FACTORS INFLUENCING INTENTION OF INFORMATION-RESOURCE SHARING: FROM THE PERSPECTIVE OF CONSENSUS PERCEPTION OF BLOCKCHAIN

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A Dissertation Submitted in Partial
Fulfillment of the Requirements for the Degree of
Doctor of Philosophy (Management)
International College,
National Institute of Development Administration
2020

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ABSTRACT

Title of Dissertation	FACTORS INFLUENCING INTENTION OF INFORMATION-RESOURCE SHARING: FROM THE PERSPECTIVE OF CONSENSUS PERCEPTION OF BLOCKCHAIN
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Degree	Doctor of Philosophy (Management)
Year	2020

The spreading of information technology (IT) and information systems (IS) provides opportunities for enterprises to maintain a competitive advantage. But information silos appeared with the growing use of IS. Silos have become a severe impediment that made IS inconvenient and inefficient, and impeded enterprise's innovation and development. Therefore, the present study aims to resolve these issues by helping understand how to encourage information-resource sharing within the enterprise. We first proposed a new concept, consensus perception, based on the blockchain characteristics and advantages derived from prior studies. Then developed a conceptual model based on the consensus perception, motivational model, and principal-agent theory, to determine the factors that influence information-resource sharing intention and investigate whether blockchain technology (BT) can be used to promote information-resource sharing. Survey data were collected from 401 enterprises and institutions in the Chinese cities of Beijing, Shanghai, Guangzhou, and Shenzhen. The results evaluated using structural equation modeling (SEM) showed that information security concern, perceived rewards, and openness have direct influences on information-resource sharing intention and that trust has indirect effects. However, the impacts of the information confidentiality concern are not supported. The findings provide valuable theoretical and practical contributions to the enterprise on how effectively promote information-resource sharing, and whether BT can be used to solve the issues of information silo.

ACKNOWLEDGEMENTS

This research would not have been possible without the support of many people. Firstly, the deepest appreciation to my advisor, Dr. Chih-Cheng Fang, who is a preciseness and conscientious person that enlightened and changed my cognizance about Ph.D. research through his patience and enthusiastic behavior, and enormous knowledge. This dissertation was impossible to complete without his persistent guidance and numerous revisions. Secondly, thanks to the rest committee members of my dissertation, Dr. Zhuoran Zhang and Asst. Prof. Dr. Marisa Laokulrach. They gave me a lot of insightful comments and suggestions to improve my dissertation. Thirdly, thanks to my friends and classmates at ICO NIDA who offered unconditional help and support in this prolonged process. Finally, sincere thanks to my family. I would not have a chance to complete my Ph.D. without their support and help for my life.

Gang Li

June 2021

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CHAPTER 1

INTRODUCTION

1.1 Background of the Study

In recent decades, the rapid growth of the Internet has caused the appearance and wide use of a vast number of information systems (IS). "The 43rd statistical report on Internet development in China", issued by China Internet Network Information Center (CNNIC), indicates that as of December 2018, the number of Internet users in China reached 829 million, including approximately 792 million instant messaging (IM) users which accounted for 95.6% of the total netizen population; 610 million online shopping users in an increase of 14.4% from the end of 2017, accounting for 73.6% of total Internet users; 600 million online paying users in an increase of 13.0% compared to the end of 2017, accounting for 72.5% of utilization; and 394 million online government users, accounting for 47.5% of the total netizens. By the end of 2018, China had 5.23 million websites, and 4.49 million mobile applications (APP) had been available on China's market. Of these, the number of life service applications reached 542,000, ranking second and accounting for 12.1%; e-commerce applications reached more than 421,000, ranking third and accounting for 9.4% (CNNIC, 2019).

These ISs make life convenient and efficient. e-Commerce makes it easy to buy products or use social networks to post and share information. Similarly, Management Information Systems (MIS) also produce many benefits for the enterprise, such as increasing product quality and productivity and reducing stock levels and unnecessary product handling. A modern enterprise usually has numerous different MISs, including finance, customer relationship management, product data management, and inventory management systems (Hicks, 2007), all of which are intimately associated with the

interests of the organization. Therefore, information-resource,[1] as the key to sustaining IS existence and development, is steadily increasing in value of use and is treated as strategic resources for the enterprise (Bebber, 2017; Mamonov & Triantoro, 2018). However, reasons such as lack of trust (Drake, Steckler, & Koch, 2004; Liu & Chetal, 2005); security and privacy concerns; and competitive relationships with each other (Keller, Yeung, Baiocchi, & Welser, 2013) make many organizations, enterprises, or institutions unwilling to share their information, thereby producing an information island. Coining the term "silo"[2] to represent this phenomenon, Tett (2015) demonstrates that these silos not only block innovation and commercial opportunities but also encourage a focus on current issues while overlooking potential risks and hazards. Information silos severely restrict the development of enterprise and can cause serious consequences. For example, the Walkman department of Sony, which once developed the original Walkman symbolizing music products, was gradually lost the ability of innovation due to the information silo, thus caused the failure of developing digital Walkman and finally withdrew its offerings from the market. Therefore, how to prevent the information silos and gain competitive advantage through information-resource sharing are important issues related to the long-term survival and development of enterprise.

1.2 Statement of the Problem

The existence of information silos not only impedes organizational efficiency and the formulation and implementation of the strategy (Khan & Haleem, 2015), but also obstructs the improvement of IS and the development of the informatization process. Therefore, breaking information silos has become a popular research topic. Previous scholars have found that methods such as communication and cooperation

[1] Information-resource is a general term for all documents, information, charts, and data involved in an enterprise's process of production and management. It is not only used as electronic information throughout the enterprise management process but also the assets that can be sold, traded, and exchanged (Engelsman, 2007; Oppenheim, Stenson, & Wilson, 2001).

[2] Silo – also called the silo effect, which indicates that departments within the organization cannot build consensus nor cooperate due to lack of communication and separate management.

between people; reasonable incentive mechanisms; information sharing; and the adoption of new technologies all facilitate to break the information silo (Bowman, 2008; Elkington, 2013; Gulati, 2007; Tett, 2015), However, as no concrete evidence has been revealed to prove the effectiveness of these factors, how exactly to break the information silo is still at an exploratory stage.

Meanwhile, blockchain technology has become another popular research topic in recent years due to the rapid growth of the Internet. Blockchain is a distributed ledger[3] based on a peer-to-peer network and consists of three main components: consensus mechanism, smart contract, and P2P network. P2P network is the network foundation of the blockchain technology, which determines the network structure adopted by the blockchain; smart contract is the execution principles, which comprise the guidelines of blockchain running; and consensus mechanism is the fundamental structure of the blockchain technology and shapes its basic framework architecture, including participants, participation conditions, and participation methods (Swan, 2015; Szabo, 1997; Valkenburgh, 2016).

Blockchain is considered to have inherent advantages in data storage and information sharing and is used particularly widely in the domains of finance and medicine, due to its distributed characteristic and consensus mechanism (Ølnes, Ubacht, & Janssen, 2017). It has many successful implementations, such as Bitcoin, MedRec (a medical case management system), and Provenance (an origin record tracking system) (Ekblaw & Azaria, 2016). Due to blockchain characteristics such as confidentiality, security, trust, and immutability, scholars believe that blockchain can be used extensively in various contexts including finance, industry, education, media, entertainment, government, retail, health, medical, supply chain, insurance, and public service.

Current studies on blockchain mostly focus on two aspects: (1) cryptocurrency and its application, such as using blockchain technology to issue more coins (tokens), and (2) enhancing the blockchain: improving the blockchain itself by improving the blockchain's relevant algorithm, to increase performance, reduce resource

[3] "Distributed ledger" refers to the technology that stores the same data in each node of the peer-to-peer network and ensures that the data in each node remains synchronized through technical means (Brakeville & Perepa, 2018). The data shared in each node is called "public ledger."

consumption, etc. (Eyal & Sirer, 2018; Holub & Johnson, 2018; Tang, Shi, & Dong, 2019; Tasca, Hayes, & Liu, 2018). However, research on practical industries, such as the application of blockchain technology to solving issues in production or life (e.g., data transaction, identity authentication, copyright protection, and origin traceability), is still in its infancy. Most of these studies simply exploratorily (literature review) or conceptually (theoretical description) discuss and analyze the applying context of blockchain, or otherwise explore its future application; consequently, the empirical research is limited. Therefore, scholars have emphasized the urgent need for empirical research related to blockchain, to enrich and expand on existing blockchain research (Wang, Singgih, Wang, & Rit, 2019).

1.3 Research Gap

According to the previous research, information-resource sharing is one of the most effective methods for breaking information silos. However, theoretical research about sharing (e.g., information sharing, knowledge sharing) has mostly been conducted from the intention-behavior perspective, based on traditional theory such as theory of reasoned action (TRA) (Bock, Zmud, Kim, & Lee, 2005; Dinev & Hart, 2006; Kolekofski & Heminger, 2003; Pavlou & Gefen, 2004); the technology acceptance model (TAM) (Gefen, Karahanna, & Straub, 2003; He & Wei, 2009; Jarvenpaa & Staples, 2000; Pavlou & Fygenson, 2006; Sharma, 2017); and unified theory of acceptance and use of technology (UTAUT) (Alotaibi, Crowder, & Wills, 2013; Fang, Li, & Liu, 2008; Lu & Lee, 2012). These studies assert that the sharing behavior is influenced by subjective norms and is related to people's beliefs and attitude. For example, Kolekofski and Heminger (2003) found that the beliefs underlying interpersonal relationships and organizational factors will influence the intention of information sharing though attitudes toward the stewardship and value placed on feelings.

Some scholars focusing on the aspect of technology explain how information technologies such as cloud computing and Internet of Things (IoT) benefit information sharing (Li, Yu, & Wang, 2018; Ma & Wang, 2016), as well as which algorithms (security, privacy, and efficiency) can provide more advantages for information sharing

(Li, Zhou, Liu, & Li, 2018; Piao, Liu, Shi, Jiang, & Song, 2019). Meanwhile, some scholars focusing on the aspect of mechanism have studied strategies and policies (e.g., minimizing sharing costs, establishing long-term partnerships) to determine those that can promote information sharing (Yan & Bi, 2011; Zhang, 2015), and have discussed which sharing scheme is most suitable for information sharing (Li, Liu, Liu, Li, & Zhao, 2016; Yang, 2009).

However, these studies have some limitations. First, most study the environment or factors that affect people's knowledge-sharing behavior in the contexts of knowledge sharing or knowledge transfer. Studies on information-resource sharing are limited. Second, most of the research about information-resource sharing is conceptual, explanatory, or exploratory, and few studies have adopted empirical approaches to investigate information-resource sharing and provided supporting evidence. Therefore, the results cannot effectively guide enterprises to solve the problem of information silo. Besides, as information-resource has both information and asset characteristics (Brown, DeHayes, Hoffer, Martin, & Perkins, 2015; Wang, Liu, & Han, 2017), not only is information-resource sharing a voluntary behavior, but it is also affected by other factors such as technology, organization, and environment. Studying information-resource sharing, merely as information and from the perspective of intention-behavior, cannot fully explain this behavior. Consequently, it is necessary to pursue a new direction that can include both characteristics of information and assets, to supplement and improve the existing research on information-resource sharing.

Moreover, while scholars have proposed that blockchain technology contains inherent advantages in data storage and information sharing, it can also be used to promote information sharing and resolve the problem of information silo in enterprise (Pan, Pan, Song, Ai, & Ming, 2020; Saberi, Kouhizadeh, Sarkis, & Shen, 2019; Tett, 2015; Wang et al., 2019). Current research on the industrial application of blockchain is exploratory (literature review) or conceptual (theoretical description), and empirical research is limited. Although some of these studies adopt empirical approaches, they are rather narrow in their approach; focusing on a sole entity, these studies are qualitative in nature and simply draw on and extend upon an existing theoretical framework (Kamble, Gunasekaran, & Arha, 2019; Wang et al., 2019; Wong, Leong, Hew, Tan, & Ooi, 2020; Ying, Jia, & Du, 2018). Thus, these studies cannot provide

effective empirical support for research in other industries. Currently, there is an urgent need to enrich and expand the current blockchain research with more empirical evidence related to other industries from different perspectives.

1.4 Research Questions

In summary, these are the issues worth studying; that from the perspective of empirical research studies whether and how the advantages and characteristics of blockchain technology can effectively promote information-resource sharing, and whether blockchain technology can be used to solve the problem of information silo by the enterprise? According to these issues, the research question of this study is proposed:

What are the connections between the characteristics and advantages of blockchain technology with information-resource sharing, and could they have significant effects on information-resource sharing?

1.5 Objectives of the Study

The objective of this study is, from the perspective of consensus perception of blockchain, to investigate whether blockchain technology can effectively promote information-resource sharing, and whether enterprise should adopt blockchain technology to resolve the problem of information silo. This investigation contains the following three steps.

First is the extraction of blockchain consensus perception factors:

Based on the current blockchain research in the field of information technology, this study analyzes and investigates the structural features, operating mechanism, and related algorithms of the main components of blockchain technology (P2P network, consensus mechanism, and smart contract) to identify the characteristics and advantages of blockchain technology.

According to blockchain research in other fields, this study investigates the relationship between these characteristics and advantages and the blockchain application, to identify the factors that constitute the consensus

perception of blockchain: trust, security, confidentiality, openness, and perceived rewards.

Second is the examination of factors affecting information-resource sharing:

This study uses social science research methods to investigate the relationships between the factors of consensus perception and information-resource sharing intention based on prior theories, such as motivational model and principal-agent theory.

It then uses empirical methods to analyze the association between the five factors of consensus perception and the information-resource sharing intention through the conceptual model, and to illustrate the affecting extent of each factor of blockchain consensus perception on information-resource sharing intention using data results.

According to the influence extent of five factors from blockchain consensus perception on information-resource sharing intention and based on the existing research, this study analyzes the impact of trust, security, privacy, openness, and perceived rewards on the sharing of information-resource, respectively. Thus, to guide the enterprise's information-resource sharing and whether blockchain technology adoption is needed.

1.6 Contributions of the Study

1.6.1 Academic Contributions

This study provides an academic contribution to existing research on information-resource sharing and blockchain. Firstly, regarding information-resource sharing research, most prior studies of this area are conducted from the perspective of intention-behavior. Accordingly, this study will fill the research gap by studying information-resource sharing from the perspective of blockchain, specifically regarding consensus perception of blockchain, using the factors of consensus perception as constructs. This provides a new perspective for the domain of information-resource sharing research.

Secondly, regarding research on blockchain: this study adopts empirical methods, applying the characteristics and advantages of blockchain technology as

impact factors to theoretical research in management and other fields. This provides a new direction for further blockchain research.

1.6.2 Practical Contributions

This study also provides several practical contributions. Firstly, it is of value to enterprises and institutions by providing empirical evidence on how to form an appropriate strategy to share information-resource and assess whether blockchain technology can be used to break the information silo. Secondly, it provides valuable support for the practice of information-resource management. Based on the perspective of blockchain consensus perception, it provides a new method for the study of information-resource sharing intention, such as by using the factors of consensus perception; it also provides new approaches for information silo research, such as using blockchain technology to address the problem of information silo. Finally, this study provides practical contributions for the industrial implementation of blockchain technology. Conducted from the perspective of empirical research, it provides valuable evidentiary support and guidance through the consensus perception of blockchain regarding whether enterprises and institutions need to adopt blockchain technology.

1.7 Definition of Terms

The definitions of the main terms and constructs involved in this research are listed below.

1) **Distributed ledger** refers to the technology that stores the same data in each node of the peer-to-peer network and ensures that the data in each node remain synchronized through technical means (Brakeville & Perepa, 2018). The data shared in each node are called “public ledger”.

2) **Public ledger** refers to the data stored on the blockchain. It has copies in each node of blockchain and uses technological methods to maintain synchronization in these nodes (Brakeville & Perepa, 2018).

3) **Distributed timestamp server** is the server used to generate time-based stamps. It refers to the nodes in the blockchain network.

4) **Computational proof** refers to an electronic proof calculated by encryption algorithms.

5) **Hash (hash value)** is a string value calculated by the hashing algorithm. Its characters are uniqueness (the same data can only get the same hash value), fixed-length (one hashing algorithm can only produce one length of hash values, regardless of the length of the original data), and irreversible (the data cannot be reversely generated from hash value).

6) **Blockchain application** refers to the information system or software developed by the blockchain technology.

7) **Peer-to-Peer network (P2P network)** is a network architecture consisting of interconnecting computers without a central server.

8) **Consensus mechanism** is a mechanism that constantly records valid changes and keeps the data on all nodes of the P2P network synchronized using consensus algorithms (Valkenburgh, 2016).

9) **Smart contract** is an automatically executed computer program customized by participants. It is used to store and execute the rules, terms, and policies that have achieved consensus among participants.

10) **Information Infrastructure (II)** is "*a shared, open and unbounded, heterogeneous and evolving socio-technical system consisting of a set of IT capabilities and their user, operations, and design communities.*" (Ølnes & Jansen, 2017, p. 220)

11) **Asymmetric cryptography algorithm** is a cryptography-based algorithm. It uses pairs of keys (public key and private key) to encrypt or decrypt data. Data encrypted with public key can only be decrypted with the private key, and vice versa (Rivest, Shamir, & Adleman, 1978). In blockchain applications, each node has one pair of keys; the public key is open to all nodes and the private key is kept by the node. When a node intends to provide public data, it uses the private key to encrypt the data. When data is only provided to a specific node, the public key of that node is used for encryption.

