial least square structural equation modeling (PLS-SEM) was used to evaluate the collected data, as recommended by Hair et al. (2017). PLS-SEM comprises two elements. The first is the measurement model, called the outer model. The second one is the structural model, which is known as an inner model. It is a causal prediction system that prioritizes forecasts while assessing statistical models to explain causal relationships (Hair et al., 2017). This approach is beneficial in many ways. PLS-SEM works proficiently with small sample size, many constructs, and related questions by calculating the separate OLS regression for measurement and structural models (Hair et al., 2017).

Assessing common method bias

Because all of the questions were answered by a single informant, the Harman one-factor test was used to measure common method bias (CMB). The results discovered that the maximum variance explained was 30.03%, less than 40%, representing that CMB was not an issue in our research (Babin et al., 2016). Further, following Kock (2015), a full collinearity calculation was also performed to assess values of variance inflation factors (VIF) of latent constructs. The results in Table 5 indicate that the highest inner VIF value was 2.905, which was under the threshold value of 3.3, signifying that the study does not have the issue of CMB. In addition, following Bagozzi & Yi (1990), a correlational matrix procedure was adopted, which shows the presence of CMB if correlations among the principal construct are considerably large (i.e., $r > 0.90$). Table 5 indicates that correlations among latent constructs are not high, which shows the absence of CMB in our study.

Measurement model analysis

In order to ensure the fitness of a measuring tool, the reliability and validity of measures are first checked. Reliability ascertains the consistency in results measured using the instrument, whereas validity is all about the reflection of measures and variables of a particular

Table 1
Demographics detail.

Respondent	N	%
Gender		
Female	178	61.59
Male	91	31.49
Nondisclosed	20	6.92
Age		
20 to 30	81	28.03
31 to 40	102	35.29
41 to 50	75	25.95
Above 51	31	10.73
Education		
College	66	22.84
Bachelors	105	36.33
Masters	85	29.41
Technical	33	11.42
Work Experience		
Less than 5 years	94	32.53
5 to 10 years	109	37.72
10 years or more	86	29.76
Job Title		
Executive	45	15.57
Sr. Officer	83	28.72
Manager	71	24.57
Sr. Manager	90	31.14

Table 2
Summary of quality criteria of measures.

	Factor Loading	Cronbach's Alpha	rho_A	Composite Reliability	AVE
BCA		0.842	0.857	0.893	0.676
	0.817				
	0.810				
	0.827				
	0.834				
KM		0.847	0.851	0.897	0.685
	0.815				
	0.834				
	0.821				
	0.840				
SOP		0.917	0.926	0.935	0.706
	0.816				
	0.828				
	0.816				
	0.855				
	0.877				
	0.848				
SCV		0.905	0.963	0.931	0.772
	0.873				
	0.908				
	0.842				
	0.891				

concept. We measured the reliability and validity to operationalize the construct through different means. The results given in Table 2 specify that the standardized factors loadings in the outer model were above the threshold of 0.70 (Hair et al., 2017). We investigated the probability of multicollinearity by examining the tolerance and variance inflation factor (VIF). The low tolerance number suggests that the measures are perfect, and there is less likelihood of multicollinearity. The VIF value must be less than the cut-off value of 3.3. VIF showed that there was no problem with the multicollinearity of the dataset, as shown in Table 5 (Sarstedt et al., 2017). Furthermore, all constructs' Cronbach's alpha and composite reliability values were larger than the threshold, indicating that our measurement approach was reliable and convergent. Table 2 highlights the findings of major performance metrics for evaluating the measurement model's quality.

Evaluation of discriminant validity

To examine if the constructs utilized differed from one another, discriminant validity (DV) was assessed. We judged the discriminant validity through various methods. We investigated the association between shared variance between constructs and the value of extracted average variance (AVE). Table 3 shows that the root of AVEs for all constructs was greater than the values of the correlation. Furthermore, all items' corrected total item correlation (CITC) values were larger than the cut-off value of 0.5, demonstrating that our measuring model had no discriminant validity issues. Furthermore, all items' corrected total item correlation (CITC) values were greater than the cut-off value of 0.5, indicating that there was no DV issue in our measuring model (Fornell & Larcker, 1981). Besides, the Heterotrait-Monotrait (HTMT) ratio was calculated using the Henseler et al. (2015) method, which is measured by a current approach to DV analysis. Hair et al. (2017) argued that HTMT values greater than 0.90 indicate short DV. Henseler et al. (2015) proposed more stringent criteria that an HTMT value should not be more than 0.85. Table 4 displays the HTMT values of all assessed constructs that do not exceed the criteria. As a result, the DV issue is not present in this study.

