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Blockchain in global finance make-over: Exploring the mediating role of supply chain flexibility

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A B S T R A C T

This study examined the relationship among blockchain technology utilization, information sharing, supply chain flexibility, and competitive advantage in UAE financial institutions. For this purpose, a theoretical framework was examined regarding the relationship among blockchain technology utilization, information sharing, supply chain flexibility, and competitive advantage. Additionally, mediating effect of supply chain flexibility was also examined. This research is cross-sectional by design. The respondents collected the data in the form of questionnaires. The response rate of this study was 63.03%. The data collected was examined by Smart PLS. The study's findings confirm that supply chain flexibility is affected by blockchain technology and information technology, which affects the financial institutes' competitive advantage. The implications of these findings cannot be neglected in the financial industry.

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1. Introduction

Blockchain is gaining popularity among all life fields, such as digital certificates, health technology, smart city technology, eCommerce, and online banking in the present era. Security is needed in technology-related activities, which are increasing daily. If the organizations want to run their processes privately and smoothly, they must use technology effectively and send an encrypted key to the customers. As a result, customers will not have to worry about privacy and security (Rejeb, Keogh, & Treiblmaier, 2020). At the same time, blockchain is a relatively new technology and has several potential benefits for its stakeholders. Organizations can make their operations very effective and efficient using the blockchain. On the other hand, customer trust is also developed for the organizations. On the other hand, blockchain applications are transformative and can change the record of transactions (Jain, Dash, Kumar, & Luthra, 2021).

One of the important components for organizations to develop a competitive advantage is information sharing. Information sharing also plays a very important role in the supply chain context. Information in terms of the supply chain is an essential resource for organizations (Latunreng & Nasirin, 2019). The produced data is extensive when the organizations produce the products or services. Therefore, it is critical to identify the most critical information and use it strategically. It has become vital for organizations to share information sharing and integration at different levels of supply chains. As a result, the organizations gain rapid success by acquiring information. This information helps organizations gain a competitive advantage (Eidizadeh, Salehzadeh, & Esfahani, 2017).

To share information among different levels of supply chains, the organizations' supply chains must be flexible. Supply chain flexibility shows the logical progression of the flexibility of manufacturing that extends the idea of penalty-free change and goes beyond the concept of a single firm to the complete supply chain (Liao, 2020). Supply chain flexibility results from an increased focus on the supply chain contribution, due to which the organization gains competitiveness. The organizations that develop flexibility in the supply chain can quickly get efficiency and competitiveness. It is because the product life cycle

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of such organizations gets short, can quickly adapt to the change of technology, and can make customized products efficiently (Delic & Eyers, 2020).

In the supply chain context, communication and information technology helps organizations gain a competitive advantage. Additionally, there are several benefits organizations can get from a competitive advantage and a fast supply chain. These benefits include a short life cycle time, less process cost, efficient customer services, and a fast, responsible supply chain. To get a proper response from the market, organizations must develop well-planned strategies (Rumengan, Rumengan, Wibisono, & Otok, 2018). It is because organizations need to focus on the competitive advantage and uniqueness of the organization to which it is distinguished from others. Therefore, it is crucial to gain and develop sustainable development. To improve the outcome of the available resources for the organization, organizations must plan their resources very well. This can be achieved through modern supply chains. The modern supply chain can help develop unique capabilities and gain a competitive advantage (Tukamuhabwa, Mutebi, & Kyomuhendo, 2021).

In the age of Covid-19 and the current competitive environment, it has become essential for the banks to have improved, secure, trusted, efficient, and transparent payment systems. Moreover, monitoring of the finances must also be easy for the institutes. Additionally, there is a need to reduce the financial costs for the customers. Therefore, this study examined the role of blockchain technology, information sharing, supply chain flexibility, and competitive advantage underpinned by RBV theory.