12) **Hash function** is an algorithm that creates a digital "fingerprint" from data of arbitrary size. It uses algorithms index data to a fixed-length digest or "fingerprint"; this fingerprint is called hash value.

13) **Bullwhip effect** refers to the phenomenon that when the information flow shifts from the client to the supplier, the information will be distorted and amplified gradually. This prevents it from being shared effectively, which causes increasing swings of demand for information.

14) **DevOps** is a compound word of Development and Operations and represents a set of cultures, practices, or conventions that values communication and cooperation between software developers (Dev) and IT operations (Ops).

15) **Motivation model (MM)** is a theory from the field of psychology. It was developed by Davis, Bagozzi, and Warshaw (1992) to predict the behavior intention through general motivation, so as to better explain behavior.

16) **Principal-agent theory**, a theory from the domain of political science and economics, is based on the agency theory proposed by Jensen and Meckling (1976) to solve the principal-agent problem when cooperating parties have different goals and divergent interests.

17) **Trust**

First, it is one of the characteristics and advantages of blockchain technology. Blockchain technology provides people with a new trust pattern, "trust machines", which makes "trust-free" between people possible and can be used to resolve the issues of trust between participants (Aste, Tasca, & Matteo, 2017; Hawlitschek, Notheisen, & Teubner, 2018).

Second, it is one of the independent variables of this study and is defined as a social complexity-reducing mechanism which leads to a willingness of organizational dependence (Gefen & Straub, 2004).

18) **Openness**

First, it is one of the characteristics and advantages of blockchain technology. Blockchain technology provides people with a transparent and traceable environment which allows participants to supervise each other (Pournader, Shi, Seuring, & Koh, 2020; Wang et al., 2019).

Second, it is one of the independent variables of this study and is defined as the extent to which information can be shared among all participants (Haesevoets et al., 2019).

19) **Confidentiality**

First, it is one of the characteristics and advantages of blockchain technology. Blockchain technology provides sufficient support for data confidentiality from the algorithm perspective (Hoy, 2017; Ji, Zhang, Ma, Yang, & Yao, 2018).

Second, information confidentiality concern is considered as one of the independent variables in this study and is defined as the people's perception of the information-resource recipient's ability and willingness to protect sensitive information (Pavlou, Liang, & Xue, 2007).

20) **Security**

First, it is one of the characteristics and advantages of blockchain technology, as blockchain technology provides strong guarantees on data security from the aspects of structure and algorithm (Hoy, 2017; Ji et al., 2018).

Second, information security concern is deemed as one of the independent variables in this study and is defined as the people's perception of Internet security (Yenisey, Ozok, & Salvendy, 2005).

21) **Rewards**

First, it is one of the characteristics and advantages of blockchain technology, as the structural characteristics of blockchain technology facilitate the reward mechanism's easy addition to the blockchain and automatic execution (Atzori, 2015; Peters & Panayi, 2016; Shabani, 2019; Swan, 2015).

Second, perceived rewards is considered as one of the independent variables in this study and is defined as the people's perception that rewards (e.g., money, reputation, and reciprocity) could promote information-resource sharing (Zhang, Liu, Chen, & Gong, 2017).

22) **Perceived uncertainty**, one of the independent variables of this study, is defined as the degree to which future risk cannot be accurately predicted due to information asymmetry (Pfeffer & Salancik, 2003).

23) **Intention of information-resource sharing**, the dependent variable of this study, is defined as a probability that will influence people to share information-resource with others (Ajzen & Fishbein, 1980).

CHAPTER 2

LITERATURE REVIEW

This chapter details the concepts, fundamental theories, variables, and conceptual framework involved in this study according to the research purpose and prior literature. The contents are organized as follows. First, the concepts and technical characteristics of blockchain are discussed, and the core concept of this research—the consensus perception of blockchain—is extracted. Next, the fundamental theories involved in this study, including motivational model and principal-agent theory, are introduced. Next, the ten variables of this study are elaborately discussed according to previous studies, including the variables' source, definition, position, and function, and proposed research hypotheses. Finally, the conceptual framework of this study is proposed according to the hypotheses.

2.1 Blockchain

2.1.1 Introduction of Blockchain

Blockchain is a distributed trust-free system which uses a public ledger[4] to transfer data on the peer-to-peer (P2P) network without support from traditional trust systems. It can provide a non-tamperable record[5] for participants who lack trust and allow them to exchange data without intermediary participation. This also allows two people who are unknown to each other conduct a transaction through blockchain technology without the guarantee institution.

[4] Public ledger refers to the data stored on the blockchain, it has copies in each node of blockchain and uses technology methods to keep synchronous in these nodes (Brakeville & Perepa, 2018)

[5] Record is the data stored on the node of the blockchain, it also called ledger due to its content is similar to ledger used in usual.

Blockchain was first proposed by Nakamoto (2008), who combined several computer technologies such as peer-to-peer network, asymmetric encryption, and hash code technology to develop a cryptocurrency that entirely depends on algorithms without human intervention. Nakamoto states that "*A purely peer-to-peer version of electronic cash would allow online payments to be sent directly from one party to another without going through a financial institution*" (Nakamoto, 2008, p. 1).

In traditional business transactions, to resolve both parties' concerns regarding funds and product quality, third-party institutions (e.g., financial institutions, shopping malls, or trading platforms) will provide guarantees for them. Thus, when conducting the transaction, the first issue to consider is whether these guarantee institutions can be trusted. In the e-commerce context, this issue will be more prominent since these guarantee institutions cannot be inspected face-to-face.

To address the inherent weaknesses of third-party institutions during the electronic commercial transaction, it is necessary to replace the third part with a new trust mechanism to ensure the transaction's conduction. Consequently, Nakamoto (2008) proposes a mechanism using a distributed timestamp server [6] to generate computational proof [7] based on the chronological sequence of transactions. This mechanism ensures the effectiveness of a direct transaction between two people while eliminating the need for the guarantee of a trusted third party. This is the fundamental element of blockchain technology.

Blockchain technology consists of three core components: P2P network, consensus mechanism, and smart contract.

2.1.1.1 P2P Network

P2P network, as the network framework of blockchain technology, determines that the network architecture adopted by the blockchain is decentralized, as shown in the right-hand side of Figure 2.1.

[6] Distributed timestamp server is the node of the blockchain network.

[7] Computational proof refers to an electronic proof calculated by encryption algorithms.

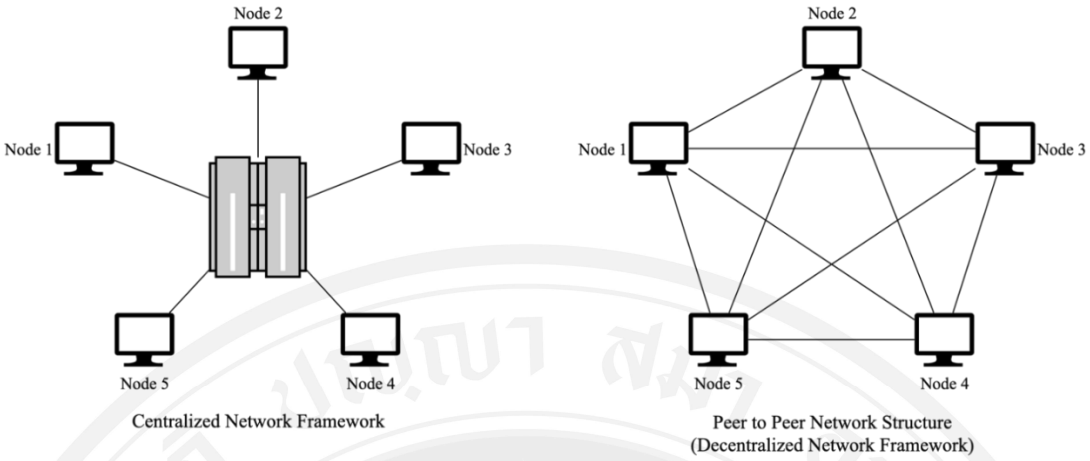


Figure 2.1. The Difference Between Peer-to-peer Network and Centralized Network.

Unlike the traditional centralized network framework, the P2P network uses node computers that are connected to each other instead of the central server. Each node can provide data to others as a server. In the P2P network, each node is an anonymous participant with a unique digital identification. Blockchain data (ledger)[8] are encrypted and stored in each node and are synchronized on each node by algorithms. The content of blockchain ledger consists of several series of chain-like block data consisting of six components, as shown in Figure 2.2.

Block Header—stored a title of this block data which indicated the purpose of this block, such as add XXX data.

Block Hash—stored the hash[9] of this block data which was calculated based on all data of this block.

[8] The storage size of the blockchain is determined according to the storage content and storage strategy. For example, Bitcoin Core, one of the Bitcoin wallets, will occupy about 200G of personal computer space when performing full node verification (bitcon.org, 2020). To ensure that Bitcoin can be used on all terminals (including mobile phones), Bitcoin adopts a solution that full nodes coexist with SPV (Simplified Payment Verification) nodes. Full nodes store complete blockchain data, while SPV nodes only save hash values of the data (e.g., Block Hash and Previous Hash).

[9] Hash (hash value) is a string value calculated by the hashing algorithm. Its characters are uniqueness (the same data can only achieve the same hash value), fixed-length (one hashing algorithm can only produce one length of hash values, whatever the length of the original data), and irreversible (the data cannot be reversely generated from hash value).

Index—stored this block data number, which was used to indicate this block's position in the blockchain, called Block Height. It is an increasing number starting from 0.

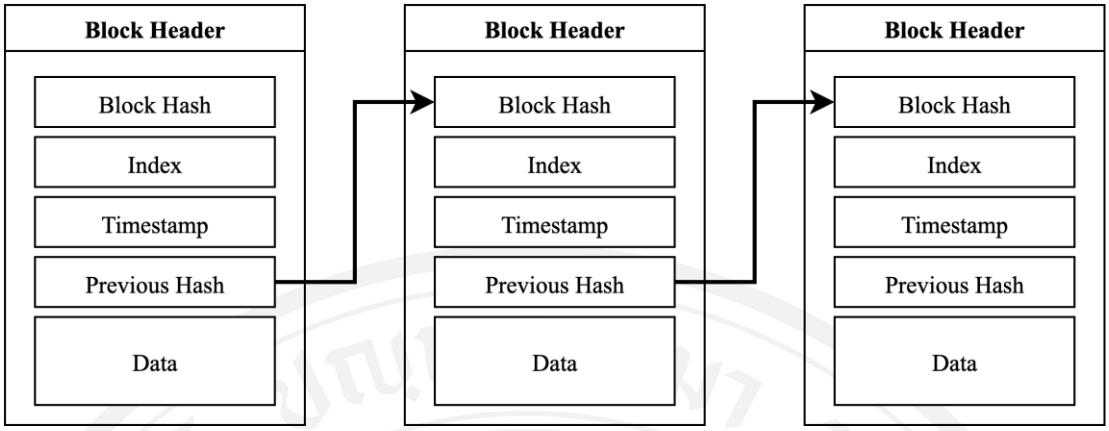
Timestamp—stored the timestamp of the block data's creation.

Previous Hash—stored the hash of the previous block data's connection with this block data.

Data—stored specific contents of these block data, such as the file data intended to share.

The data structure formed by connecting previous hash and block hash of the block data decides that the block data can only add and cannot modify and delete. Moreover, all except the data part of the block data are transparent for all nodes, but the data part's transparency is controlled by the data provider.

The P2P network not only ensures that data cannot be lost by failures of the single node but also makes it difficult for the data to be modified maliciously by unauthorized parties (e.g., hackers). Moreover, the controllability of disclosing any data content guarantees participants the significant capability of controlling sensitive data. Therefore, blockchain is considered to have high levels of security and confidentiality (Hughes et al., 2019; Ølnes et al., 2017).



Block Header—the title of the block data.
Block Hash—the hash value of all contents of the block data.
Index—the number of the block data.
Timestamp—the timestamp of the block data created.
Previous Hash—the hash value of previous block linked with the block data.
Data—the specific data of the block data.

Figure 2.2. Data Structure of Blockchain by Author.

2.1.1.2 Consensus Mechanism

Consensus mechanism is used to maintain the data of blockchain in the same P2P network. It records valid changes constantly and keeps the data on all nodes of the P2P network synchronized, through consensus algorithms (Valkenburgh, 2016). The workflow of the consensus algorithm is as follows. When the record is created by any node of the P2P network, it will be broadcast to all other nodes of the same network. Once this record is verified by other nodes, the data with audit trails are stored and replicated to all nodes and cannot be modified or deleted. If the data needs to be modified, this can only be achieved by adding a new block over the current block and re-establishing the consensus (Aste et al., 2017; Wang et al., 2019). Since all participants (nodes) in the same P2P network can access audit trails and participate in the maintenance of block data (e.g., verify all processes involving data changes, such as adding, modifying, and accessing), this not only ensures openness between participants, but also reduces concerns regarding trust among participants (Pournader et al., 2020; Wang et al., 2019).

There are three factors that impact the process of building the blockchain's consensus network of the blockchain application[10] (Fan, Wang, Ren, Li, & Yang, 2018; Leng, Bi, Jing, Fu, & Nieuwenhuyse, 2018; Valkenburgh, 2016).

relative openness of the blockchain application—the reading and writing permissions of data underlying different strategies, which are determined by the openness among participants involved in the application, such as the openness of department members within the enterprise.

degree of trust for the blockchain application—the auditability of the application software and creating process, the trustworthiness of the consensus mechanism implemented in the application, and the purpose of creating the application. It is determined by the trust among participants involved in the application.

degree of confidentiality of the blockchain application—the capability of confidentiality protections offered by the application such as "partial encryption of data", which are determined by demands of control over the information when participants interact through the application.

2.1.1.3 Smart Contract

The smart contract is an automatically executed computer program customized by participants, used to store and execute the rules, terms, and policies that have achieved consensus among participants. The smart contract can automatically verify the record according to the stored contract rules when blockchain creates a new record or stores the verified data to the block (Peters & Panayi, 2016; Saberi et al., 2019). This process partially improves the security of the blockchain (Pournader et al., 2020). Moreover, since reward mechanisms can easily be added into the smart contract as rules and run automatically, the reward system can easily be built based on the user requirement, such as the mining mechanism of the Bitcoin (Aste et al., 2017; Atzori, 2015; Shabani, 2019; Swan, 2015).

[10] Blockchain application refers to the information system or software developed by the blockchain technology.

An instance of a medical record system called “MedRec” is used to illustrate these three components of blockchain technology and how they worked. In this application, every patient and hospital indicated a node. They all formed a P2P network (Ekblaw & Azaria, 2016).

The consensus mechanism is used to maintain who can participate in this system and trace medical records changes. For example, when a patient creates a new medical record, other patients and hospitals will check whether this person is an authorized participant and whether this record is valid. Also, when a hospital wants to add a patient’s medical record, its authorization and the record’s validity will be verified by other patients and hospitals (Ekblaw & Azaria, 2016).

Smart contracts are used to create the operational rules of medical records. Such as the rules, patients can create one personal medical record, hospitals can update patients' medical records by adding the medical record block, patients can control and provide part of their medical records to any hospital, and patients can get rewards if they provide their medical records for medical research (Ekblaw & Azaria, 2016).

2.1.2 Characteristics of Blockchain

According to the research on the structural features, operating mechanism, and related algorithms of the three components of the blockchain technology, blockchain contains five core characteristics and advantages.

2.1.2.1 Trust

Due to the structural character of the P2P network and the features of the consensus mechanism, the addition of data to the blockchain network needs to be confirmed by all nodes and verified according to the smart contract. Moreover, due to the characteristics of the data structure, once the data are added, they cannot be modified or deleted; this greatly ensures data auditability. Therefore, blockchain technology can reduce people’s concerns about trust with each other without necessitating any third-party supervision. Blockchain’s provision of a trust-free environment without the need for third-party guarantees makes it possible to resolve the problem of trust among participants (Pournader et al., 2020; Wang et al., 2019). People’s trust patterns are also transformed from “trust others” to “trust machines”,

thereby allowing them to communicate and cooperate with each other without concern about integrity issues (Aste et al., 2017; Hawlitschek et al., 2018). Besides, the process of building the blockchain application's consensus network revealed that the conditions of trust-free among participants are agreed at the start of the consensus network's construction (Valkenburgh, 2016). Thus, trust is considered one of the main advantages of blockchain and is used in various research domains (Jun, 2018; Queiroz & Wamba, 2019; Ren, Liu, Yin, Shen, & Kim, 2019; Wang, Wu, Wang, & Shou, 2017).

For example, blockchain's trust-free characteristic causes some scholars to believe that it is the next generation of technology following the Internet, that it can be used to address some issues of trust in human society, and that a "smart city" can be built using blockchain-based sharing services (Sun, Yan, & Zhang, 2016). Similarly, the new trust mechanism of blockchain technology, "trust machines", is considered as the technology directly related to the organization and can impact its systems, individual interactions, and decision-making process (Allen, Berg, Markey-Towler, Novak, & Potts, 2020; Jun, 2018; Li, Greenwood, & Kassem, 2019; Mainelli & Smith, 2015). It is also used as the information infrastructure[11] for various fields and services, such as education, property management, medicine, internet of things, supply chain, and government (Dorri, Kanhere, Jurdak, & Gauravaram, 2017; Wamba, 2019; Lin & Liao, 2017; Park & Park, 2017; Zhao, Fan, & Yan, 2016).