Structural model analysis

Structural equation modeling (SEM) was engaged to test the hypotheses and answer the promising research questions for structural model analysis. First, it was examined for path coefficient values, R^2, i.e., explanatory power, Q^2 for the study model's predictive significance. The bootstrapping method was used to examine the significance of the hypotheses (5000 resamples). The findings are shown in Table 6 and Fig. 2. The results support our hypothesis of the significant positive effect of KM on BCA (H1, β = 0.487) and SOP (H5, β = 0.282), respectively. The path coefficients for the effects of BCA to SCV (H2, β = 0.251) and SOP (H3, β = 0.186) were also positive and significant. Lastly, the effects of SCV on SOP (H4, β = 0.213) were also positive and significant, respectively. Further, the research model has explained 0.238 for BCA, 0.063 for SCV, and 0.259 for SOP. Furthermore, Hair et al. (2017) offered a more conservative way of assessing the predictive significance of the model using a Q^2 rather than depending just on the R^2. As a result, the Q^2 test was used, containing 0.151 for BCA, 0.037 for SCV, and 0.175 for SOP, as Stone (1974) recommended. Because our model has a Q^2 value larger than zero, it has strong predictive relevance for endogenous constructs.

Table 3
Discriminant validity (Forner and Lacker criterion).

	BCA	KM	SOP	SCV
BCA	0.822			
KM	0.487	0.827		
SOP	0.377	0.424	0.840	
SCV	0.251	0.245	0.328	0.879

Table 4
Discriminant validity (HTMT).

	BCA	KM	SOP	SCV
BCA				
KM	0.557			
SOP	0.409	0.470		
SCV	0.247	0.254	0.331	

Mediation test

This study inspects the mediating role of BCA and SCV among KM and SOP. Testing for the type of mediation in a model requires running a series of analyses through a bootstrapping approach, as Hair et al. (2017) suggested. At first, this study assessed the indirect effects of KM on SOP through BCA and SCV. This study found the substantial indirect effects of KM to SOP (β = 0.091) and BCA to SOP (β = 0.053). Further, we evaluated the direct effect of KM on SOP and BCA on SOP and found substantial positive influences of KM to SOP (β = 0.282) and BCA to SOP (β = 0.186). The results are given in Table 7, which leads to partial mediation. This study detected the sign of the effects (p_1*p_2*p_3); it is determined that the BCA and SCV have complementary partial mediation. Hence, H1a-H2a is fully reinforced.

Importance-performance map analysis

The IPMA is a beneficial systematic device in SEM that visually depicts the space among the relevance and overall performance of variables and broadens the standard path coefficient estimations in a greater diagnostic manner. IPMA's essential intention is to decide which antecedents have excessive overall performance, however low importance, and vice versa Hair et al. (2017). The SOP is a model dependency structure predicted from the three ancestors of KM, BCA, and SCV. Fig. 3 shows that the KM importance value is 0.485, and the performance value is 70.610. Similarly, the BCA severity value is 0.250, and the performance value is 70.093. Finally, the SCV importance value is 0.188, and the power value is 62.446.

If we evaluate KM with different focused constructs, KM has better significance and overall performance. In the ceteris paribus situation, one unit's growth in KM overall performance will result in a 0.485-unit development in overall organizational performance. As a

Table 5
Discriminant validity (cross loadings).

	BCA	KM	SOP	SCV	VIF
BCA1	0.817	0.321	0.265	0.175	2.009
BCA2	0.810	0.397	0.336	0.218	1.774
BCA3	0.827	0.498	0.366	0.231	1.675
BCA4	0.834	0.344	0.240	0.186	2.171
KM1	0.377	0.815	0.308	0.212	1.932
KM2	0.431	0.834	0.338	0.222	1.926
KM3	0.337	0.821	0.384	0.212	1.952
KM4	0.457	0.840	0.371	0.169	1.907
SOP1	0.279	0.257	0.816	0.240	2.399
SOP2	0.252	0.282	0.828	0.235	2.451
SOP3	0.372	0.411	0.816	0.287	2.132
SOP4	0.312	0.365	0.855	0.306	2.633
SOP5	0.363	0.404	0.877	0.320	2.856
SOP6	0.289	0.377	0.848	0.246	2.562
SCV1	0.227	0.199	0.263	0.873	2.462
SCV2	0.317	0.321	0.347	0.908	2.533
SCV3	0.070	0.113	0.164	0.842	2.705
SCV4	0.164	0.146	0.307	0.891	2.905

Table 6
Hypotheses results.