2. Literature review and hypotheses building

2.1 Supply chain Flexibility

The supply chain is a complex process consisting of several links and nodes. Several departments of the organization are involved in the supply chain process—this department ranges from logistics, purchasing, information systems, and operations. To achieve a competitive advantage, supply chain management plays a significant role. Supply chain management also plays a significant role in maximizing the value of an organization (Daneshvar Kakhki & Gargeya, 2019). For these reasons, the organization needs to adopt flexibility, karma speed, agility, and management in their supply chains to secure the targeted goals and compete in the market (Morad & Houssam, 2019). Flexibility is the organizational ability regarding its operations to adjust the reaction in the case of any uncertainty and develop alternative plans to link supply chains. There are many dimensions of supply chain flexibility. These dimensions range from inbound logistics to the customers' end. The requirements of supply chain flexibility are different from the firm's perspective (Fantazy & Tipu, 2019). Supply chain flexibility includes information system flexibility, supply network, organizational structure, logistic practices, and systems involvement. The organization's business is affected positively by the flexibility of the supply chain.

There is much uncertainty in today's business environment. Moreover, it is a very dynamic and troubled environment as well. Therefore, organizations need to compete strategically with their competitors. Organizations compete to develop the low risk of the supply chain, better visibility of the supply chain and enhanced flexibility of the supply chain (Hou, 2020). Therefore, flexibility in the supply chain is our philosophy and is the requirement to compete in the current market. There are two classifications of flexibility, external elements and internal elements (Shukor, Newaz, Rahman, & Taha, 2020). The flexibility in the supply chain also impacts the supply chain design and strategy, which the organization is following. For example, that up to the sub-contracting firm is the main reason for the low production of plants data producing low. Whereas the other organizations that can produce and meet the high demands can grip the demand fluctuation. One can view flexibility in the lost city between a violation ship or supplier and buyer (Singh, Modgil, & Acharya, 2019).

In past studies, the flexibility of the supply chain is defined as the ability of an organization to manage the supply chain with the help of collaboration among the partners of the supply chain in a quickly changing environment. This collaboration needs effectiveness and efficiency. There are several different meanings for how to build from this definition; Firstly, the entity of the supply chain is an essential determinant of the organizational ability of the supply chain so it can make fast changes. Secondly, Inter-organizational coordination is required for the flexibility of the supply chain. It engages human factors, information, process, and technology towards coordination to develop the capability to recognize the supply chain network (Liao, 2020).

2.2 Competitive advantage

Competitive advantage is how the firm could create its defensive position in front of the competitor. To develop and sustain the competitive advantage, all supply chain factors must work together. So, the customers can be served better. The organization's competitive advantage is affected by how a particular organization is linked to other organizations (Medvedeva, Merenkov, & Medvedeva, 2020). Researchers have expressed competitive advantage in delivery, quality, flexibility, and cost. Therefore, it can be a very decisive factor and develop a competitive advantage in terms of market opportunities, market share, sales, and product image. Reducing product development time can also play an essential role in increasing profit, market share, and developing a competitive advantage (Afraz, Bhatti, Ferraris, & Couturier, 2021).

Since the last decade, the researchers have identified several values creating activities. Product innovation is one of the critical capabilities. The organization's competitive intensity is mainly dependent on the speed of innovation. Scholars mentioned the abilities of competitive advantage of the organizations spread in five factors, including product innovation, dependable delivery, quality to the customer, premium pricing, and competitive pricing. These factors define competitive advantage as a time to market, product innovation, dependability, quality, and cost (Abeysekara, Wang, & Kuruppuarachchi, 2019).

2.3 Blockchain technology utilization

The technology of blockchain is dependent upon the transactional database. This technology is decentralized to manage tamper resistance of the transaction and validation consistently for a large number of participants. These large numbers of participants are also known as the nodes. The primary purpose of blockchain technology is to renovate the economic system by reducing transaction costs. Moreover, the operations are conducted responsibly through recognized parties (Kumar et al., 2018). The research on the blockchain is growing continuously. This research shows that blockchain technology was adopted to develop some information systems. Several different opportunities can be utilized through blockchain technology (Ali, Jaradat, Kulakli, & Abuhalimeh, 2021).

The technology of blockchain has altered the way the administrative control mechanism is maintained and regulated digitally. Through blockchain technology, the transformation of data is done in digital codes. These codes are stored in the database that is shared. Moreover, it has a high level of transparency, and there is a minimal risk of revision and deletion. On the other hand, the payments conducted through blockchain and financial deals conducted through blockchain are kept secret through digital recordings (Mayer, da Costa, & Righi, 2020). The code is shifted to computers through blockchain technology, and humans are disabled from the traditional verification process. There is a need for the financial supply chains to be redesigned by the banks. The global supply chain has been revolutionized by the technology of blockchain (Meidute-Kavaliauskiene, Yıldız, Çiğdem, & Činčikaitė, 2021).