Furthermore, this feature has already been applied in several instances. For example, due to the advantages of blockchain technology in terms of trust, Estonia has used blockchain technology to issue e-IDs to its citizens. Similarly, the US uses blockchain technology to record and share medical information, while other countries use it to manage their land registers (Walport, 2016).

This study believes that trust is one of the characteristics and advantages of blockchain technology, using it as one of the factors that constitute the consensus perception of blockchain to study information-resource sharing.

[11] Information Infrastructure (II) is "a shared, open and unbounded, heterogeneous and evolving socio-technical system consisting of a set of IT capabilities and their user, operations, and design communities." (Ølnes & Jansen, 2017, p. 220)

2.1.2.2 Openness

Due to the structural characteristics of the P2P network and the features of the consensus mechanism, all audit trails of the blockchain—such as someone adding a record at some time, providing a record to another at some time, and someone accessing a record at some time—are transparent for all nodes and supervised by all participants (Pournader et al., 2020; Wang et al., 2019). Thus, blockchain technology is considered to have a high openness regarding its algorithm and operating mechanism. Moreover, the process of building the blockchain application's consensus network indicates that participants should agree on the application's degree of openness at the start of the consensus network's construction (Valkenburgh, 2016). Therefore, openness is deemed as another core characteristic of the blockchain and is used in various domains of research (Ji et al., 2018; Park & Park, 2017).

For example, due to its characteristic of openness (data is transparent to all participants and can be traced), blockchain technology is considered as the best technology for processing public data. It can be applied in scenarios such as the identification and authentication of digital identities; data storage; and information sharing (Ølnes & Jansen, 2017). Additionally, since participants can track any event that occurred at any time in the blockchain network, some countries have attempted to use blockchain technology to build electronic voting systems (Walport, 2016).

Furthermore, the openness characteristic of blockchain technology has led to its application in several cases. For example, the software industry has constructed a system named "Provenance" which provides a blockchain-based provenance record of transparency in manufacturing. Additionally, the UK Department of Work and Pensions built "Govcoin", a system based on blockchain technology, to record and manage pensions.

This study believes that openness is also one of the characteristics and advantages of blockchain technology, using it as one of the factors that constitute the consensus perception of blockchain to study information-resource sharing.

2.1.2.3 Confidentiality

Due to the characteristics of the blockchain data structure and the use of asymmetric cryptography algorithm,[12] the data provider can partially or completely encrypt the data part of the block data shown in Figure 2.2 and grant people with different permissions to access different parts of the data according to their needs, thereby sharing data while maintaining confidentiality. Thus, participants of blockchain can independently determine who can access data and which data contents can be accessed when publishing data in the blockchain network. This enables them to exert maximum control over sensitive data. These guarantee the advantages of blockchain technology in data confidentiality from the algorithm perspective (Hoy, 2017; Ji et al., 2018). Moreover, the process of building the blockchain's consensus network of the blockchain application indicates that participants' requirements for confidentiality (i.e., control over sensitive information) also needs to be decided and agreed in advance when the consensus network is starting to be built (Valkenburgh, 2016). Therefore, confidentiality is also considered as one of the blockchain characteristics and used for research in various domains (Tapscott & Tapscott, 2016; Thakur, Doja, Dwivedi, Ahmad, & Khadanga, 2020; Zyskind, Nathan, & Pentland, 2015).

For example, since blockchain technology can provide confidentiality guarantees without third-party supervision, it is considered as the next generation of technology after the Internet and can be used in research on data management. Therefore, governments consider using it as a technical guarantee to provide support for land record management (Walport, 2016; Yli-Huumo, Ko, Choi, Park, & Smolander, 2016). Additionally, blockchain's advantage of facilitating analysis without compromising confidentiality has led scholars to consider using it to create universal medical records in the medical field (Hoy, 2017; Ji et al., 2018; Yue, Wang, Jin, Li, & Jiang, 2016).

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[12] Asymmetric cryptography algorithm is an algorithm based on cryptography: it uses pairs of keys (public key and private key) to encrypt or decrypt data. Data encrypted with the public key can be decrypted with the private key, and vice versa (Rivest et al., 1978). In blockchain applications, each node has one pair of keys. The public key is open to all nodes and the private key is kept by the node. When a node wants to provide public data, it uses the private key to encrypt the data; when data is only provided to a specific node, the public key of that node is used for encryption.

Furthermore, this feature has led to its application in some cases. For example, since blockchain technology can provide the maximum confidentiality guarantee while keeping openness, MIT using blockchain technology built an electronic medical records system named “MedRec”. This system is used for patients to manage authentication, protect privacy, and share medical records.

Above all, this study believes that confidentiality is one of the main advantages of blockchain technology, using it as one of the factors that constitute the consensus perception of blockchain to study information-resource sharing.

2.1.2.4 Security

Due to the features of the P2P network and the physical structures of decentralization and peer-to-peer, blockchain data has independent duplication on each node: data integrity can be guaranteed provided that one node is available. Moreover, due to the consensus mechanism, if people want to tamper with the blockchain’s record, they need to tamper with the record on each node; tampering with a single node record cannot be accepted by other nodes of the blockchain and cannot be authenticated by the consensus mechanism. This not only ensures data reliability, as data cannot be lost when a single node fails, but also greatly reduces the possibility of data being tampered with. Additionally, blockchain technology adopts several cryptographic algorithms such as asymmetric cryptography and hash function.[13] The blockchain technology is guaranteed on aspects such as the robustness of the program structure and the security of data storage, which reduces the possibility of accessing data through abnormal methods. If the data were to be stolen, the encryption algorithm prevents the contents of the data from being accessed. Therefore, security is deemed as an inherent attribute of blockchain which stabilizes the blockchain’s operation and is used for research in various domains (Dorri, Kanhere, et al., 2017; Hughes et al., 2019; Ølnes et al., 2017; Park & Park, 2017; Wang et al., 2017; Zheng et al., 2018).

For example, blockchain technology can provide security and data integrity without any third-party supervision. Governments and enterprises have

[13] Hash function is an algorithm that creates a digital "fingerprint" from data of arbitrary size. It uses algorithm index data to a fixed-length digest or “fingerprint”, which is called hash value.

therefore considered using it as the support infrastructure for information exchange and electronic transactions (Walport, 2016; Yli-Huumo et al., 2016). Besides, due to blockchain's characteristics of immutability and the guarantees of security, blockchain technology is considered as the next-generation technology after the Internet that could address societal issues related to security. It can be used to store and transfer various kinds of assets or data, such as digital currency, stocks, bonds, futures, loans, mortgages, titles, digital property, and contracts (Dorri, Steger, Kanhere, & Jurdak, 2017; Lorenz et al., 2016; Pazaitis, Filippi, & Kostakis, 2017).

Furthermore, this feature has led to its application in several cases. For example, due to the security advantages of blockchain technology, software enterprise has created a "keyless" signature system named "Guardtime", which uses blockchain technology to protect the health records of one million Estonian citizens. The US has also built a system named "MedRec" based on blockchain technology, which is used to record and share medical information.

This study believes that security is one of the core advantages of blockchain technology, using it as one of the factors that constitute the consensus perception of blockchain to study information-resource sharing.

2.1.2.5 Rewards

Due to the availability of smart contracts, when building blockchain application systems, participants can add any term that meets the consensus among participants into smart contracts according to their requirements, including the reward mechanism. Any smart contract added to the blockchain can be automatically executed as the blockchain execution principles. Thus, the reward mechanism is an inherent character and advantage of blockchain technology from the perspective of algorithms (Atzori, 2015; Peters & Panayi, 2016; Shabani, 2019; Swan, 2015).

This characteristic is already applied to various blockchain applications related to virtual currency to maintain the stability of the blockchain system. For example, in blockchain applications in the financial domain such as Bitcoin and Ethereum, these applications designed a reward system (e.g., mining system) to attract new users to the blockchain network in order to increase the stability and security of the blockchain system (the nature of the P2P network structure determines that the

more participating nodes, the higher stability, and security). These systems provide tokens (e.g., bitcoin) to participants who provide computing power and network bandwidth to the blockchain, thereby rewarding their contributions to maintaining the blockchain's stability (Aste et al., 2017; Hughes et al., 2019; Kshetri, 2017; Pazaitis et al., 2017; Pournader et al., 2020; Saberi et al., 2019).

This study believes that the reward mechanism is also one of the core advantages of blockchain technology, using it as one of the factors that constitute the consensus perception of blockchain to study information-resource sharing.

2.1.3 Consensus Perception Factors Extraction

Given the characteristics and advantages of blockchain technology, blockchain technology is deemed as a novel technology combined with information technology and social technology (Jun, 2018). It is widely used in research in various fields such as finance, government, health, science, society, culture, and management to resolve some problems that cannot be solved using previous technologies (Morse, 2018; Swan, 2015). Similarly, blockchain technology is considered one of the most effective technologies for promoting information-resource sharing and addressing the issue of information silo within the enterprise, as it allows two parties to communicate and collaborate without having to consider issues of privacy and integrity (Pan et al., 2020; Saberi et al., 2019; Tett, 2015; Wang et al., 2019).

Additional benefits of blockchain technology are as follows:

Blockchain technology can provide a trust-free mechanism to help people address the problem of trust. Those for whom the problem of trust is a major consideration will tend to adopt blockchain technology (Allen et al., 2020; Jun, 2018; Li et al., 2019; Pournader et al., 2020; Wang et al., 2019).

Since blockchain technology can provide guarantees about information security, people will consider adopting blockchain technology when they are concerned about information security (Dorri et al., 2017; Hughes et al., 2019; Pazaitis et al., 2017; Zheng et al., 2018).

Since blockchain technology can provide maximum protection for information confidentiality while maintaining openness, it is a useful

technology worth for people whose requirements include both openness and information confidentiality (Hoy, 2017; Ji et al., 2018; Yue et al., 2016). Due to the inherent advantages of blockchain technology regarding the rewards mechanism, it is also one of the technologies that can be adopted when people need to deal with rewards (Hughes et al., 2019; Kshetri, 2017; Pournader et al., 2020; Saberi et al., 2019).

Therefore, this study uses these constructs derived from the concept of blockchain technology as predictors of the adoption of blockchain technology, calling it the consensus perception of blockchain. This includes five factors—trust, information confidentiality concern, information security concern, openness, and perceived rewards—and is used to predict the probability of enterprises using blockchain technology.

Subsequently, this research will use five constructs of the consensus perception of blockchain, adopt a social science research approach, and combine existing theories to investigate the relationships and influence extents between the factors of consensus perception and information-resource sharing intention. Thus, it will examine whether blockchain technology effectively promotes information-resource sharing and determine ways to influence the intention of information-resource sharing. Finally, it will provide theoretical and empirical support for whether enterprises adopt blockchain technology to address the issues of the information silo.

2.2 Related Theories

Information-resource sharing behavior can be considered as a behavior generated by subjective intention. It also contains some characteristics of economic behavior due to the nature of its assets. Therefore, the study of information-resource sharing intention can not only be explained using intention-behavior theory, but can also be explained using the theories of economics. The following content will elaborate on the theories involved in this study.

2.2.1 Motivational Model (MM)

Motivation model (MM) is a theory from the field of psychology. It was developed by Davis et al. (1992) to predict behavior intention through general motivation, so as to better explain behavior. MM explains behavior intention from two aspects: extrinsic motivation and intrinsic motivation. Extrinsic motivation refers to the performance of an activity due to perceived beneficial outcomes which are distinct from the activity itself. Intrinsic motivation refers to performing an activity to enhance the process of performing the activity or improve the outcomes of the activity.

This model has been practiced in many different contexts, such as knowledge sharing (Lin, 2007; Zhang et al., 2017) and information technology (Fagan, Neill, & Wooldridge, 2008). Prior scholars have applied the motivation model in combination with other intention-behavior theories to explain behavior intention. For example, Shang, Wu, and Li (2017) combined motivation model and field theory,[14] applying the environmental factors of field theory as external motivations to investigate information-sharing continuance. They found that this integrated model can provide an explanation for continuous information-sharing behavior on two different types of social media platforms, experience-socialization and intelligence-proliferation. Vilnai-Yavetz and Levina (2018) incorporated the motivational model and TPB to propose a new incentive model from the intrinsic motivation generated by social norms (altruism and fun, and extrinsic motivation related to external rewards), financial incentives, recognition, and social connections, the purpose of which was to study the motivation of sharing e-commerce content on social media. The subsequent results of the study revealed that this incentive model has good adaptability. Lin (2007) integrated the motivational model into the TRA to study knowledge sharing within the organization, and found that motivational factors such as reciprocal benefits, self-efficacy, and enjoyment in helping others significantly affect both the attitudes and intentions of knowledge sharing. Moreover, some scholars state that external rewards, such as currency, reputation, and reciprocity, have positive effects on behavior intention and could promote people's

[14] Field theory is one of the main theories of sociology, proposed by Bourdieu (1993). It asserts that every action is affected by the field in which the action occurs. The field refers to the physical environment, other people's behaviors in this environment, and the sum of related factors.

intention of using and sharing (Foss, Minbaeva, Pedersen, & Reinholt, 2009; Silic & Back, 2017; Vilnai-Yavetz & Levina, 2018; Wang, Clay, & Forsgren, 2015).

Since MM can better explain intention behavior from the perspective of motivation, it is an appropriate method of investigating the information-resource sharing intention. Therefore, this study will apply MM as a fundamental theory to study the intention of information-resource sharing.

2.2.2 Principal-agent Theory

The principal-agent theory, which in the domain of political science and economics is based on the agency theory proposed by Jensen and Meckling (1976), is used to solve the principal-agent problem when cooperating parties have different goals and divergent interests. The principal is the owner of assets such as the company and any economic and information-resource. The agent is the person or entity contracted to manage, control, or use those assets on behalf of the owner. Common examples of this relationship are company management (agent) and shareholders (principal); officials (agent) and citizens (principal); and brokers (agent) and markets (principal).

Agency problems occur in the following circumstances: (1) when an individual or entity (agent) is motivated to pursue their own interests by making decisions or taking actions that impact another individual or entity (principal); (2) when the two parties (principal and agent) have different interests and asymmetric information, preventing the principal from confirming that the agent will always act in both parties' best interest, particularly when the activities are expensive to the agent and useful to the principal or vice versa; and (3) when the principal considers the possibility that the agent would choose to exploit the relationship instead of engaging in a mutually beneficial transaction (Bebchuk & Fried, 2009). For example, agents may pursue a hidden agenda by using their objectives in place of those of the principal. Alternatively, asymmetrical information favoring agents who participate in day-to-day management may make it difficult for principals to track the behavior of executive directors.

The agency theory is used to resolve two problems of agency relationships: (a) when the goals of the principal and agent conflict and (b) when it is difficult or expensive for the principal to confirm the agent's true action. Agency theory includes two streams, one of which is the principal-agent theory. Based on the asymmetric

information game theory, it resolves the issue caused by asymmetrical information. Asymmetrical information can be divided into two aspects: (1) the time when the asymmetry occurs, and (2) its content. In terms of time, the asymmetry may occur either before or after the contracting, called “ex-ante” and “ex-post”, respectively. In terms of content, asymmetrical information may refer to the actions or knowledge of participants (Keat, 2009). The principal-agent theory applies four concepts to align these four aspects of asymmetrical information: adverse selection, moral hazard, hidden action, and hidden knowledge. Adverse selection and moral hazard are used to study the asymmetry based on the occurrence time, while hidden action and hidden knowledge are used to study it based on the information content. The model of the principal-agent theory contains three main types. First is state-space formulation, proposed by Wilson (1968); Spence and Zeckhauser (1978); and Ross (1973), which has the main advantage that every technical relationship is naturally displayed; however, it cannot achieve an economically informative solution. Second is parameterized distribution formulation, developed by Mirrlees (1974, 1976) and Hölmstrom (1979), which has already become the standardized approach. Third is general distribution formulation, which is the most abstract; although this model provides a concise generalized model, it does not clearly explain the agent actions and the costs incurred.

Due to the use of principal-agent theory to study behaviors of principals and agents in uncertain environments, it has been extended to almost all types of transactional exchanges occurring in a socio-economic system characterized by information asymmetry and fears of opportunism. It has also widely been used in various fields such as accounting, economics, finance, marketing, political science, organizational behavior, and sociology (Eisenhardt, 1989). Scholars have also applied it to the areas of information systems and technology. For example, Nan (2008) explores different effective incentive designs to address the knowledge-sharing problem associated with asymmetric information and develop a set of incentive solutions for different knowledge types with specific levels of intangibility based on the principal-agent model. Steinle, Schiele, and Ernst (2014) use principal-agent theory to investigate associations among moral hazard, perceived uncertainty, and maintenance of cooperative relationships with suppliers. Using thorough empirical research to examine moral hazard from the perspective of ex-ante and ex-post

(information asymmetry), they found that reputation (operationalize as ex-ante) and monitoring (operationalize as ex-post) have a significant influence on moral hazard; furthermore, moral hazard could significantly influence the continuation of the cooperative relationship through perceived uncertainty. Pavlou et al. (2007) use principal-agent theory to study the influence of information asymmetry on buyers' purchase intention through online transaction platforms. They found that the adverse selection problem caused by sellers' hidden information and the moral hazard problem caused by sellers' hidden action will increase buyers' perceived uncertainty and consequently decrease their purchase intention. Moreover, scholars have found that users' concerns about information security and confidentiality caused by information asymmetry between users (principal) and service providers (agent) cause them to perceive more uncertainty, which in turn reduces their intention to use service providers' online services (Kim & Kim, 2018; Trenz, Huntgeburth, & Veit, 2013).