Path	Original Sample (O)	Standard Deviation (STDEV)	T Statistics (|O/STDEV|)	P Values	Result
BCA -> SOP	0.186	0.061	3.069	0.002	Supported
BCA -> SCV	0.251	0.065	3.863	0.000	Supported
KM -> BCA	0.487	0.051	9.510	0.000	Supported
KM -> SOP	0.282	0.065	4.349	0.000	Supported
SCV -> SOP	0.213	0.058	3.645	0.000	Supported

result, commercial groups must prioritize KM along BCA and SCV, considering that KM overall performance outperforms others.

Goodness-of-fit (GoF)

The prime way to figure out the model's explanatory power is the value of R^2, and GoF specifies that the model is "parsimonious and plausible" (Henseler et al., 2015). An investigative tool offered by Tenenhaus et al. (2005) was used to measure the goodness of fit (GoF). The formula for estimating the goodness of fit is (GoF = $\sqrt{(AVE \times R^2)}$), it is calculated by the mean of AVE values and R^2 values. There is a standardized approach for validating a path model in which values between 0 and 1 are interpreted. The threshold values for assessing the GoF are 0.1-Small, 0.25-Medium, and 0.36-Large, respectively (Wetzels et al., 2009). As per the formula, we have calculated the GoF; the results are shown in Table 8. The value of the GOF is 0.361, which is very good and shows a great model fit. Secondly, the SRMR value was 0.067 below the threshold of 0.080, elucidating the overall fitness of the proposed research model (Hair et al. (2017)).

Discussion and conclusion

Discussion of key findings

For this study, we composed data from Chinese employees to observe the assumptions. Five primary hypotheses were offered to attain the research goal. The analytical results highlight that one of the strongest reasons for each enterprise to use KM is to make the best use of prevailing knowledge while ensuring that it has made sufficient efforts to increase knowledge to meet its needs. Our results show that KM has been identified as a critical method for increasing BCA for supply chain visibility and SOP. The empirical results confirmed that KM has encouraged and motivated for incorporation of BCA for SOP. Findings exposed that KM certainly led to BCA (H1, β = 0.487) and SOP (H5, β = 0.282), respectively. Broadly, these consequences are in accordance with Darroch (2005), Janssen et al. (2020), Shahzad et al. (2020a), Venkatesh et al. (2020), Wang et al. (2008), who acknowledged similar results in this context. Further, investigating the direct relationship between BCA to SCV (H2, β = 0.251) and SOP (H3, β = 0.186) was also positive and significant. Besides, the effects of SCV on SOP (H4, β=0.213) were also positive and significant. These findings also align with Gosain et al. (2004), Morgan et al. (2018), Le (2022), and Wang (2019). Using BCA to track products enables the ability to directly verify an item's provenance and authenticity. Any participant in a blockchain network has access to a full and up-to-date copy of the ledger. This allows them to track their supply chain in real-time using the ledger. Concerns over data protection can be alleviated with a smart contract-based corporate identity solution. Technological infrastructure, skills, procedures, and financial contracts and deals are all part of the supply chain of production environments, and they help move a product from the seller to the consumer. Further, examining the intermediary relationship between KM and SOP through BCA and SCV. The findings revealed that BCA and SCV partially mediate the targeted relationships, supporting our