2.4 Information Sharing

Information sharing is based on sharing information content and support systems. Past researchers have suggested that understanding the information content and information sharing support systems is based on developing a solid understanding of information systems. Researchers proposed that information creates a difference in the performance of the organizations. Highly successful organizations use IT systems to share their strategic and operational information efficiently (Ben-Daya, Hassini, & Bahroun, 2019). So, organizations must consider investing in sharing required information through IT systems to improve their operations. The internal integrative mechanism is represented through this kind of information sharing that helps the organizations to gain and assimilate the knowledge (Savolainen, 2017).

This sharing of information allows the organizations to develop links among external as well as internal sources of knowledge through the facilitation of the flow of information. Moreover, it also provides a proper mechanism for retrieving the data. Furthermore, the knowledge benefit is also enhanced through these mechanisms (Tchamyou & Asongu, 2017). Knowledge utilization is also enhanced through greater coordination and an integrated database. It also allows the firms to quickly introduce new products and modify the old ones. They may use the information shared among the suppliers to forecast future demands based on the customers' historical data (Huo, Haq, & Gu, 2021).

2.5 Supply chain Flexibility and Competitive advantage

One of the most critical issues in today's market is flexibility. It is because flexibility is their adoptive response to the organization. The static response of the organization to meet the acquisition of a logistic system Is to enhance flexibility. The organization's competitiveness can be improved through the flexibility of the supply chain. In this way, technology will be implemented in the organizations' decisions (Jin, Vonderembse, Ragu-Nathan, & Smith, 2014). Scholars explained that organizational efficiency could be improved through the flexibility of the supply chain. The study's findings conducted by Sánchez and Pérez (2005) show that improvement of supply chain brings improvement in organizational competitiveness. Scholars also pointed out that flexibility in the manufacturing supply chain of the organization affects the competitiveness level. Many studies revealed that responsiveness, flexibility, and quality affect the competitive advantage in a significant manner. Researchers also found a relationship between logistics, delivery, and sourcing with competitive advantage (Palandeng, Kindangen, Tumbel, & Massie, 2018).

H_1: Supply chain Flexibility significantly affects Competitive advantage.

2.6 Blockchain technology utilization and Supply chain Flexibility

The business's supply chain has become more uncertain, dynamic, and complex in the current business environment. The customers' expectations are exaggerated in terms of the diversity of the products, variable demands of the products, and minimizing the product's lifecycle as well. Therefore, there is a need to improve the supply chain. In this regard, the flexibility of the supply chain allows the management systems, resources, processes and structures to adapt to environmental changes (Kartskhiya, Tyrtychnyy, Smirnov, Dolgikh, & Khmelnytskyi, 2020).

In the current globalized world, there exists much competition in the global supply chain. This competition is not limited to the level of just one organization. Thus, there is the need for organizations, and members of a supply chain can restructure themselves so the organizational response can be balanced according to the changes in the market by enhancing flexibility. In the current economic environment, some of the business processes of the organizations are outsourced so that supply chain flexibility can be ensured (Hald & Kinra, 2019). However, as a result of outsourcing, the control of the business process is lost. Organizations can control the logistic systems because of the present digital technology. Organizations must share information with other supply chain parties so they can get flexibility in the supply chain (Meidute-Kavaliauskiene et al., 2021). Supply Chains require different kinds of information so they can perform adequately. Thus, the information provided from one firm to another should be helpful. Moreover, this information must also be available for other supply chain parties (Meidute-Kavaliauskiene et al., 2021).

One of the technologies serving customers in a better way is blockchain technology. It facilitates the customers by tracing and tracking the product at different stages so the adjustment in the production can be made easily and quickly. The applications used and introduced by the technology of blockchain can only be realized at specific network points relevant to that party. Therefore, it is possible to secure the data during supply chain transactions. The blockchain can increase the visibility of the supply chain. Moreover, it also enables real-time data sharing on different networks (Rogerson & Parry, 2020). Therefore, strategies related to the flexibility of the supply chain can be supported by the blockchain by minimizing the number of stakeholders that can be involved. Blockchain also ensures the level of output. All of the supply chain processes can be integrated by the blockchain. The organizations can manage the demand and improve the level of prediction, which will lead to more inventory and supply management. Additionally, blockchain has enabled sharing of information among the parties. Therefore, it is possible to improve decision-making throughout the supply chain by sharing documents (Meidute-Kavaliauskiene et al., 2021).