The above literature on principal-agent theory demonstrates that information asymmetry increases both transaction parties' uncertainty, and that principal-agent theory can be used to explain the influence of perceived uncertainty on behavior intention. Similarly, when sharing information-resource as assets, the perceived uncertainty of the information-resource provider also increases due to the information asymmetry caused by the recipient's hidden information and hidden action, thereby affecting the provider's information-resource sharing intention. Therefore, this study will apply the principal-agent theory as another fundamental theory to investigate the information-resource sharing intention from the perspective of perceived uncertainty.

In summary, since information-resource for enterprise is not only the container of information but also the information asset (Brown et al., 2015; Engelsman, 2007; Oppenheim et al., 2001; Wang et al., 2017), it is influenced by other factors such as technology, organization, and environment in addition to personal subjective factors. Analyzing the information-resource sharing intention exclusively from the traditional behavior-intention perspective cannot produce an adequate explanation. Therefore, this study will draw on the two existing theories of the motivational model and principal-agent theory, using the consensus perception of blockchain as intrinsic motivation to study information-resource sharing intention.

By studying the relationship and influence extent between five factors of consensus perception—trust, information confidentiality concern, information security concern, openness, and perceived rewards—on perceived uncertainty and information-resource sharing intention, this study will examine the following questions: (1) What is the nature of the relationship between consensus perception and the information-resource sharing intention? (2) What is the influence extent between the five factors of consensus perception and the information-resource sharing intention, respectively? (3) Is it possible to promote information-resource sharing within the enterprise through consensus perception? (4) Can blockchain technology be used to resolve the problem of information silo within enterprises?

2.3 Constructs and Hypothesis Development

2.3.1 Intention of Information-Resource Sharing

Intention is a concept of psychology which represents the mental state that determines the probability of an individual performing a behavior (Fishbein & Ajzen, 1975). Whether an individual intends to execute a behavior is one of the determinants for actual action and directly dominates a person's behavior (Ajzen & Fishbein, 1980). Prior scholars have stated that people find it difficult to make rational decisions based on the information that is available to them. While people are likely to create an intention to act when their attitude is favorable and they perceive their behavior as controllable, they ignore the connection between control and intentions when their attitude is negative and they perceive normative pressure unrelated to specific actions (Eagly & Chaiken, 1993). Besides, people are more likely to act if they have previously established relative intentions. Moreover, people's intention of acting depends on the consciousness of their decision-making attitude, which is determined by the tendency to act favorably or unfavorably toward the object (Davis, Bagozzi, & Warshaw, 1989).

TRA and TPB suppose that individuals' behavior intentions are the main determinants that inform their eventual action. This intention is influenced by individuals' attitudes, subjective norms, and perceived behavior control (Ajzen, 1985; Ajzen & Fishbein, 1980). For instance, an individual's determination to exercise after work is caused by several factors. The first determinant factor is the individual's intention; people's positive attitude toward exercise in general helps them reduce stress and promote health and can greatly impact the attitude of one's exercise after work. The second factor is the subjective norms surrounding people. The degree of intention to exercise after work is impacted by whether the people surrounding the individual hold a favorable or unfavorable attitude toward exercise, in addition to whether society tends to accept and/or favor those whose attitude toward exercise is positive. The final factor is the degree of perceived behavior control to the behavior intention; in other words, someone who is more confident about the specific health benefits of exercise will exercise more. Therefore, if all these factors tend to increase someone's intention of exercise after work, they are more likely to do so. The longer that they maintain the

behavior of exercising after work, the stronger and more consistent their intention to continue will become (Carrera, Muñoz, Caballero, Fernández, & Albarracín, 2012).

Intention can also be used to interpret the behavior of information system or technology acceptance, as well as the behavior of innovation or purchase based on the information system or technology. For example, TAM illustrates users' attitude toward using technology or systems, and UTAUT predicts the intention of use behavior using four constructs derived from seven related frameworks. Moreover, intention is also used in the field of information management to evaluate various systems such as word processing, enterprise information systems, and online gaming (Hess, McNab, & Basoglu, 2014). For example, in research on mobile banking adoption, scholars found intention to have a positive relationship with willingness to use, indicating that it can positively influence people's willingness to use the relevant system (Bhattacherjee, 2001). Besides, the intention to use is different from the intention to use continuously: current use has a significant effect on the intention to reuse or continuously use and can predict the actual usage (Delone & McLean, 2003). Intention is also used to explain behaviors related to information sharing and knowledge sharing. For instance, Kolekofski and Heminger (2003) demonstrate that beliefs such as interpersonal relationships and organizational factors can influence people's intention of information sharing through attitudes and impact actual sharing behavior. Chung, Lee, and Han (2015) state that communication can indirectly impact the intention of travel information sharing through transactive memory systems. Curado and Vieira (2019) found that trust can influence the behavior of knowledge sharing within small- and-medium-sized enterprise through people's knowledge-sharing intention. Similarly, some scholars state that factors such as commitments and rewards can, through intention, impact knowledge-sharing behavior in public service departments (Rasdi & Tangaraja, 2020) and within organizations (He & Wei, 2009; Hooff & Weenen, 2004).

In addition, since intention can indirectly reflect behavior, many scholars have used it as a key predictor to study the actual behavior underlying it, such as behaviors of information technology adoption, knowledge sharing, information sharing, and purchase. This intention-behavior research pattern has been used in various research domains to predict the possibility of behavior. Additionally, motivations (including intrinsic and extrinsic motivation) are the salient determinants of intention and can

directly and indirectly influence the behavior intention. Motivation can moderate the impact of attitudes on intentions by changing the strength of attitude (directly) and the relations of the attitude-intention (indirectly) (Mackenzie & Spreng, 1992). For example, both extrinsic motivations such as expected reciprocal relationship and intrinsic motivations such as self-efficacy were found to positively influence information sharing behaviors related to products and services (Cho, Park, & Kim, 2015; Lin, 2007). Similarly, extrinsic motivations of the environment, such as social factors and individual factors, also significantly impact the intention to share information (Park, Gu, Leung, & Konana, 2014). Table 2.1 illustrates some empirical research on intention since 2000.

Table 2.1 Summary of Research on Intention

Authors	**Research contexts**	**Intention types**
Ball and Levy (2008)	Emerging educational technology.	Intention to use.
Chung et al. (2015)	Social network.	Intention to share travel information via social media.
Delone and McLean (2003)	Information system.	Intention to continuous use.
Wamba (2019)	Supply chain.	Intention to use and continuous use.
George (2004)	Online shopping.	Intention of purchasing.
Lin (2007)	Knowledge sharing.	Intention of knowledge sharing.
Lu and Hsiao (2007)	Web blog update.	Intention to continuous update.
Hayashi, Chen, Ryan, and Wu (2004)	e-Learning system.	Continuance intention.
Hernandez and Mazzon (2007)	Online banking.	Intention to adoption and continue to use.
Cho et al. (2015)	Information system.	Information sharing intention for products and services.
Park et al. (2014)	Social network.	Intention to share information.
Kankanhalli, Tan, and Wei (2005)	Electronic knowledge repository system.	Intention to use.
Klein (2007)	Healthcare web application.	Intention to use.
Kolekofski and Heminger (2003)	Information resource management.	Intention toward sharing information.

Table 2.1 (*continued*)

Authors	**Research contexts**	**Intention types**
Mas'ud and Umar (2019)	e-Filing system.	Intention to accept.
Ranganathan and Jha (2007)	Online shopping.	Online shopping intention.
Cho, Park, and Kim (2019)	Information system.	Consumption intention.
Chan and Lu (2004)	Internet banking.	Intention to adopt and continue use.
Shivers-Blackwell and Charles (2006)	ERP technology.	Intention to use.
Vilnai-Yavetz and Levina (2018)	Social network.	Intention to share information and knowledge.
Kim, Kim, and Hwang (2009)	Online shopping.	Purchase intention.
Park and Chen (2007)	Smartphone use.	Intention to use.
Lee (2006)	e-Learning system.	Intention to use.

According to current literature, the concept of intention has already been used as the key predictor to study the actual behavior in various research contexts. However, the literature of studies about information-resource sharing behavior, especially empirical studies, remains limited. Information-resource sharing involves sharing information-resource to other people or departments within the enterprise, thereby producing many benefits for both enterprises and governments. First, modern businesses tend to deploy global resources to increase their potential competitive advantage. Information-resource sharing is the main method to coordinate these resources, and adopting information technology to share information across entities is one of the most cost-effective approaches (Whang, 2000). Second, sharing information-resource can help supply chain members to improve the performance of the entire

system and reduce the "bullwhip effect"[15] (Dubey et al., 2018; Wei, Ke, Lado, Liu, & Wei, 2020; Yu, Yan, & Cheng, 2001). Similarly, sharing information-resource among government agencies can reduce the isolation among departments and improve understanding of government-wide policy goals, increase productivity, improve policymaking, and integrate public services (Dawes, 1996; Ma, Zhou, & Zuo, 2020; Yang, Guevara-Ramirez, & Bisson, 2020). Moreover, information-resource sharing is considered an effective approach to resolving information silo in enterprise (Jiang, 2020; Tett, 2015; Hongqin Zhang & Fang, 2020).

Additionally, due to the dual nature of information-resource—digital information and assets—information-resource sharing is influenced by not only the traditional factors of intention-behavior but also the problems of moral hazard and adverse selection, which are caused by information asymmetry. Since the information provider and recipient may have different goals and the information provider lacks effective means to monitor the recipient action, problems of moral hazard and adverse selection, caused by hidden action and hidden information, respectively, may arise. This consequently influences the willingness to share information-resource. Therefore, this study defines the intention of information-resource sharing as the probability of people sharing information-resource with others (Ajzen & Fishbein, 1980), and investigates information-resource sharing intention from the perspective of e-commerce and the traditional perspective of intention-behavior, according to the dual nature of information-resource.

2.3.2 Perceived Uncertainty

2.3.2.1 Prior studies

A concept derived from organization theory, perceived uncertainty is used to explain the relationship between organization and environment. It is considered as a central construct in organizational design theory and the strategic planning system model. Prior theorists in the fields of psychology and economics have cited this uncertainty in terms of "environmental uncertainty", framing it within three common

[15] Bullwhip effect refers to the phenomenon in which the information flow shifts from the client to the supplier, the information will be distorted and amplified gradually due to it cannot be shared effectively, which causes increasing swings of demand information.

definitions: (1) an inability to indicate probabilities of future events, (2) a lack of information about causality, and (3) an inability to accurately predict the outcomes of a decision (Conrath, 1967; Duncan, 1972; Lawrence & Lorsch, 1967). Scholars have defined perceived uncertainty based on the definition in prior studies: "*an individual's perceived inability to predict something accurately*" (Milliken 1987, p. 136). Uncertainty has been separated into three types according to different experiences of it: state uncertainty, effect uncertainty, and response uncertainty.

State uncertainty, also called "perceived environmental uncertainty", involves the environment relevant to organizations or key organizational members. When people cannot understand how components of the environment may be changed, they cannot predict the future behavior of a key competitor or what events changes in the state of the relevant environment would cause. Thus, they experience perceived uncertainty related to the environment, which is defined as the inability to predict the likelihood of future events or the future consequences of decisions (Milliken, 1987).

Effect uncertainty refers to uncertainty about the environment, or an individual's ability to predict what environmental event or change will influence the organization. This type of uncertainty is therefore defined as the inability to predict how the future environmental state or environmental changes will affect the organization. Related to conditions of the organization's external environment, effect uncertainty involves whether the event or change of environment will impact the organization, as well as the severity and timing of the impact. This uncertainty is caused by a lack of understanding of causal relationships (Duncan, 1972; Milliken, 1987).

Response uncertainty refers to uncertainty about an organization's response, which is caused by an inability to make a reasonable response due to insufficient information when making choices. If an organization lacks sufficient information or knowledge, it may not have sufficient response options nor evaluate the value and use of each option when faced with choices. Therefore, response uncertainty is defined as the uncertainty caused by an inability to predict the possible outcomes of each response option and select the correct response option due to a lack of information. This type of uncertainty exists in the context of an immediate need for decision making (Duncan, 1972; Milliken, 1987).

These three types of uncertainty are concluded as follows: state uncertainty refers to uncertainty about the future state, effect uncertainty refers to uncertainty about the effects of a given state, and response uncertainty refers to uncertainty about response options. These uncertainties are all caused by a lack of sufficient information: state uncertainty lacks information about the nature of the environment; effect uncertainty lacks information to estimate the impact of events or changes of the environment on the organization; and response uncertainty lacks information to respond with the optimal choice and evaluate the impact of each selection (Milliken, 1987).

This concept was extended and used in various contexts such as organization management, electronic commerce, and information management to explain various phenomena due to lacking or incomplete knowledge. For example, Lascaux (2003) states that uncertainty refers to the dilemma of the unknowable, unpredictable, and uncontrollable future. Hubbard (2014) argues that a lack of knowledge and certainty would cause inaccurate descriptions of current states and predictions of future outcomes, thereby reducing the possibility of the actual behavior.

From the view of principal-agent theory, perceived uncertainty is similar to the perception of risk, reflecting one's capacity of enduring a risk; that is, the assessment of the probability of gains or losses caused by actual behaviors such as information sharing, technology use, and purchase (Slyke, Shim, Johnson, & Jiang, 2006). This uncertainty can influence people's actual behavior intention. In the context of online transactions, if people were to perceive more uncertainty about the internet environment such as privacy risk and economic risks, their willingness to conduct e-commerce transactions would decrease (Dinev & Hart, 2006). Buyers face numerous risks arising from adverse situations due to asymmetrical information. For example, the seller may not deliver products after receiving payment, or the delivered product may differ from the product that was advertised (e.g., low quality, fake). If buyers were more worried about the outcome of the online transaction due to the perceived uncertainty, they may experience less intention to purchase (Pavlou et al., 2007; Zhang, Qin, Wang, & Luo, 2020) and repurchase (Yang, Ngo, Chen, Nguyen, & Hoang, 2019) products using e-commerce.

In the context of technology use, using an online service requires users to provide sensitive information such as personal details and account information to the service provider's system. Therefore, if users cannot fully evaluate the service provider, they face economic risks and personal risks. Furthermore, as these transactions are conducted through the public Internet, users face privacy risks if they cannot evaluate the network security of the service provider and its willingness and capacity to protect information. These risks could reduce people's willingness to use online services (Trenz et al., 2013) such as internet banking (Sharma, Singh, & Sharma, 2020), information-seeking services (Cheng, Liu, & Li, 2020), and mobile learning (Al-Adwan, Al-Adwan, & Berger, 2018).

In the context of supply chain management, the unpredictability of customers' demands, in addition to the unpredictability of suppliers' morality, lead-time, and delivery dependability, produce economic and privacy risks. The perceived uncertainty caused by these risks is the main factor that affects the supply chain's operational performance (Brahmi, Hadj-Alouane, & Sboui, 2020; Yaghin & Darvishi, 2020) and interdepartmental information sharing (Barykin, Bochkarev, Kalinina, & Yadykin, 2020; Li & Lin, 2006).

Table 2.2 illustrates some empirical research about perceived uncertainty.

Table 2.2 Summary of Research about Perceived Uncertainty

Authors	**Research contexts**	**Conclusions about perceived uncertainty**
Al-Adwan et al. (2018)	Mobile learning.	Perceived uncertainty impedes mobile activities and reduces students' intention to use mobile learning.
Hsu, Lee, and Straub (2012)	Information system.	Perceived environmental uncertainty, as a moderator, positively affects the relationship between institutional influences and the adoption of information security management.
Chatterjee and Datta (2006)	e-Commerce.	In the electronic market, anonymity and lack of product and process transparencies generate customer uncertainty.
Pavlou et al. (2007)	e-Commerce.	Perceived uncertainty reduces buyers' intention to purchase products online.
Sharma et al. (2020)	Internet banking.	Perceived risks negatively affect customers' intention to adopt internet banking.
Li and Lin (2006)	Supply chain management.	Environmental uncertainties influence information sharing and cooperation among supply chain partners.
Shropshire, Menard, and Sweeney (2017)	Organization management.	Uncertainty negatively impacts attitudes toward DevOps.[16]
Trenz et al. (2013)	Information system.	Perceived uncertainty indirectly reduces people's intention to use the cloud computing service continually.

[16] A compound word of Development and Operations, DevOps represents a set of cultures, practices, or conventions facilitating communication and cooperation between software developers (Dev) and IT operations (Ops).

Table 2.2 (Continued)

Authors	Research contexts	Conclusions about perceived uncertainty
Yang et al. (2019)	e-Commerce.	The high level of uncertainty perceived by customers reduces their intention to repurchase.