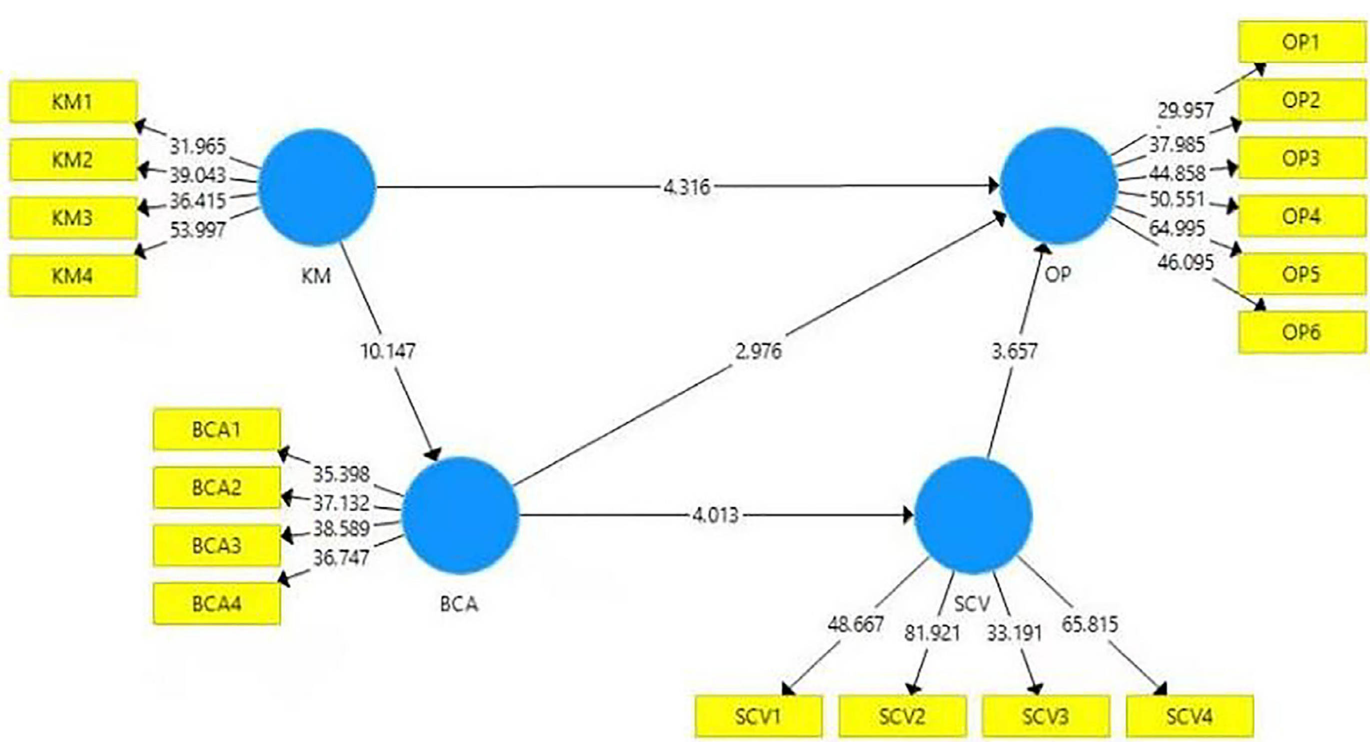

Fig. 2. Structural model analysis.

Table 7
Total and specific indirect effects.

Path	Original Sample (O)	Standard Dev (STDEV)	T Statistics (|O/STDEV|)	P Values
BCA> SOP	0.053	0.020	2.619	0.009
KM > SOP	0.117	0.035	3.328	0.001
KM > SCV	0.122	0.038	3.195	0.001
KM > BCA > SOP	0.091	0.033	2.747	0.006
BCA > SCV > SOP	0.053	0.020	2.619	0.009
KM > BCA > SCV > SOP	0.026	0.011	2.473	0.014
KM > BCA > SCV	0.122	0.038	3.195	0.001

(H1a-H2a) hypothesis. IPMA also emphasized that KM has higher importance and higher performance in predicting SOP. Following KBV and UTAUT, our findings primarily demonstrated the important role of KM in BCA adoption by indicating SCV, as SOP is reliant on government, suppliers, producers, distributors, end consumers, and other relevant stakeholders.