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H_2: *Blockchain technology utilization significantly affects supply chain flexibility.*

H_3: *Supply chain Flexibility mediated the relationship between Blockchain technology utilization and Competitive advantage.*

2.7 Information Sharing and Supply chain Flexibility

Researchers have shown that communication enhancement influences the flexibility of the supply chain among the suppliers. Additionally, in crises, information plays a vital role that helps organizations to gain a competitive position. It is because the managers of the organizations can share the information to the different forums. Because of these forums, organizations can brainstorm solutions regarding the challenges they face in the marketplace. Thus, past scholars have demonstrated the role of supply chain flexibility and sharing of information to gain a competitive position (Topal & Sahin, 2018).

The success of the supply chain is mainly dependent upon coordination among different units of the organization. Additionally, for coordination, information sharing plays a vital role and is considered an essential tool. It is also key to overcoming the dynamics of the supply chain. Researchers have found that supply chain practices are positively influenced by information sharing. These supply chain practices include coordination, JIT production, and collaborative planning (Zhang & Yang, 2016). Scholars have suggested that information sharing must be widespread along with the centralization of information sharing to manage uncertainty in the supply chain. If the supplier's capacity is higher, then it becomes more vital to share information with that particular supplier. Therefore, production quantity can be reduced or increased by the flexibility of the supply chain (Huo et al., 2021). External collaboration, along with internal collaboration, is significant for the flexibility of the supply chain. There must be responsiveness in the capability of the suppliers for the changes of the marketplace, which can be achieved by the increased sharing of information among the organizations that are collaborating. In this regard, a study was conducted by Sánchez and Pérez (2005) in the automotive sector of Spain. The study reported that supply chain flexibility plays a vital role in minimizing uncertainty and improving the organization's performance. Thus, supply chain flexibility is an integral part of developing strategic supply chain management because it plays a vital role in getting a competitive advantage for the firm (Baah et al., 2021). This leads us to the following hypothesis:

H_4: *Information Sharing significantly affects Supply chain Flexibility.*

H_5: *Supply chain Flexibility mediated the relationship between Information Sharing and Competitive advantage.*

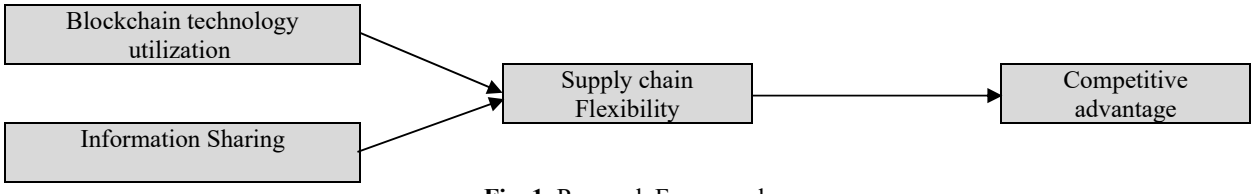

Fig. 1. Research Framework

3. Methodology

This study is cross-sectional and quantitative by research design. To collect data from the respondents, convenience sampling was used. Studies mentioned that scholars of behavioral and consumer research use convenience sampling. This is a very efficient and quick way to collect the data from the respondents (Sekaran & Bougie, 2016). The focus of this study was the employees working in the banks of the UAE. Because they could give the idea regarding usage of technology and information sharing among the banking channels. Therefore, employees were an appropriate target market. The data was collected from the respondents in survey questionnaires developed from past studies. The items of blockchain were adapted from Meidute-Kavaliauskiene et al. (2021), items supply chain flexibility were adapted from (Meidute-Kavaliauskiene et al., 2021), items of information sharing were adapted from (Huo et al., 2021), and items of competitive advantage were adapted from (Son, Narasimhan, & Riggins, 2005). This study analyzed the 307 responses gathered from the 487 questionnaires distributed. This sample size was in line with Hair Jr, Sarstedt, Matthews, and Ringle's (2016) recommendations, as they proposed that the sample size should be between 300-500.