2.3.2.2 Hypothesis

Similarly, regarding information asymmetry, when information providers provide information-resource to recipients, they also could face uncertainties caused by numerous unfavorable situations and risks. For example, they cannot assess whether the recipient will adequately protect the information, or whether they will use it in a scenario that could harm the provider's interests. These factors influence the provider's intention to share information-resource. Therefore, this study defines perceived uncertainty as the degree to which future risk cannot be accurately predicted due to information asymmetry, when the information is insufficient to facilitate comprehensive evaluation of the recipient's morality, ability, and behavior (Pfeffer & Salancik, 2003). Moreover, the perceived uncertainty caused by the information provider's inability to predict the recipient's behavior after providing information-resource could reduce the provider's intention to engage in information-resource sharing. The hypothesis is as follows:

H1. A high level of perceived uncertainty leads to a low level of information-resource sharing intention.

2.3.3 Information Confidentiality Concern

2.3.3.1 Prior studies

Information privacy refers to the ability of the individual to control sensitive information (Stone, Gueutal, Gardner, & McClure, 1983); more specifically, their ability to control the collection and use of sensitive information by third parties.

Scholars studying information privacy from the perspective of organizational information privacy practice have identified personal concerns about information privacy that mainly focus on the following aspects (Smith, Milberg, & Burke, 1996).

Collections of sensitive information—concerns about numerous types of sensitive information are collected and stored in the database.

Internal unauthorized secondary use of sensitive information—concerns about sensitive information are collected by the enterprise and used within the company without authorization for other purposes.

External unauthorized secondary use of sensitive information—concerns about sensitive information are collected by the enterprise and disclosed to external third parties without authorization for other purposes.

Errors of sensitive information—concerns about sensitive information are distorted due to a lack of protection.

Improper access of sensitive information—concerns about sensitive information are easily accessed and used without authorization.

Scholars have developed an instrument about the information privacy concern based on the above aspects, called concern for information privacy (CFIP). This instrument uses four sub-dimension constructs—collection, unauthorized secondary use, improper access, and errors—to examine the connections between privacy, privacy concerns, and the outcomes of those concerns. Simultaneously, when consumers use online markets, they may be aware that their information could be collected by marketers without their permission and used for other purposes which could threaten their privacy, thus creating concerns about information privacy. The degree of this concern depends on the information's level of sensitivity, the entity using it, and the compensation for disclosed information (Sheehan & Hoy, 2000). Therefore, a measurement model has been developed, based on the three dimensions of control over collection and usage of information; short-term transaction; and established relationships, to examine the level of consumers' privacy concerns when conducting transactions in the online environment (Sheehan & Hoy, 2000). Moreover, to promote e-commerce, scholars have drawn on the trust-risk framework (McKnight, Cummings, & Chervany, 1998) and CFIP (Smith et al., 1996) to develop a new model for studying Internet users' information privacy concerns. This model is the second-order model

focusing on three dimensions, namely the collection, control, and awareness of privacy practices, and is called Internet Users' Information Privacy Concerns (IUIPC). IUIPC is used to describe the degree of concern experienced by Internet users regarding the collection of sensitive information by third parties, the control of this collected information, and how this collected information will be used (Malhotra, Kim, & Agarwal, 2004). The differences between CFIP and IUIPC are compared in Figure 2.3 and Table 2.3.

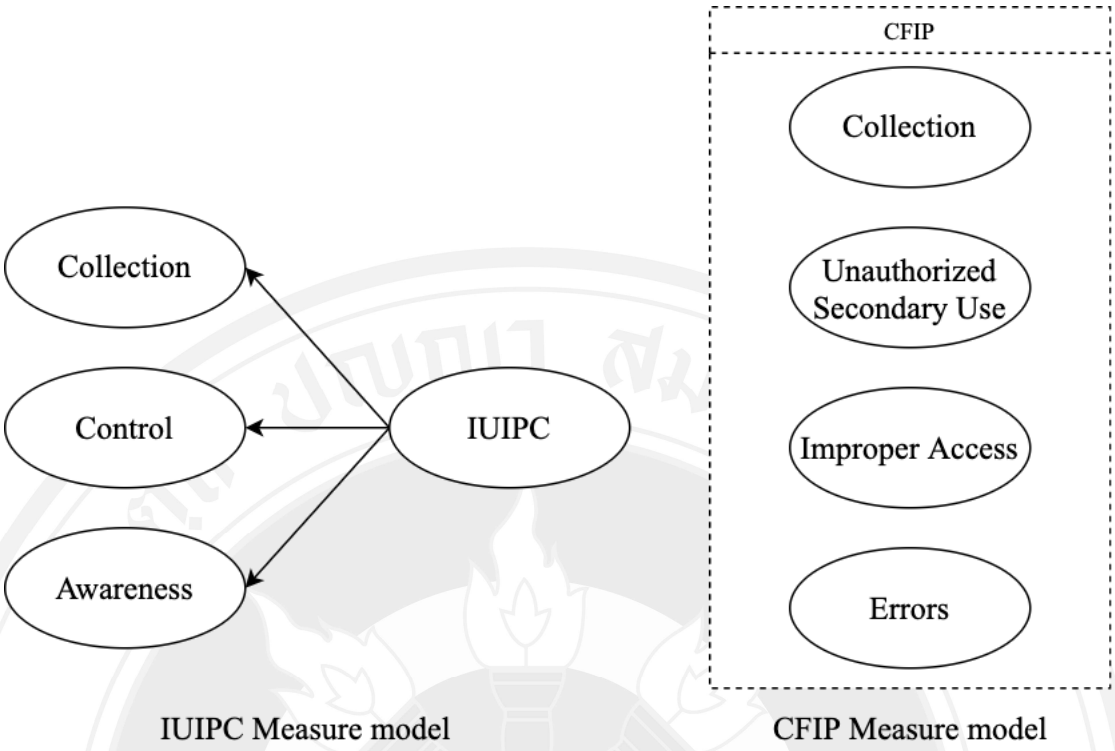


Figure 2.3. The Measure Model of CFIP and IUIPC.

Table 2.3 Comparison between CFIP and IUIPC

	CFIP	**IUIPC**
Objective	To reflect individuals' concerns about organizational information privacy practices.	To reflect Internet users' concerns about information privacy.
Context	Offline or conventional environment.	Online environment.
Dimensions	Collection, Improper Access, Errors, and Secondary Use.	Collection, Control, and Awareness.
Representation	First-order model.	Second-order model.

The growth of the Internet has increased scholarly interest in the issues of online privacy, which has been investigated from various aspects. For example, Bansal, Zahedi, and Gefen (2010) state that information privacy concern refers to concerns about information control, information exchange security, and the rationality of the information collector's behavior. People who experience higher levels of concern about information privacy are less willing to provide their health information to online medical services. Kumar, Mohan, and Holowczak (2008) describe information privacy concern as people's perception of their ability to control sensitive information, which can directly affect their attitude toward firewall software and indirectly affect their willingness to use it. Moreover, Fan et al. (2019) found that information privacy concerns are one of the main influential factors for local governments' choices regarding information technology for data integration and sharing. They also identify information privacy concerns as one of the determinants influencing the government's adoption of blockchain technology to integrate data and share information across agencies and departments.

In the field of e-commerce, customers are required to submit sensitive information to suppliers when making transactions; this information is then stored and used by suppliers. This transfers the information privacy concern from the personal perception of the ability to control sensitive information to the personal perception of the supplier's capacity and willingness to protect the information. In this context, information privacy concern is defined as the level of consumers' perception of suppliers' capacity and willingness to protect their sensitive information (Pavlou et al., 2007). It is considered as a key factor that influences consumers to conduct resource exchanges (Dinev & Hart, 2006; Liao, Liu, & Chen, 2011; Slyke et al., 2006) and decide whether to provide sensitive information to suppliers (Dinev & Hart, 2006; Hui, Teo, & Lee, 2007; Zimmer, Arsal, Al-Marzouq, Moore, & Grover, 2010). Moreover, information privacy concern is also the main factor influencing the decision of universities and other institutions to adopt cloud computing to store their data (Almaiah & Al-Khasawneh, 2020).

Table 2.4 shows some empirical research about the information privacy concern.

Table 2.4 Summary of Research about the Information Privacy Concern

Authors	**Research contexts**	**Conclusions about information privacy concern**
Almaiah and Al-Khasawneh (2020)	Information management.	Perceived privacy positively affects university departments' intention to adopt cloud computing.
Awad and Krishnan (2006)	Information technology.	High level of information privacy concern is associated with low level of willingness to be profiled online for personalization.
Bansal et al. (2010)	Information system.	Information privacy concern is negatively associated with the intention to disclose health information.
Dinev and Hart (2006)	e-Commerce.	High level of information privacy concern could induce a low level of willingness to provide sensitive information in online transactions.
Hui et al. (2007)	e-Commerce.	People who experience higher levels of information privacy concern could be less likely to disclose sensitive information.
Kumar et al. (2008)	Information technology.	Individuals' levels of information privacy concern could influence their attitudes toward using firewall software.
Fan et al. (2019)	Information management.	Information privacy concern is one of the main factors influencing local government's adoption of blockchain technology for information sharing across agencies and departments.
Liao et al. (2011)	e-Commerce.	Information privacy concern negatively affects intentions to conduct transactions and retrieve privileged information.

Table 2.4 (*continued*)

Authors	**Research contexts**	**Conclusions about information privacy concern**
Slyke et al. (2006)	e-Commerce.	Consumers' information privacy concerns will reduce their willingness to conduct transactions with an online merchant.
Xu, Dinev, Smith, and Hart (2011)	Information management.	Institutional privacy assurances–privacy policies and industry self-regulation–can reduce individuals' concern for information privacy.
Zimmer et al. (2010)	e-Commerce.	Information privacy concerns could negatively impact intentions to disclose sensitive information to an e-vendor.

2.3.3.2 Hypotheses

In the context of information-resource sharing, information-resource shared by information providers includes sensitive information such as employees' personal information and financial information. This may cause information providers to be concerned about sensitive information, similarly to the context of e-commerce. This refers to concern about whether the recipients are able and willing to protect the sensitive information provided by them. In this study, this concern is called information confidentiality concern and is defined as people's perception of a recipient's capability and willingness to protect sensitive information (Pavlou et al., 2007). When people have a higher level of information confidentiality concern, they have a higher desire to control sensitive information and a lower intention to share information-resource (Almaiah & Al-Khasawneh, 2020; Fan et al., 2019; Valkenburgh, 2016). Thus, since the information confidentiality concern is considered as a negative factor on information-resource sharing intention, the following hypothesis is proposed:

H2a. Information confidentiality concern negatively associates with information-resource sharing intention.

Information confidentiality concern is considered to have an impact on uncertainty, except for affecting behavior intention. Scholars have stated that if customers cannot accurately predict whether the information they provided will be appropriately used, they may perceive more uncertainty, since self-regulation is still the primary way to protect sensitive information (Kim & Kim, 2018; Pavlou et al., 2007). When users wish to use online services provided by the information system, such as location-based services, information sharing services, and purchase services, they provide information to the service providers and subsequently lose control of this information. Consequently, they may be concerned about whether the sensitive information that they provided is collected properly, stored securely, and used appropriately, particularly if they cannot predict the service provider's capabilities and willingness. This creates more uncertainty when using services (Kim & Kim, 2018; Li & Lin, 2006; Trenz et al., 2013; Zhou, 2011). Therefore, people who have a high level of information confidentiality concern will perceive more uncertainty. The hypothesis is assumed:

H2b. Information confidentiality concern exerts a positive effect on perceived uncertainty.

2.3.4 Information Security Concern

2.3.4.1 Prior studies

Information security is another issue that appeared with the growth of the Internet, caused by the way in which the open Internet infrastructure enables the easy collection, processing, and use of people's personal and monetary information (Pavlou et al., 2007). Scholars have reported that the consumer's ability to control the Web environment directly impacts consumer perception of the security of online shopping, and concerns about the security are the main barrier for the online exchange (Hoffman, Novak, & Peralta, 1999). This issue has been labeled by government and enterprises as the major concerns affecting e-commerce (Miyazaki & Fernandez, 2001).

Some researchers have suggested that issues of security would be the main issue faced by the future development of e-commerce (Milne, 2000; Rose, Khoo, & Straub, 1999), leading to an increasing number of scholars becoming interested in this type of research. When engaging in online shopping, security is the first factor that users must consider, as purchasing is accompanied by the risks involved in transmitting sensitive information and the uncontrollability of outcomes (Salisbury, Pearson, Pearson, & Miller, 2001). Besides, the risks that people perceived in using online services mostly derived from the inability to comprehensively assess the service providers' ability and morality such as the intention to protect users' information, as well as potential security issues related to information technology, such as problems in the process of data transmission and storage. These risks are the critical concerns that make people skeptical about online transactions and services (George, 2002; Kim & Kim, 2018; Yang & Jun, 2002), in addition to the major barriers to applying information systems (Chang, 2014; Cheng, Lam, & Yeung, 2006; Singh & Srivastava, 2018; Taherdoost, 2018; Trenz et al., 2013).

Many scholars have also examined information security in other research contexts (Kshetri, 2017; Pournader et al., 2020; Wang et al., 2019). For example, in the context of supply chain research, scholars have stated that information security issues are the primary issues that enterprises must consider when using the supply chain, as the opportunistic behavior of supply chain participants will increase in correlation with information security risks, and the enterprise may consequently experience unnecessary losses (Saberi et al., 2019). Besides, increasing information security risks may also cause participants of the supply chain to feel reluctant to share critical data and relevant information (Sharma, 2017). This could negatively influence supply chain operations such as information integration, continuity planning, and decision making, as well as supply chain performance (Sindhuja, 2014). In the context of research on information technology, "*one of the largest disadvantages of cloud computing revolves around security and confidentiality*" (Allen 2011, p. 3). Consequently, information security is one of the topmost concerns for organizational decisions regarding the adoption of cloud computing rather than the total cost of ownership (Brodkin, 2010; Kshetri, 2017). Moreover, the issue of information security is the main factor influencing local government decision making regarding the selection

of information technology for data integration and sharing. It is also the determinant leading governments to adopt blockchain technology to integrate data and share information across agencies and departments (Fan et al., 2019).

In summary, the information security risk caused by information security issues can cause concern about information security and impact people's behavior intention. Moreover, information security issues occur not only in the field of e-commerce, but also in fields related to the Internet, the information system, and information technology, where similar information security risks also exist. Therefore, the concept of information security concern is widely used in various fields related to information systems and technology, to explore the people's intention or behavior regarding existing security concerns. This includes research in the field of information-resource sharing.

Table 2.5 shows some empirical research about the information security concern.

Table 2.5 Summary of Research about the Information Security Concern

Authors	**Research contexts**	**Conclusions about information security concern**
Fan et al. (2019)	Information management.	Information security is one of the main factors influencing local governments adopting blockchain technology to share information across agencies and departments.
Miyazaki and Fernandez (2001)	e-Commerce.	The perceived security risk of online purchases is negatively related to the intention to purchase products online.
Oliveira, Thomas, Baptista, and Campos (2016)	Mobile payment.	Perceived technology security could promote customers' intention to adopt mobile payment.
Pavlou et al. (2007)	e-Commerce.	Information security concern related to both hidden information and hidden action could reduce buyers' purchase intention, as it increases buyers' perceived uncertainly about sellers' ability and willingness.
Salisbury et al. (2001)	e-Commerce.	People could have more intention to purchase online when they perceive Web security.
Singh and Srivastava (2018)	Internet banking.	Consumers' concerns about the security of conducting transactions over the Internet is one of the major barriers to adopting Internet banking.
Cheng et al. (2006)	Internet banking.	Perceived online security has positive relationships with both customers' intention and attitude regarding the use of Internet banking.

Table 2.5 (*continued*)

Authors	**Research contexts**	**Conclusions about information security concern**
Taherdoost (2018)	Information technology.	Information security significantly influences people's intention to use an e-service and consequently their acceptance of e-service technology.
Trenz et al. (2013)	Information technology.	Information security concern related to both hidden information and hidden action could reduce users' intention to continue using cloud computing, due to the way that it increases their perceived uncertainly about the provider's ability and willingness to handle their sensitive information appropriately.
Yang and Jun (2002)	e-Commerce.	Information security is a major concern for both Internet purchasers and non-purchasers to use e-services.

2.3.4.2 Hypotheses

The information security concern discussed in this study is also a concern about information security generated by the Internet context. When people share information with other departments, they also experience concern about information security within the process of information transmission and storage, and whether information recipients are able and willing to secure their information in the process of information transmission and storage. Therefore, considering that the relationship between two parties of information-resource sharing is the stakeholder, this study defines information security concern as the people's perception of Internet security (Yenisey et al., 2005), which includes the network environment security; the recipient's security awareness and capacity; and the computer equipment security. If the information-resource provider perceives that the recipient can ensure the security

of the information system and a willingness to secure information-resource, their information security concern is decreased.

From the perspective of principal-agent theory, when the information-resource provider (principal) cannot accurately determine whether the information they provided will be appropriately safeguarded by the recipient (agent), they will be unwilling to conduct the transaction (Pavlou et al., 2007). The same relationship is also examined by other researchers from technical perspectives such as confidentiality and authentication (Flavián & Guinalíu, 2006), to examine people's feelings or concerns about security (Shin, 2010). For example, in Singh and Srivastava's (2018) study of the adoption of Internet banking through business clients, they found that security concern is one of the main factors that negatively impact people's adoption of Internet banking. Additionally, Taherdoost (2018) found that information security concern is an important factor that inhibits people's intention to purchase or adopt technologies. Therefore, this study considers that information security concern negatively influences people's intention to share information-resource (Cheng et al., 2006; Fan et al., 2019; Oliveira et al., 2016; Topaloğlu, 2012; Tsai & Yeh, 2010). The hypothesis is as follows:

H3a. Information security concern exerts a negative effect on the intention to share information-resource.