Theoretical and managerial implications

The present research donates to the core literature on sustainable performance in many ways. From a theoretical aspect, it first fills in the gaps in previous research by using an RBV, KBV, and UTAUT approach to observe the antecedents of blockchain adoption in supply chain visibility and sustainable organizational performance. The study adds to the expanded resource-based perspective by saying that knowledge is a complex resource capability and that investment in these resources will not be completely realized until the technology is integrated into supply chain functions (Geng et al., 2020). Being a part of wider supply chains causes a challenge for businesses to manage consumer demand and integrate novel technology into dynamic supply chain systems. This research further identified that the direct impact of KM on BCA and SOP and further BCA on SCV and SOP were significant. These results add to the knowledge processing perspective by stating that BCA improves an organizational information processing capacity and aid in information exchange and activity integration, allowing a company to respond to both internal and external customers (Hassan & Jaaron, 2021). Businesses will stimulate themselves to have a comprehensive solution by integrating their supply chain partners' processes using information technology. Besides, the mediating role of BCA and SCV are also evaluated between KM and SOP. This research indicated that BCA and SCV play a significant role in achieving SOP. The study contributes further to the relational perspective of the company by proposing that businesses cultivate close relationships with the associates they have in their value chain. Companies operating in today's market are unable to react rapidly enough unless they maintain a relational edge over their business partners. According to the findings of the research, the assumption that the influence of supply chain integration on agility is magnified when the complexity of the supply chain is large is supported. Additionally, the significance of KM in working toward SOP was emphasized by our IPMA. This study has strategic implications for increasing agility and

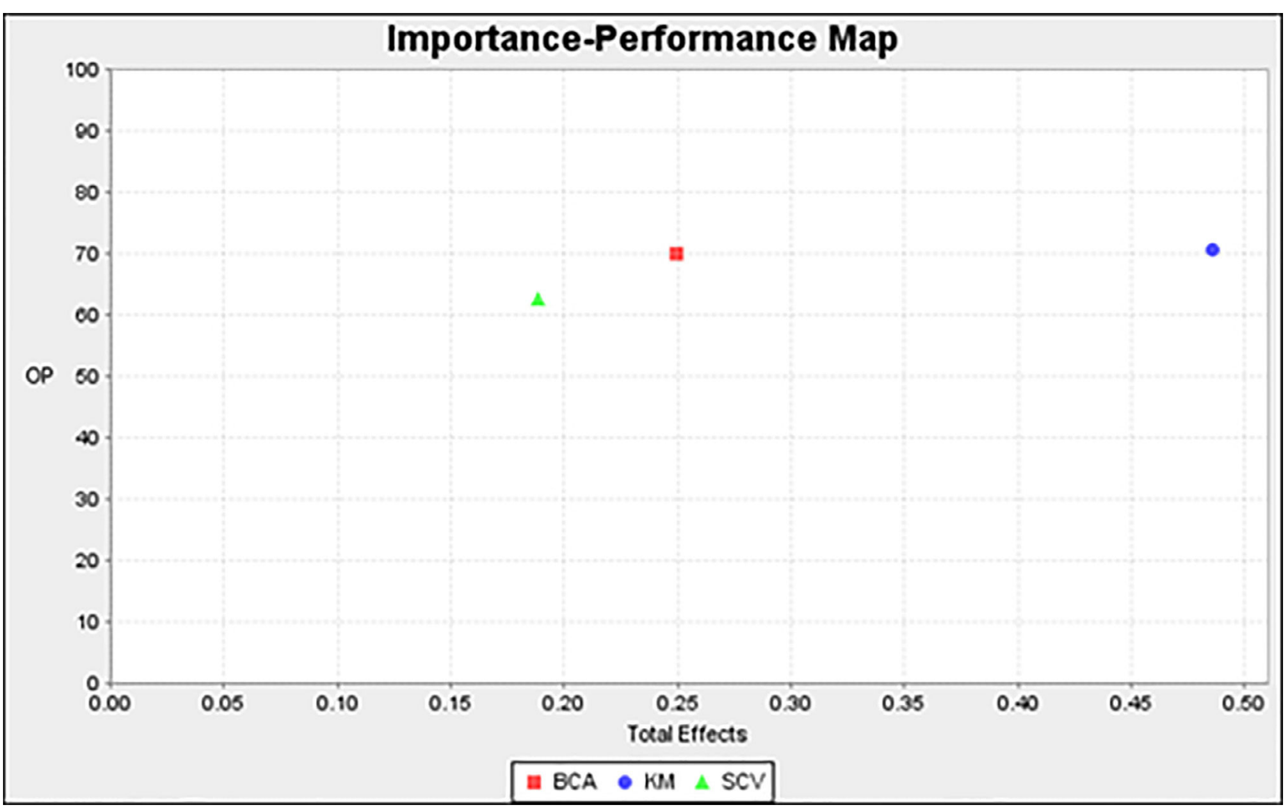

Fig. 3. Importance-performance map analysis.