4. Results and Analysis

To test the related hypothesis and proposed model of the study, Smart PLS 3.0 was used. This methodology is preferred in this research because there are several advantages of using smart PLS. Firstly, this is a robust and effective method for predictive and exploratory purposes (Hair Jr, Matthews, Matthews, & Sarstedt, 2017). Secondly, PLS is preferred in complex, non-normal data models and small sample sizes (Faizan, Nair, & Haque, 2018). The section below shows the statistical results of the proposed model.

Table 1
Factor Loading

	BTU	CA	IS	SCF
BTU1	0.932			
BTU2	0.935			
BTU3	0.941			
BTU4	0.935			
BTU5	0.886			
BTU6	0.892			
CA1		0.924		
CA2		0.891		
CA3		0.913		
CA4		0.919		
CA5		0.894		
IS1			0.931	
IS2			0.925	
IS3			0.900	
IS4			0.920	
IS5			0.878	
SCF1				0.910
SCF2				0.867
SCF3				0.890
SCF4				0.882
SCF5				0.810
SCF6				0.828

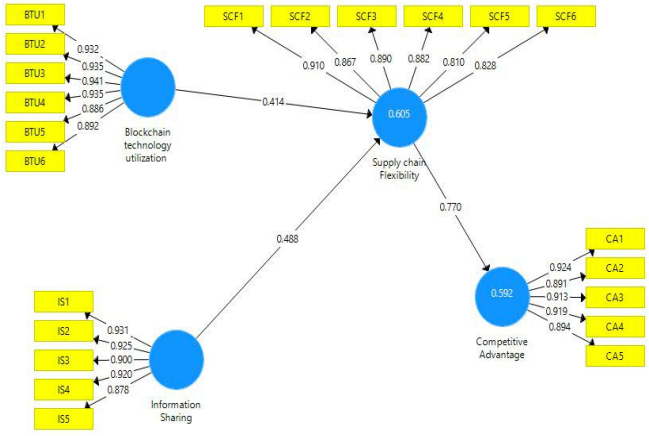

Fig. 2. Measurement Model

The present research used confirmatory factor analysis along with convergent validity for every structure examined. The test results of factor loading are mentioned in Table 1. According to (Hair, Gabriel, & Patel, 2014); Hair, Ortinau, and Harrison (2010), the factor loading of the items should be more than 0.50 for their validation. It is evident from table 1 that the retained items have a factor loading of more than 0.50. For further examining the convergent validity, AVE and reliability of the constructs were assessed. According to Hair et al. (2014) and Fornell and Larcker (1981), the values of AVE must be more than 0.50. The AVE figures mentioned in Table 2 demonstrate that this criterion is fulfilled.

Table 2
Reliability and Validity

	Cronbach's Alpha	rho_A	Composite Reliability	Average Variance Extracted (AVE)
BTU	0.964	0.965	0.971	0.847
CA	0.947	0.948	0.959	0.825
IS	0.949	0.951	0.961	0.830
SCF	0.932	0.933	0.947	0.748

Composite reliability and Cronbach Alpha were confirmed to confirm the validity and reliability of the items. According to Hair et al. (2014), the values of Cronbach Alpha and composite reliability should be more than 0.70. The results mentioned in Table 2 show that the present study items are reliable as the values of Cronbach Alpha and CR are more than 0.70. Thus, the requirements of convergent validity are confirmed.

Table 3
Discriminant Validity

	BTU	CA	IS	SCF
BTU	0.921			
CA	0.589	0.908		
IS	0.486	0.741	0.911	
SCF	0.651	0.770	0.689	0.865

Later, this study examined the value of discriminant validity through Fornell and Larcker (1981) and HTMT. To examine discriminant validity through Fornell and Larcker (1981), the square root of the AVE of every variable was compared. The discriminant validity is established if the AVE at the diagonal of the matrix is more than the remaining values. The values of Table 3 show that the discriminant validity in this study is achieved through Fornell and Larcker (1981). Moreover, this study evaluated discriminant validity through HTMT as well. This method has very high power to identify the validity issues in SEM. According to (Henseler, Ringle, & Sarstedt, 2015), the HTMT value must be less than 0.90. Thus, this criterion is achieved per the values of Table 4.

Table 4
The results of HTMT

	BTU	CA	IS	SCF
BTU				
CA	0.615			
IS	0.505	0.780		
SCF	0.684	0.818	0.731	

The statistical results of the directly proposed hypothesis are mentioned in Table 5 below.