From the perspective of principal-agent theory, information security concern will increase uncertainty in online contexts such as online exchange, information sharing, and technology use (Pavlou et al., 2007). First, due to information asymmetry, the information-resource provider hardly judges whether the security breach arises and whether an appropriate precaution approach is taken (Kim & Kim, 2018; Trenz et al., 2013). Thus, if the provider has the capacity to confirm that the recipient can and is willing to ensure the security of the information system, the levels of security concern and uncertainty caused by information security risks are decreased. Second, if the recipient can provide detailed information, the provider can estimate their capacity and willingness to maintain information security, thereby reducing the information security concern and the uncertainty caused by information security risks (Kim & Kim, 2018; Pavlou et al., 2007; Trenz et al., 2013). Therefore, reduced

information security concern will cause a lower perceived uncertainty when sharing information-resource, which derives from an individual finding it difficult to assess and predict the recipient's ability and willingness to safeguard information. The hypothesis is as follows:

H3b. Information security concern positively relates to perceived uncertainty.

2.3.5 Openness

2.3.5.1 Prior studies

Openness is a multidimensional concept which involves two aspects: individual and environmental. Individual-related openness occurs in the form of "openness to experience". This type of openness is the component of psychological assessment in the Revised NEO Personality Inventory (NEO PI-R),[17] which is used to assess human personality. According to McCrae and Costa (1997), "*Openness is seen in the breadth, depth, and permeability of consciousness, and in the recurrent need to enlarge and examine experience*" (p. 826). This type of openness therefore needs to be viewed from both structural and motivational aspects. In other words, the open individual should possess two characteristics. From the structural aspect, they should possess a breadth of interests; in-depth and intense attentions; and permeable cognitive structures. From the motivational aspect, they should possess a vigorous motivation to explore unfamiliar topics and ideas.

Individual-related openness is associated with human intelligence linked to cognitive abilities such as knowledge achievement or creative thinking (Cucu-Ciuhan & Răban-Motounu, 2012; Myers, Sen, & Alexandrov, 2010), and is one of the human behavioral tendencies that are influenced by the environment of human growth and development. This type of openness is also associated with an individual's behavior intention and willingness to face new experiences and ideas and accept changes, such

[17] The revised NEO Personality Inventory (NEO PI-R) is one of the most popular personality measurement tools worldwide. It considers five dimensions—neuroticism, openness, agreeableness, conscientiousness, and extraversion—to comprehensively evaluate one's personality from the aspects of psychological and physical (McCrae & Costa, 1997).

as the identification of new outcomes or solutions through intelligence (Hsu & Chen, 2014; Malik, Hairuddin, & Shuib, 2018). Some scholars find that openness positively impacts the development of cognitive abilities such as reading and learning activities. For instance, openness leads to more learning opportunities by creating an environment that facilitates communication; people with high openness to experiences are more likely to face new situations and receive new information (Trapp, Blömeke, & Ziegler, 2019; Trapp & Ziegler, 2019; Ziegler, Danay, Heene, Asendorpf, & Bühner, 2012).

Environment-related openness is associated with "openness to communication" and is defined as the "*message-sending and receiving behaviors of superiors, subordinates, and peers with regard to task, personal, and innovative topics*" (Rogers, 1987, p. 54). This type of openness is promoted in environments in which communication among stuff and manager is open and transparent, making it a crucial component of organizational culture. It is usually described from different perspectives such as the nature of resources (open resources), the nature of processes (open processes), or the effects on a specific domain (open effects) (Rogers, 1987). Therefore, openness is related to the improvement of performance and can create an open and secure climate to facilitate improved performance (Toffolutti & Stuckler, 2019). Likewise, open communication implies that employees are willing to exchange and develop their thoughts and ideas, thereby revolving around all organization-level individuals who receive and respond to the information provided by their colleagues (Norman, Avolio, & Luthans, 2010; Thomas, Zolin, & Hartman, 2009). Therefore, it is considered as the essential element associated with organizational effectiveness and connected to the success of the organization. It contains three dimensions: upward (from subordinate to superior), downward (from superior to subordinate), and horizontal (from peer to peer) (Gibbs, Rozaidi, & Eisenberg, 2013). Its degree depends on individual and organizational motivations and goals, as well as the environmental or situational characteristics of the workplace (Breen, Fetzer, Howard, & Preziosi, 2005).

In the area of information technology study, openness and information technology are inseparable and have a symbiotic relationship. This has a significant effect on traditional organizations and businesses and can provide an open environment for research and innovation in various institutions or enterprises, such as "open government" (governments that make information transparent and available for

participation and collaboration) (Schlagwein, Conboy, Feller, Leimeister, & Morgan, 2017). Moreover, openness is a criterion for relevant partnership when entrepreneurs wish to evaluate potential partnerships or establish partners (Allmendinger & Berger, 2020).

Table 2.6 shows some empirical research about openness.

Table 2.6 Summary of Research about Openness

Authors	**Research contexts**	**Conclusions about Openness**
Allmendinger and Berger (2020)	Enterprise management.	People are more willing to become partners with another party when the other party demonstrates a high level of openness.
Breen et al. (2005)	Organizational management.	Openness communication is an essential element for managerial decision making associated with organizational effectiveness.
Gu et al. (2019)	IT/IS usage.	A high degree of openness provides more favorable attitudes toward, and less perceived risks of, using social media-based health management systems.
Haesevoets et al. (2019)	Enterprise management.	Openness in communication is important for workplace ethics, as it can foster collaboration and benefit organizational practice.
Malik et al. (2018)	Information technology.	Openness to experience has moderating effects on customer satisfaction among social commerce users.
Myers et al. (2010)	Marketing.	A higher level of openness to experience indicates a favorable attitude toward advertising.
Phung and Mai (2017)	Finance.	Openness to experience can facilitate investment performance due to mitigate perceived uncertainty.
Puck, Rygl, and Kittler (2007)	Organizational management.	Communication openness within an innovation team has a positive impact on its performance.

Table 2.6 (*continued*)

Authors	**Research contexts**	**Conclusions about Openness**
Shropshire et al. (2017)	Organizational management.	Openness has moderating effects on employees' attitude towards DevOps, as it can mitigate future uncertainty.
Yu, Lu, and Liu (2010)	Online community.	Community openness positively affects knowledge-sharing behavior mediated through community sharing culture.
Thomas et al. (2009)	Organizational management.	Open communication implies that employees are willing to exchange their thoughts and ideas, which is positively associated with involvement in organizational goals.
Toffolutti and Stuckler (2019)	UK National Health Service.	Openness is an environment in which communication among patients, staff members, and managers is open and transparent, which can promote health care performance.
Trapp and Ziegler (2019)	Personality.	Openness leads to engagement in more learning activities by creating an enriched environment (e.g., reading and communication).

2.3.5.2 Hypotheses

In this study, openness is operationalized as a similar concept to "openness to communication" or transparency. Regarding blockchain technology, openness represents the permission to read and write data. As a major factor of democratizing communications and encouraging competition and innovation, it can provide transparent data for communication or exchange when an enterprise or enterprises need to disclose data (Park & Park, 2017; Valkenburgh, 2016). Therefore,

this study defines openness as the extent to which information can be shared among all participants (Haesevoets et al., 2019).

In the field of organizational research, scholars find that openness is one of the essential factors for an effective organization, as it can effectively promote communication and exchanges between employees and consequently improve organizational performance (Norman et al., 2010; Puck et al., 2007; Toffolutti & Stuckler, 2019). In knowledge research, openness can effectively encourage communication and knowledge sharing due to disclosing information and unambiguous communication (Gibbs et al., 2013). Moreover, openness could promote knowledge-sharing behavior through the positive effects on the community sharing culture (Yu et al., 2010). Furthermore, a high level of openness would generate a high willingness to become partners (Allmendinger & Berger, 2020). Therefore, as this study assumes that openness will positively relate to the intention of information-resources sharing, the following hypothesis is proposed:

H4a. Openness has a positive relationship with the intention to share information-resource.

In organizational theory, organizational theorists studying openness in uncertain environments have found that openness can reduce uncertain factors in uncertain environments (Duncan, 1972; Miller & Dröge, 1986). For example, Chatterjee and Datta (2006) found that product and process transparency could reduce perceived uncertainty in electronic markets. Phung and Mai (2017) use mixed interviews and questionnaires to explain the correlation between openness and perceived uncertainty, finding that openness reduces perceived uncertainty when investors want to invest. Furthermore, other scholars have found that individuals with a high degree of openness find it easier to absorb new experiences, accept changes, and effectively use various strategies to deal with unknowns. Thus, they will perceive less uncertainty when they facing unknowns and are more willing to try new things and challenge the uncertain future (Gu et al., 2019; Retzbach, Otto, & Maier, 2016; Shropshire et al., 2017; Thomas et al., 2009). Therefore, this study assumes that higher

environmental openness will produce lower perceived uncertainty when communicating or sharing information, as the following hypothesis assumes:

H4b. Openness has a negative impact on perceived uncertainty about information-resource sharing.

2.3.6 Trust

2.3.6.1 Prior studies

As trust is a complex concept in both social and online contexts, scholars have not limited it to one universal definition. In the social context, trust is an ethical habit which can facilitate the creation of new associations and cooperation. It can promote innovation in product, process, and management by making it easier for participants to cooperate for a common goal (Fukuyama, 1995). The characteristics of trust in this context contain the following two aspects (Mayer, Davis, & Schoorman, 1995).

Propensity to trust—it is viewed as a willingness to trust, a generalized expectation about the reliability of others. It is significantly connected to people's behavior and performance.

Trustworthiness—it is seen as an assessment of the level of trust that people's behaviors, as well as current and previous claims, can allow them to gain. This explains why some people are more trusted, and some are not.

Based on these two characteristics, trust is defined as "*the willingness of a party to be vulnerable to the actions of another party based on the expectation that the other will perform a particular action important to the trustor, irrespective of the ability to monitor or control that other party*" (Mayer et al., 1995, p. 712). From the perspectives of ability, benevolence, and integrity, developing a trust-related model can facilitate understanding of how trust impacts between departments in an organizational environment.

Trust is also a psychological state. Due to its decisive value in uncertain conditions (Mayer et al., 1995), it has attracted many scholars in various fields. For example, in research on organizational management, scholars studying the concept of trust from a multidisciplinary view have found that it is related to dispositions, decisions, behaviors, and institutions. Trust has therefore been defined as "*a psychological state comprising the intention to accept vulnerability based upon positive expectations of the intentions or behavior of another*" (Rousseau, Sitkin, Burt, & Camerer, 1998, p. 393) and used to study the nature of trust in and between organizations. In economic research, scholars have developed a calculative approach to study trust. Finding that trust can be interpreted in terms of efficiency and credibility,

these scholars have separated it into three types: calculative trust, personal trust, and institutional trust (Williamson, 1993).

Due to the uncertainty that characterizes the online environment, trust is considered an important in relation to online activities such as e-commerce and technology adoption and widely used in the research related to the Internet. For example, trust, as the confidence that one expects what others will do, develops gradually through ongoing interactions; it is therefore considered as a major element to reduce the uncertainty of online context and create an understandable interactive organization (Gefen, 2000). Besides, trust can also be defined as the belief that depends on others but does not control them, especially in the relationship between clients and service providers (Gefen, 2004). Therefore, some scholars define trust as one party's belief that their needs will be implemented in the future by the actions of the other party. It is determined by three dimensions, namely perceived honesty, benevolence, and competence, and can be used to study the relationship between consumer and supplier (Flavián & Guinalíu, 2006). Other scholars define trust as the buyer's intention to accept vulnerability based on the belief that the transaction will correspond with their expectation. It can facilitate online transactions by reducing the uncertainty through the mitigation of the problems of hidden information and hidden action (Pavlou et al., 2007). Additionally, trust has been found to be multi-faceted. Affect-based trust is based on relationships in which the parties are required to experience a level of care or concern for each other, while cognition-based trust is grounded in the perception of peers' competence and reliability (McAllister, 1995). These types of trust both have a positive impact on behavior intention related to knowledge sharing; technology and service use; and online transactions (Holste & Fields, 2010).

Trust can also be used to explain behavior intention about sharing and technology use in various contexts (Heiskanen, Newman, & Eklin, 2008; Sherchan, Nepal, & Paris, 2013). In the context of virtual communities, trust, as a key element, not only encourages online cooperation between strangers but also increases members' intention to share information or communication within the community (Ridings, Gefen, & Arinze, 2002). Moreover, trust is the central concept that positively affects users' intention to adopt social network services (Shin, 2010). Furthermore, trust can

be used to maintain reciprocal faith in each other, thereby facilitating members to share knowledge through professional virtual communities (Lin, Hung, & Chen, 2009).

In the field of e-commerce, trust is a positive factor that influences consumers' decisions. For example, Gefen et al. (2003) integrate trust into TAM, consequently finding that trust has a stronger effect on customer intention to use and reuse an e-commerce website than other factors of TAM. Likewise, trust has a positive effect on consumer loyalty and satisfaction, thereby influencing the decision to use m-commerce (Chung & Kwon, 2009; Duane, O'Reilly, & Andreev, 2014; Lin & Wang, 2006). Moreover, some scholars have found that trust can help customers overcome the uncertainties of security and privacy risks in the online environment, which thus increases their intention to use mobile banking (Singh & Srivastava, 2018; Thusi & Maduku, 2020).

In the field of knowledge management, scholars focusing on the affect-based and cognition-based to study the effect of trust on knowledge sharing have found both types of trust to significant influence the decisions of tacit knowledge sharing and use. Affect-based trust has a greater influence on knowledge sharing, while cognition-based trust has a greater impact on knowledge use (Holste & Fields, 2010). Additionally, affect-based trust significantly affects the intention of knowledge sharing in organizations (Huang, Davison, & Gu, 2011). Moreover, some scholars using interpersonal trust and organizational trust as organizational socialization factors to study knowledge-sharing behavior within organizations have found that trust not only directly influences knowledge sharing within SMEs (Curado & Vieira, 2019), but also significantly affects knowledge-sharing behavior within public service organizations through the normative commitment (Rasdi & Tangaraja, 2020).

Table 2.7 shows some empirical research about trust.

Table 2.7 Summary of Research about Trust

Authors	Research contexts	Conclusions about Trust
Akman and Mishra (2017)	e-Commerce.	Trust positively affects consumer intention to use social commerce, as it mitigates risks through trustworthiness.
Cheung and Lee (2003)	Internet shopping.	Trustworthiness and propensity to trust have direct and moderating effects on consumer trust regarding Internet shopping.
Curado and Vieira (2019)	Knowledge management.	Trust has positive influences on knowledge sharing within SMEs.
Duane et al. (2014)	Information technology.	Trust reduces consumers' perceived risks of using m-payments, thereby increasing their willingness to make m-payments.
Flavián and Guinalíu (2006)	e-Commerce.	High level of consumer trust in a web site increases intention to purchase products through it.
Gefen and Straub (2003)	B2C e-services.	Higher levels of consumer trust in the service provider leads to higher intentions to use e- services.
Holste and Fields (2010)	Knowledge management.	Both cognition-based and affect-based trust in a coworker have positive effects on intentions to share knowledge.
Li, Li, Wang, and Li (2019)	Knowledge management.	When the initial willingness to trust each other is higher, the knowledge sharing is more effective.
Huang et al. (2011)	Knowledge management.	Affect-based trust has a significant effect on intentions to share tacit and explicit knowledge.

Table 2.7 (continued)

Authors	Research contexts	Conclusions about Trust
Luo (2002)	Electronic market.	Trust plays a major role in the electronic market, which involves high uncertainty and deems it as a solution for consumers' privacy concerns.
Lin et al. (2009)	Knowledge management.	Trust facilitates members' knowledge-sharing behavior in professional virtual communities.
Pavlou and Gefen (2004)	e-Commerce.	Trust in the community reduces perceived risk and increases transaction intentions in online marketplaces.
Pavlou et al. (2007)	e-Commerce.	Trust reduces buyers' perceived uncertainty to purchase online, by mitigating buyers' information security and privacy concerns and moderating information asymmetry.
Rasdi and Tangaraja (2020)	Knowledge management.	Trust has significant effects on knowledge sharing within public service organizations through the normative commitment.
Ridings et al. (2002)	Virtual communities.	Participants' trust in the virtual community is positively related to their willingness to share information with others.
Sanchez-Franco and Rondan-Cataluña (2010)	Online music services.	Trust leads customers to develop high commitment to online music services.

Table 2.7 (*continued*)

Authors	Research contexts	Conclusions about Trust
Singh and Srivastava (2018)	IS adoption.	Trust increases customers' intention to use mobile banking by helping them to overcome the uncertainties of security and privacy risks in the online environment.
Shin (2010)	Online communities.	Trust increases users' favorable attitudes toward social network services.
Trenz et al. (2013)	IS adoption.	Trust reduces users' perceived uncertainty of cloud computing continuance by mitigating their information security and privacy concerns.