Table 8
The Goodness of fit (GoF).

Latent Construct	AVE	R^2
Knowledge Management (KM)	0.685	
Block Chain Adoption (BCA)	0.676	0.235
Sustainable Organizational Performance (SOP)	0.706	0.252
Supply Chain Visibility (SCV)	0.772	0.063
Average Score	0.710	0.183
AVE * R^2	0.130	
GoF = $\sqrt{}$ (AVE × R^2)	0.361	

gaining a competitive edge in a highly competitive environment, which will ultimately lead to improved performance in terms of RBV and KBV.

This study also provides some vital practical implications. According to the findings, companies should carefully establish BCA-enabled supply chain competencies under the context in which they are used. Manufacturing companies' supply chains are flexible due to the fragile nature of goods, intense competition, volatile demand, and the long summer season. To succeed in such a tumultuous market climate, companies depend on their partners' internal and external capital to boost their value chain success. Due to their low labor costs and consumer-oriented economies, developing countries are attractive markets for production outsourcing. However, businesses must incorporate and align their resources and processes with supply chain partners to meet evolving consumer demands. As a result of our research, executives in different consumer goods manufacturing industries should incorporate the newest technology into their daily operations to improve supply chain integration. The research tells companies to adopt technology to assist in supply chain plans that optimize value for both the company and its supply chain partners. Firms may be more open to market disruptions by acquiring and assimilating knowledge. This research further assists managers in better understanding how KM can be used to achieve SCV through BCA. SC practitioners could better use a portfolio of BCA tools both within and outside the enterprise once they understand how lower-order dynamic skills help supply chain activities. Firms in developing countries are decentralized, and advanced IT technologies are still being adopted steadily. As a result, a single company's sole investment in IT resources would have no effect unless IT is integrated into service delivery and after-sales facilities. This is imperative for Chinese companies to concentrate on enhancing their capability of responding to the market and raising the export performance of the country and the business value of firms in domestic and international markets. Through efficient integration, the Chinese industry has enormous potential to emerge from the global slump and maximize corporate profitability by offering clients the correct volume and mix of products at the right time. Firms can also use technical approaches to better understand industry dynamics and expand their knowledge base. Regarding knowledge acquisition and its application, business leaders must collect necessary information from various sources, including consumers, vendors, staff, and other stakeholders. The acquired information must be transformed into a useful format that can be applied to organizational growth. Firms must foster a culture of sharing and trust among employees regarding information sharing. They should inspire their employees to collaborate, foster and improve their communication skills, and provide financial and non-financial incentives for information sharing by rewarding employees who come up with new and creative ideas.

Conclusion

As one of the most important new technologies, blockchain is disrupting traditional business processes at an unparalleled rate, changing all industries' speed. Organizations have not yet fully embraced it, although it provides new possibilities for supply chain accountability, immutability, traceability, and performance. This research examined the impact of KM on BCA and SOP through SCV following KBV and UTAUT in Chinese manufacturing industries. We expected this study structure and validated the hypotheses using SEM based on the prior literature. The empirical analysis demonstrated that KM has a direct impact on BCA and SOP and that BCA and SCV have a direct influence on SOP. Furthermore, BCA and SCV mediate the targeted relationship. This study offers important insights that manufacturing businesses can use to improve the adoption and use of their products by reducing obstacles, barriers, and resistance. The current study has shown a strong case for knowledge-based blockchain adoption. It also gives strong experimental evidence for the claim that KM is absolute for BCA and SOP. Furthermore, the findings of this study can be utilized as a future standard for BCA and SOP.

Nonetheless, the study offers new ideas for theory and practice and some shortcomings that policymakers must overcome. To answer the problem posed in the research questions, the study is primarily conducted in Chinese manufacturing industries. However, this research could not cover a wide range of industries. We chose only enablers of complex supply chain capabilities as antecedents of supply chain agility, and we overlooked relational factors that influence agility. Other contingencies related to BCA, such as supply network complexity, environmental dynamism, operational risk, and channel structure, among others, were not covered by this research. Another drawback of the analysis is that the questionnaire answers are based on respondents' perceptions and do not consider published reports. It's possible that respondents' perceptions of these variables in relation to their firm's success influenced the results. Even though the authors conducted a traditional method bias test to investigate this problem and found it to be non-existent, the data collection method was sufficient, and we took all precautions to eliminate the possibility of CMB.

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