Table 5
Direct Result

		Beta	SD	T value	P Values	Results
H1	SCF → CA	0.770	0.043	18.064	0.000	Supported
H2	BTU → SCF	0.414	0.071	5.841	0.000	Supported
H4	IS → SCF	0.488	0.069	7.062	0.000	Supported

The values mentioned in Table 5 demonstrate that SCF and CA have a positive significant relationship. These findings support H1 with beta=0.770 and t value=18.064. Moreover, H2 of the present research is also significant, showing the positive relationship among BTU and SCF with Beta= 0.41 and t value=5.841. In the end, the IS and SCF have also proved to be significantly related to each other supporting H4 with Beta=0.488, t=7.062.

Table 6
Mediating Results

	Relationship	Beta	SD	T value	P Values	Results
H3	BTU → SCF → CA	0.318	0.056	5.701	0.000	Supported
H5	IS → SCF → CA	0.375	0.061	6.174	0.000	Supported

Table 6 demonstrates the indirect results of the study. The values show that H3 is supported in which SCF is mediating the relationship between BTU and CA. Moreover, the mediating role of SCF between BTU and CA is also proved to support H5. In the end, the study examined the value of R square. According to Chin (1998), the value of 0.19 is considered weak, 0.33 is considered moderate, whereas 0.67 is considered high. As per the values of R square in table 6, the R square is Moderate.

Table 6
R square

	R Square
CA	0.592
SCF	0.605

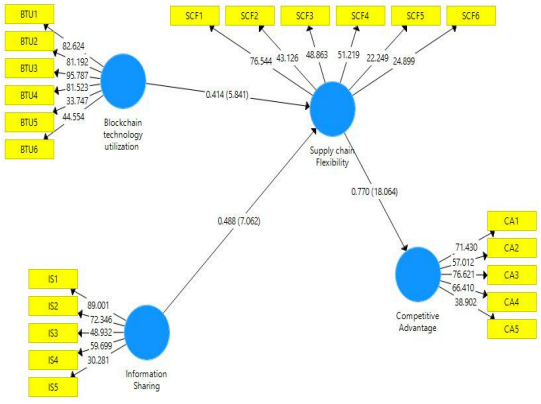

Fig. 2. Structural Model

5. Discussion

This study analyzed different factors on competitive advantage. The study's findings supported the claim that SCF has a positive significant relationship with CA. This result shows that financial institutions must focus on the flexibility of the supply chain to get a competitive position in the market. These findings of the study are similar to the findings of (Palandeng et al., 2018). Moreover, the results also show that information is one of the essential tools to gain flexibility in the supply chain. The critical information must be shared with all critical stakeholders of the organization. This finding is also aligned with the findings of (Topal & Sahin, 2018).

Furthermore, the results show that blockchain technology can also play a critical role in gaining supply chain flexibility. The information can easily be shared with the stakeholders efficiently and effectively through blockchain technology adoption. This finding is the same as the results gathered by (Meidute-Kavaliauskiene et al., 2021). In the end, the mediating role of supply chain flexibility is also confirmed in this study.

6. Conclusion, Limitations, and Implications

Banking is one of the critical financial institutes of every country. Banks face immense competition at the local and international levels in the present global situation. Therefore, banks need to focus on the flexibility of the supply chain to develop a competitive advantage. If the organization's supply chain is flexible, it will also help the banks sustain the developed competitive advantage. Moreover, it is also crucial that banks focus on the factors that can help them develop flexibility in the supply chains. In this regard, one of the critical factors is sharing information with the parties of the supply chain level. On the other hand, blockchain technology adoption can also help firms develop flexibility in their supply chains. With the help of blockchain, firms can keep track of their operations. Thus, they can adjust their operations to meet specific goals.
This study has a few limitations similar to the other empirical study. This study is cross-sectional; future studies can use longitudinal research design. Moreover, this study used the mediation effect of supply chain flexibility, whereas future studies can use moderation variables like Word of mouth (WOM). This study has practical as well as theoretical implications. The financial service industry can use this study for the trading process, security, data privacy, recordkeeping, and clients' screening. The findings of this study can help revolutionize the financial business world. In the end, the study's findings can be used by the policymakers of the financial services to gain a competitive advantage.

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