2.3.6.2 Hypotheses

In this study, trust is also a critical factor. Not only is trust an inherent characteristic of blockchain technology, but it is also a core factor that must be considered when designing the blockchain consensus mechanism. Moreover, in a risky environment, trust can encourage voluntary behaviors such as purchase, service use, and knowledge sharing, by promoting cooperation and reducing perceived uncertainty (Curado & Vieira, 2019; Mainelli & Smith, 2015). Therefore, this research also believes that trust can promote information-resource sharing by increasing willingness to cooperate between departments and reduce perceived uncertainty in information-resource sharing. This research also defines trust as a social complexity-reducing mechanism that leads to a willingness for organizational dependence (Gefen & Straub, 2004). It is used to assess whether the department or organization is trustworthy and provides support for further assessing the risks faced by information-resource sharing. Besides, prior studies have shown trust to have a significant influence on intentions of knowledge sharing, purchase, and technology use (Curado & Vieira, 2019; Holste &

Fields, 2010; Huang et al., 2011; Lin et al., 2009; Rasdi & Tangaraja, 2020; Shin, 2010; Yang, Lin, Chandlrees, & Chao, 2009). Therefore, this study assumes that trust will positively influence the information-resource sharing intention, as the following hypothesis states:

H5a. Trust has a positive relationship with the intention of sharing information-resource.

Trust also can reduce the perceived uncertainty by decreasing people's perception of risk, as it can ensure that people attain the desired result of events in the unknowable future as if being assured from the knowable past (Lascaux, 2008); it also decreases the likelihood of people to consider the impact of uncertainty (Yang et al., 2019). When the information-resource provider trusts the recipient, they tend to assume that the trusted recipient will not engage in opportunistic behavior and will take action to reduce environmental uncertainty and the risks related to Internet infrastructure. It will reduce the perception of environmental risk connected with information-resource sharing (Pavlou et al., 2007; Yang et al., 2019). This relationship has been studied and verified by prior scholars. For example, Pavlou and Gefen (2004) state that trust is the subject concept and can decrease the transaction's perceived risk by reducing the expectation of opportunistic behavior. Kim, Ferrin, and Rao (2008) demonstrate that trust can mitigate the perceived uncertainty of online purchasing intentions by mitigating relevant risks related to incomplete control of the outcome. Nicolaou and McKnight (2006) claim that trust will negatively impact perceived risk related to exchange data by providing a sense of assurance even when consequences are unpredictable. Das and Teng (2001) studied the relationship between trust, control, and risk, and found that trust can minimize risks. Thusi and Maduku (2020) describe trust as a critical factor that decreases people's perception of risk in the online environment. Moreover, Yang et al. (2019) claim that trust is one of the most effective factors for reducing uncertainty, as it can decrease the conscious consideration of uncertainty. Therefore, this study proposes the following hypothesis:

H5b. Trust reduces perceived uncertainty.

Trust has also been determined to relate to information confidentiality and security concerns. It can reduce both information confidentiality and security concerns by mediating the impact of information asymmetry on both parties participating in information-resource sharing (Pavlou et al., 2007; Singh & Srivastava, 2018). If the provider is willing to trust the recipient, they can accept the vulnerability associated with sharing sensitive information (e.g., private information and monetary information) and trust that the recipient has both the competence to protect the provided information and the integrity and benevolence to refrain from selling it to third parties. Moreover, trust also can reduce the information confidentiality and security concerns by impacting the user's sense. For example, service vendors in a knowledge-sharing community may signal their benevolence, competence, and integrity to demonstrate their procedural fairness regarding the protection of users' sensitive information and security, such as by publishing a data privacy statement and security policy. This reduces the user's concerns about information confidentiality and security and promotes their willingness to use community services and share knowledge (Trenz et al., 2013). Similarly, if users believe that vendors need to maintain their reputation and can protect their information, this reduces their concerns about information confidentiality and security and increases their willingness to use the community to share information. For instance, due to trust in the baby community, users in this community are willing to share information such as their parenting experiences and even consult with free pediatricians online (Luo, 2002). Therefore, in this study, the proposition similar to the above research in the fields of e-commerce, information sharing, and information technology will be used to mitigate the information confidentiality and security concerns during information-resource sharing, as stated in the following hypotheses:

H5c. Trust exerts a negative impact on decreasing concern for information confidentiality.

H5d. Trust exerts a negative effect on reducing concern for information security.

Besides, trust is also related to openness. Openness indicates that people are willing to exchange their thoughts and ideas (e.g., open communication). Thus, when they trust each other, they will more easily share their ideas and opinions (Thomas et al., 2009). Some scholars have found that the concepts of trust and openness are related yet distinct. Trust is more affective while openness is more behavioral; additionally, a higher level of trust will lead to a higher willingness to communicate thoughts and information (Hofhuis, Van Der Rijt, & Vlug, 2016; Men, Yue, & Liu, 2020; Meng, 2015). Similarly, trust is an important requisite for open communication due to its potential reduction of opportunistic behavior. It can facilitate open communication, information sharing, and conflict management (Brinkhoff, Özer, & Sargut, 2015; McNeil, 2016; Seppänen, Blomqvist, & Sundqvist, 2007). Trust has also been shown to positively influence open communication in teams (Breuer, Hüffmeier, & Hertel, 2016; Costa & Anderson, 2011). Therefore, this study assumes the following hypothesis:

H5e. Trust facilitates enterprise to build an environment with openness.

2.3.7 Perceived Rewards

2.3.7.1 Prior studies

The rewards are a concept derived from the social exchange theory (Emerson, 1976) and social capital theory (Coleman, 1988). Social exchange theory states that individuals' decisions about building relations are based on the subjective cost-benefit analysis, in which their aim is to maximize the benefits (Tong, Wang, & Teo, 2007; Vilnai-Yavetz & Levina, 2018). When people find the costs of building relations to be higher than the rewards, problems arise. For example, if they place a substantial amount of effort into the process which is not reciprocated, they will reduce efforts to input, or may even abandon the relationship entirely (Emerson, 1976). Therefore, when people want to build relations with others, costs and rewards are elements that drive their decision making: rewards are the positive elements and costs are the negative (West & Turner, 2018). People tend to build relations with others (including people and markets) if they perceive the rewards to be higher than the costs

(Lawler, 2001), and stabilize this relationship through social exchange such as reciprocity.

Social capital theory argues that people invest in social capital or provide these resources for others because they expect to obtain rewards from the investment in the future (N. Lin, 1999; Park et al., 2014). Social capital is a resource embedded in social networks. It includes both tangible benefits such as money and intangible benefits such as reciprocity and reputation (Lin, 2002). It can significantly affect and shape interactions among members of a group, organization, community, or society, and can facilitate cooperation and mutually supportive relations in those groups (Putnam, 1995). It is also seen as the motivation of individual behavior, as it can produce rewards (whether economic or non-economic) for people when they establish connections with others or otherwise contribute to the community (Finkbeiner, 2017). For example, if people help others in the community, they may establish a positive reputation for themselves or receive help from others when needed (Finkbeiner, 2017).

Therefore, scholars consider that rewards are a positive element that promotes people's behavior intention, and have studied it from various perspectives in many fields, such as information systems and knowledge management.

Table 2.8 shows some empirical research about rewards.

Table 2.8 Summary of Research about Rewards

Authors	Research contexts	Conclusions about Rewards
Bock et al. (2005)	Knowledge management.	Expected extrinsic rewards encourages favorable attitudes toward knowledge sharing.
Lin (2007)	Knowledge management.	Organizational rewards and reciprocal benefits are two effective motivators that inspire employees to develop positive intentions regarding knowledge sharing.
He and Wei (2009)	Knowledge management.	Organizational rewards exert a positive effect on intention to contribute knowledge.
Park et al. (2014)	Online investment community.	A higher reward such as reputation leads to a higher intention to share information in online communities.
Koloniari, Vraimaki, and Fassoulis (2019)	Knowledge management.	Reward systems are key to reducing employees' knowledge-sharing hesitation.
Wasko and Faraj (2005)	Knowledge management.	The norm of reciprocity is a salient motivator to encourage members' knowledge-sharing behavior in professional virtual communities.
Vilnai-Yavetz and Levina (2018)	IT/IS.	Extrinsic rewards such as finance and recognition will increase willingness to share e-business content on social networking services.
Zhang et al. (2017)	Knowledge management.	Extrinsic rewards such as reciprocity and reputation have a positive influence on the knowledge-sharing intention in health Q&A communities.

Hypothesis

Nowadays, many scholars have placed rewards into the motivation model to investigate its effects on behavior intention in various areas. In studies of knowledge management, rewards are considered as important factors of the knowledge management process; they are the motivation and commitment for community members involved in knowledge sharing (He & Wei, 2009). Rewards such as reputation motivate individuals to engage in social interaction and contribute to the community, such as by sharing knowledge or information (Park et al., 2014). Similarly, economic and non-economic (e.g., reciprocity) rewards have positive effects for motivating individuals to perform desired behaviors. For instance, if people believe that they can receive reciprocal benefits, they will exhibit a more positive intention to share knowledge (Lin, 2007) and will continue to contribute their knowledge (Lin et al., 2009; Wasko & Faraj, 2005). Additionally, when individuals believe that they will receive monetary rewards, they will have more favorable attitudes toward knowledge sharing (Bock et al., 2005).

In studies of information systems, economic rewards (e.g., money) and social rewards (e.g., reputation and reciprocity) are incentives that encourage individuals to share e-business content by using social networking services (SNS) (Vilnai-Yavetz & Levina, 2018) or share their genomic data by using blockchain-based platforms (Shabani, 2019). Rewards are also important factors that encourage individuals to contribute to the information system (Saberi et al., 2019). For example, the Bitcoin rewards system is designed to reward participants who contribute computational power to the Bitcoin network, maintain network security, and support network growth (Pazaitis et al., 2017).

Therefore, in this study, it is defined as people's perception that rewards (e.g., money, reputation, and reciprocity) could promote the intention of information-resource sharing (Zhang et al., 2017), and is called perceived rewards. The relationship between perceived rewards and information-resource sharing intention is hypothesized as follows:

H6. Perceived rewards have a positive influence on information-resource sharing intention.

2.4 Conceptual Framework and Hypothesis

As summarized above, the model and hypotheses of this study are grounded on the motivation model and the principal-agent theory and are established from the perspective of the consensus perception of the blockchain. Figure 2.4 presents the conceptual framework in addition to the interrelationships among variables. The hypotheses supported by related theories and previous studies are also summarized below.

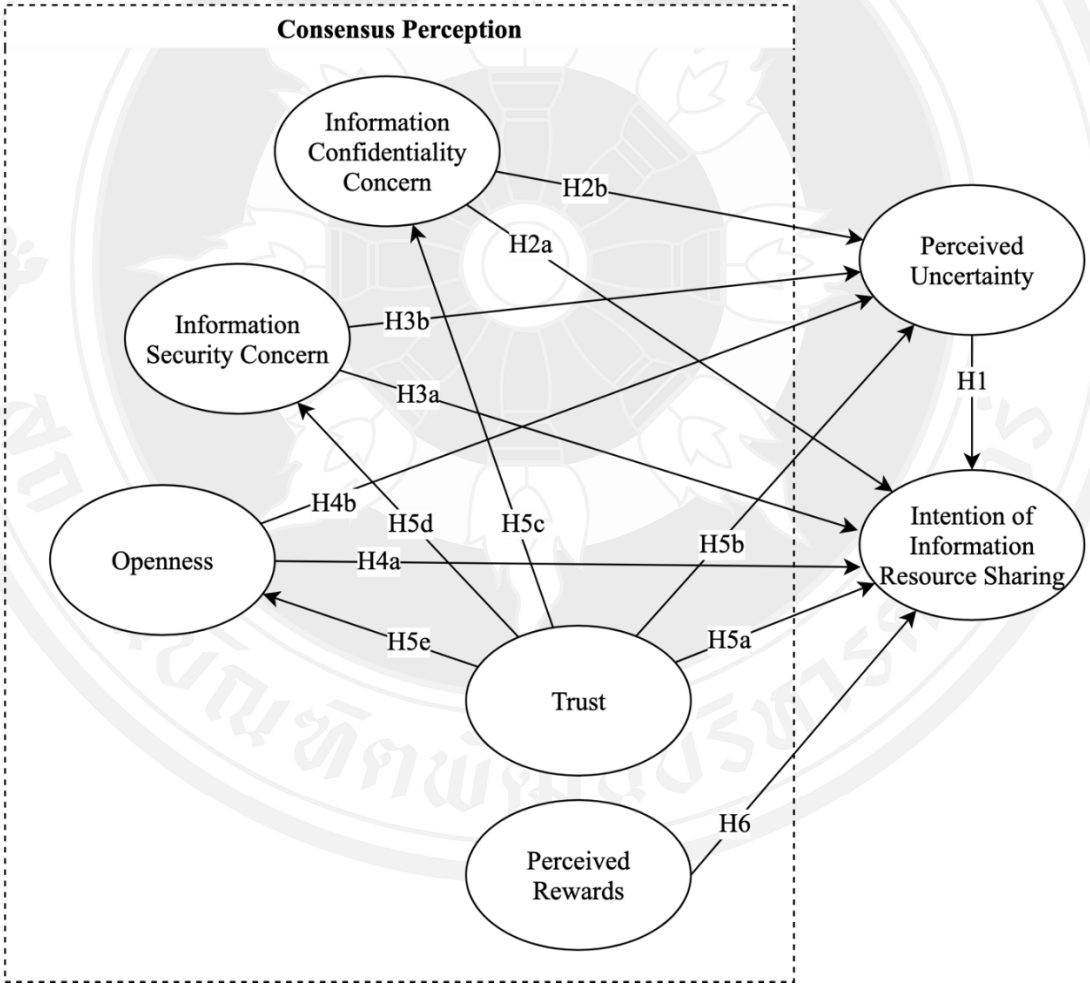


Figure 2.4. Conceptual Framework.

H1. A high level of perceived uncertainty leads to a low level of information-resource sharing intention.

H2a. Information confidentiality concern negatively associates with information-resource sharing intention.

H2b. Information confidentiality concern exerts a positive effect on perceived uncertainty.

H3a. Information security concern exerts a negative effect on the intention to share information-resource.

H3b. Information security concern positively relates to perceived uncertainty.

H4a. Openness has a positive relationship with the intention to share information-resource.

H4b. Openness has a negative impact on perceived uncertainty about information-resource sharing.

H5a. Trust has a positive relationship with the intention of sharing information-resource.

H5b. Trust reduces perceived uncertainty.

H5c. Trust exerts a negative impact on decreasing concern for information confidentiality.

H5d. Trust exerts a negative effect on reducing concern for information security.

H5e. Trust facilitates enterprise to build an environment with openness.

H6. Perceived rewards have a positive influence on information-resource sharing intention.

CHAPTER 3

METHODOLOGY

This chapter provides information regarding the research methodology and comprises six sections. It begins with the research design, discussing this study's research method and research respondents. Discussions about sample size and sampling method are presented in the sampling plan section. Next, the survey methods, questionnaire development, and data collection method are discussed. Finally, discussions related to the construct measurement and the analytical approach are presented.

3.1 Research Design

According to the research questions of this study, the quantitative approach was adopted to investigate relationships of influence factors on the information-resource sharing intention. Compared with the qualitative approach, the quantitative approach emphasizes the measurement and analysis of causal relationships among constructs (Denzin & Lincoln, 1994; Tierney & Lincoln, 1997). It is used to study human behavior, motivation, and attitude by quantifying data, especially with a larger population (Lapan & Quartaroli, 2009). Therefore, the quantitative approach is more appropriate for this study, as it involves causal research on human behavior intention.

Second, this study selected enterprises and institutions as the research object and used an anonymous questionnaire as the primary data collection method. The questionnaire method facilitates the collection of prototypical data from a large population within a short time with relatively low costs. Moreover, the anonymous questionnaire method can better reflect respondents' unbiased opinions, while the survey investigating this study's research constructs (e.g., trust, openness, information confidentiality, the security concern, and intentions of information-resource sharing) could involve issues of personal privacy.

3.2 Sampling Plan

3.2.1 Target Population

In accordance with the definition of target population definition, namely everyone who is interested in the study and can provide data (Kolb, 2008), the target population of this research includes enterprises and universities of China.

3.2.2 Sampling Method and Sampling Frame

To ensure a representative population, the judgment sampling is appropriate for this study for the following reasons:

This study's research object is organizational departments, which vary in terms of characteristics and distributions. Therefore, probability sampling may lead to issues of population representativeness due to the difficulty of designing a complete sampling frame (Kent, 2007). However, judgment sampling does not require a complete sampling frame, as samples are selected according to the researcher's subjective judgment and specific criteria (Neuman, 2016). Thus, although judgment sampling may produce non-generalizable results due to the inability to evaluate the effect of sampling error, it is appropriate for the exploratory research and hypothesis examination and is superior in terms of convenience and cost (Taherdoost, 2016).

Judgment sampling can obtain higher representative units when the researcher masters their research domain and knows their target population (Neuman, 2016). Therefore, it is typically used when the researcher has certain criteria informing the selection of population units based on their prior knowledge and the purpose of the study (Reddy & Ramasamy, 2016).

Therefore, according to the judgment sampling method and research objective, this study selected the universities, finance, and IT enterprises with more than 50 people in first-tier cities in China—Beijing, Shanghai, Guangzhou, and Shenzhen—as the sampling frame, to investigate the factors influencing information-resource sharing intention.

China's informatization construction has increased rapidly in recent decades; in particular, the first-tier cities are at the forefront of the rest of the country economically and technologically, as well as in terms of their informatization construction. Therefore, people living in these cities have a high level of acceptance of informatization. Moreover, the companies, enterprises, institutions, and government agencies in China, especially the size is more than 50 people, are all dedicated to developing informatization and adopting various information systems to participate in each company's management and operation, which will generate more issues about information-resource sharing. This is particularly observable in IT, financial enterprises, and universities. IT enterprises prefer to develop and promote information systems based on new technologies such as blockchain; as the financial industry is a pioneer of the blockchain application, financial enterprises have a high degree of understanding of blockchain; universities, as a research center, are also interested in the research of new technologies such as blockchain. Therefore, selecting universities, IT, and financial companies with more than 50 people in first-tier cities of China as the research object is representative.

According to the statistics presented in the "China Statistical Yearbook 2019" issued by the National Bureau of Statistics of the People's Republic of China, these four cities contain 308 universities, 71,721 financial companies, and 68,047 IT companies. Thus, the target population of this study is approximately 140,000.

3.2.3 Sample Size

To determine the sample size of this study, the formula is suggested (Yamane, 1973). The equation is presented as follows:

$$n = \frac{N}{1 + Ne^2}$$

Where:

n is the targeted sample size

N is the number of people in population

e is the acceptable sampling error (%)

According to Yamane's formula, 400 is the acceptable number with a confidence level of 95%. Thus, 400 effective respondents comprise the sample size of this study, without considering the response rate.

3.3 Data Collection Method

The self-administered questionnaire method was employed in this research. Compared to other methods of data collection, questionnaires can be distributed to all respondents simultaneously and immediately, and the subsequent data can be collected from a vast number of respondents within a short period of time. Besides, the questionnaire's explicit anonymity enables respondents to complete it honestly (Bell, Bryman, & Harley, 2018; Kara, Andaleeb, Turan, & Cabuk, 2013).

The questionnaire was designed through the online survey system of "Wenjuanxing". Two ways were then adopted to collect the resultant data. First, for organizations that could be directly contacted and were willing to participate in the survey, the researcher visited the companies or contacted them using instant messaging tools such as QQ and WeChat to provide the hyperlink of the questionnaire to department managers. Secondly, for organizations that could not be investigated directly, the researcher entrusted a qualified investigation agency to assist with the distribution of the questionnaire.

3.4 Questionnaire Development

This research questionnaire was conducted based on the scales that have been developed in prior studies. This approach contains several advantages. Firstly, the existing scales' validity and reliability have already been examined by prior scholars, making it more trustworthy than developing a new measurement (Bulmer, Gibbs, & Hyman, 2006). Secondly, using existing scales requires less time than developing new measurements (Bulmer et al., 2006). Finally, the results can be compared with other studies using the same existing scales, increasing the credibility of the research (Meadows, 2003). Since all variables of this study were adopted from the existing scales, which were originally developed in English, they were required to be translated into Chinese. To ensure the validity of the questionnaire, back-translation is needed. Questions were translated into Chinese by a Chinese native bilingual who is an English expert and then back-translated to English by a native English bilingual who is also fluent in Chinese, to ensure the accuracy of the questions' meaning in the target languages (Chinese and English) (Brislin, 1970).

3.5 Construct Measurements

3.5.1 Intention of information-resource sharing

Intention of information-resource sharing is defined as a probability that influences people to share information-resource with others (Ajzen & Fishbein, 1980), which indicates the probability of sharing information-resource among departments within an organization by adopting information technology such as blockchain technology. In this study, the measurement of information-resource sharing intention was adapted from ten self-reported scales: three items were derived from Bock et al. (2005), another three were adopted from He and Wei (2009), and the final one was adopted from Hooff and Weenen (2004). The reliability and validity of these scales have been confirmed in prior research in different research contexts (Chen, Chuang, & Chen, 2012; He & Wei, 2009; Huang et al., 2011; Maruping, Bala, Venkatesh, & Brown, 2017; Queiroz & Wamba, 2019; Venkatesh, Thong, & Xu, 2012). These items were measured using a seven-point Likert-Scale, ranking from 1 (strongly disagree) to 7 (strongly agree). Table 3.1 provides more information on this construct.

Table 3.1 The Questionnaire of Information-resource Sharing Intention

Items	Source
1. I intend to share information-resource with other departments more frequently in the future. 2. I will provide information-resource at the request of other departments. 3. I try to share information-resource with other departments in a more effective way.	Bock et al. (2005)
4. Sharing information-resource with other departments is considered a normal thing.	Hooff and Weenen (2004)
5. Sharing information-resource with other departments is a good idea. 6. Sharing information-resource with other departments is a wise move. 7. Sharing information-resource with other departments is a positive step.	He and Wei (2009)

3.5.2 Perceived Uncertainty

Perceived uncertainty is defined as the degree to which future risk cannot be accurately predicted due to information asymmetry (Pfeffer & Salancik, 2003). It reflects the level of uncertainty people perceive due to their inability to predict possible risk caused by sharing information-resource among departments within the organization. The measurement of perceived uncertainty was adapted from seven self-reported scales: three items were derived from a study by Datta and Chatterjee (2011) and four from a study by Pavlou et al. (2007). The reliability and validity of these scales have been confirmed in prior research in different research contexts (Datta & Chatterjee, 2011; Pavlou et al., 2007; Trenz et al., 2013). These items were measured using a seven-point Likert-Scale, ranking from 1 (strongly disagree) to 7 (strongly agree). Table 3.2 provides more information about this construct.

Table 3.2 The Questionnaire of Perceived Uncertainty

Items	**Source**
1. I can predict the outcome of any information-resource sharing with other departments. 2. My decision-making regarding information-resource sharing with other departments will always be optimal. 3. I have control over the outcome of any information-resource sharing with other departments.	Datta and Chatterjee (2011)
4. The IT infrastructures used to share information-resource (e.g., network framework and operating system) involve a low degree of uncertainty. 5. The uncertainty associated with using IT systems or services provided by the organization or other departments to share information-resource is low. 6. It is not exposed to many process uncertainties when using IT systems or services provided by the organization or other departments to share information-resource. 7. There is a low degree of unexpected results (i.e., the provided information is stolen or abused) when using IT systems or services provided by the organization or other departments to share information-resource.	Pavlou et al. (2007)

3.5.3 Information Confidentiality Concern

Information confidentiality concern is defined as the people's perception of the information-resource recipient's ability and willingness to protect sensitive information (Pavlou et al., 2007). It indicates people's desire to control sensitive information when sharing information-resource among departments within the organization (Valkenburgh, 2016). The measurement of information confidentiality concern was adapted from seven self-reported scales: three were derived from a study by Malhotra et al. (2004), three from a study by Pavlou et al. (2007), and one from Trenz et al. (2013). The reliability and validity of these scales have been confirmed in prior research in different research contexts (D. J. Kim et al., 2008; Pavlou et al., 2007; Trenz et al., 2013; Zhou, 2011). These items were measured using a seven-point Likert-Scale, ranking from 1 (strongly disagree) to 7 (strongly agree). Table 3.3 provides more information about this construct.

Table 3.3 The Questionnaire of Information Confidentiality Concern

Items	Source
1. It usually bothers me when other departments ask me for information including sensitive information. 2. It bothers me to give sensitive information to so many other departments. 3. I am concerned that other departments collect too much sensitive information provided by us.	Malhotra et al. (2004)
4. I am concerned that other departments will use sensitive information provided by us for other purposes without our authorization.	Trenz et al. (2013)
5. I am concerned about how well sensitive information is protected by other departments. 6. I am concerned that sensitive information in the information-resource could be misused after providing it to other departments. 7. I am concerned that sensitive information in the information-resource could be accessed by unknown parties after it is provided to other departments.	Pavlou et al. (2007)

3.5.4 Information Security concern

Information security concern is defined as the people's perception of Internet security (Yenisey et al., 2005). It reflects the degree of security that people feel about the Internet, including the security of the network environment; the recipient's security awareness and capacity; and the security of computer equipment. The measurement of information security concern was adapted from seven self-reported scales: six were adopted from a study of Flavián and Guinalíu (2006) and one from a study by Trenz et al. (2013). The reliability and validity of these scales have been confirmed in prior research in different research contexts (Hartono, Holsapple, Kim, Na, & Simpson, 2014; Luis, Flavián, & Guinalíu, 2007; Trenz et al., 2013). These items were measured using a seven-point Likert-Scale, ranking from 1 (strongly disagree) to 7 (strongly agree). Table 3.4 provides more information about this construct.

Table 3.4 The Questionnaire of Information Security Concern

Items	**Source**
1. I am sure that the information-resource we provide to other departments are well protected.	Trenz et al. (2013)
2. I am sure that other departments show great concern for the information security. 3. I am sure that the information-resource cannot be tampered by others when we send it to other departments. 4. I am sure that the information-resource will not be intercepted by unauthorized third parties when we send it to other departments. 5. I am sure that other departments have mechanisms to ensure the safe transmission of information-resource. 6. I am sure that other departments have sufficient technical capacity to ensure the information-resource we provide cannot be modified by a third party. 7. I am sure that other departments have sufficient technical capacity to the ensure information-resource we provide cannot be intercepted by hackers.	Flavián and Guinalíu (2006)

3.5.5 Openness

Openness is defined as the extent to which information can be shared among all participants (Haesevoets et al., 2019), which indicates the open climates provided by the company for people to communicate with each other. This reflects which information-resource can be shared among different departments within the organization. The measurement of openness was adapted from five self-reported scales, all of which were adopted from a study by Haesevoets et al. (2019) in which their reliability and validity were examined. These items were measured using a seven-point Likert Scale, ranking from 1 (strongly disagree) to 7 (strongly agree). Table 3.5 provides more information about this construct.

Table 3.5 The Questionnaire of Openness

Items	Source
1. The transparency of communication in the organization is high. 2. Departments within the organization can communicate openly with each other. 3. The relevant information within the organization can be shared among all leaders. 4. Departments within the organization can share relevant information with each other. 5. Departments within the organization can communicate candidly with each other.	Haesevoets et al. (2019)

3.5.6 Trust

Trust is defined as a social complexity-reducing mechanism that leads to a willingness of organizational dependence (Gefen & Straub, 2004). It is used to evaluate whether participants involved in information-resource sharing are trustworthy. The measurement of trust was adapted from seven self-reported scales, six of which were derived from a study by Gefen and Straub (2004) and one from a study by Chiu, Lin, Sun, and Hsu (2009). The reliability and validity of these scales have been confirmed in prior research in different research contexts (Alalwan, Dwivedi, & Rana, 2017; Chiu et al., 2009; Gefen & Straub, 2003, 2004; Pavlou et al., 2007; Trenz et al., 2013). These items were measured using a seven-point Likert-Scale, ranking from 1 (strongly disagree) to 7 (strongly agree). Table 3.6 provides more information about this construct.

Table 3.6 The Questionnaire of Trust

Items	**Source**
1. Promises made by other departments are likely to be reliable. 2. I do not doubt the honesty of other departments. 3. Other departments will keep promises they make. 4. Other departments can consider our interests. 5. Other department intentions are benevolent. 6. Other departments are well-meaning.	Gefen and Straub (2004)
7. Other departments are not opportunistic.	Chiu et al. (2009)

3.5.7 Perceived Rewards

Perceived rewards are defined as the people's perception that rewards (e.g., money, reputation, and reciprocity) could promote information-resource sharing (Zhang et al., 2017). They are used to encourage people to share information-resource among departments within the organization. The measurement of perceived rewards was adapted from six self-reported scales, three of which were derived from a study by Hung, Durcikova, Lai, and Lin (2011), two from a study by Zhang et al. (2017), and one from a study by Lin (2007). The reliability and validity of these scales have been confirmed in prior research in different research contexts (He & Wei, 2009; Hung et al., 2011; Lin, 2007; Lin et al., 2009; Wang et al., 2015; Zhang et al., 2017). These items were measured using a seven-point Likert-Scale, ranking from 1 (strongly disagree) to 7 (strongly agree). Table 3.7 provides more information about this construct.

Table 3.7 The Questionnaire of Perceived Rewards

Items	Source
1. I expect to get responses when needed, after sharing information-resource with other departments. 2. I expect that I can get information-resource from other departments when needed, after sharing information-resource with other departments. 3. I expect to receive material rewards when sharing information-resource with other departments.	Hung et al. (2011)
4. I expect to improve our reputation in the organization by sharing information-resource with other departments. 5. I expect to improve our status in the organization by sharing information-resource with other departments.	Zhang et al. (2017)
6. I expect to expand the scope of the cooperation with other departments by sharing information-resource.	Lin (2007)

3.6 Analytical Approaches

In this study, the collected data were analyzed by the SPSS and AMOS. SPSS is used to analyze basic statistics, and AMOS is used to examine the causal relationships among all variables. All research approaches used by this study are shown in Table 3.8.

Table 3.8 List of Research Approaches

SPSS	**AMOS**
Descriptive statistics	Confirmatory factor analysis (CFA)
Reliability analysis	Path analysis
Factor analysis (EFA)	Bootstrapping procedure

Descriptive statistics were employed to analyze the basic information of the questionnaire. This method is used to describe the demographic information provided by respondents through indices of frequencies and percentages. Reliability analysis was employed to measure the interitem reliability of the variable through Cronbach's alpha. CFA and EFA are used to examine the reliability indices of variables such as composite reliability (CR) and average variance extracted (AVE), as well as the validity indices of variables such as the convergent validity, which is indicated by factor loadings. Path analysis was employed to investigate direct relationships among variables and the bootstrapping procedure was used to investigate indirect relationships among variables, such as mediating and moderating effects.

Those analytical approaches were selected due to their suitability for the research design of this study. They can facilitate better analysis of the data collected by questionnaire and obtain desired results.

How these approaches were used to analyze the collected data will be detailed in the next chapter.

CHAPTER 4

RESULTS AND DISCUSSION

This chapter first describes the data collection procedures, then reports the demographic characteristics of the sample. Third, it outlines how the data were prepared and analyzed, evaluating the measurement model. Finally, the results from the structural model and hypothesis testing are discussed.

4.1 Data Collection

The data were collected from various enterprises and institutions in the Chinese cities of Beijing, Shanghai, Guangzhou, and Shenzhen. The online questionnaire system of "WenJuanXin" was used to invite institutions and enterprises to participate in the survey, one respondent represents one institution or enterprise. In Beijing, 254 institutions and enterprises were invited to participate, and 127 responses were available for data analysis, resulting in a 50% response rate. In Shanghai, 230 institutions and enterprises to participate and 117 responses were available for data analysis, resulting in a 50.87% response rate. In Guangzhou, 181 institutions and enterprises were invited to participate, and 84 responses were available for data analysis, resulting in a 46.41% response rate. In Shenzhen, 165 institutions and enterprises were invited to participate, and 73 responses were available for data analysis, resulting in a 44.24% response rate.

In summary, a total of 401 questionnaires were available from 830 participated organizations and enterprises in these four cities, which counted for 48.31%. The four cities' response rates of the questionnaire are reported in Table 4.1.

Table 4.1 Response Rates of the Questionnaire.

City	Distributed	Collected	Response Rate (%)
Beijing	254	127	50.00%
Shanghai	230	117	50.87%
Guangzhou	181	84	46.41%
Shenzhen	165	73	44.24%
Total	830	401	48.31%

4.1.1 Common method biases (CMB)

Common method biases (CMB) may arise when all constructed data are collected from a single respondent, which expands the relationships between the exogenous and endogenous constructs (Podsakoff & Organ, 1986; Queiroz & Wamba, 2019). To check for the issue of CMB, this study conducted Harman's single factor test after data collection. The result shows that a single factor explains 19.79% of the total variance, which is less than 50%; thus, there is no issue of CMB (Wong et al., 2020; Ylitalo, 2009).

4.2 Demographic Characteristics

Overall, 222 respondents were male (55.36%) and 179 were female (44.64%). 263 respondents (65.59%) were aged 25 to 35 years, 110 respondents (27.43%) were aged 36 to 45 years, 18 respondents (4.49%) were aged 46 to 55 years, 5 respondents (1.25%) were aged 56 to 65 years, and 5 respondents (1.25%) were younger than 25 years. Regarding their highest education level, 283 respondents (70.57%) had bachelor's degrees, 79 respondents (19.7%) had master's degrees, 26 respondents (6.48%) had diploma degrees, 8 respondents (2%) had doctoral degrees, and 5 respondents (1.25%) had not attained a diploma degree. These three characteristics are presented in Table 4.2.

Table 4.2 Respondents' Gender, Age, and Highest Education Level.

Measures	**Categories**	**Frequency**	**Percentage**
Gender	Male	222	55.36%
	Female	179	44.64%
	Total	401	100%
Age	Below 25	5	1.25%
	25~35	263	65.59%
	36~45	110	27.43%
	46~55	18	4.49%
	56~65	5	1.25%
	Total	401	100%
Highest education level	Below diploma degree	5	1.25%
	Diploma degree	26	6.48%
	Bachelor's degree	283	70.57%
	Master's degree	79	19.70%
	Doctoral degree	8	2.00%
	Total	401	100%

Regarding job position, 158 respondents (39.4%) held the position of middle manager, 140 respondents (34.91%) held the position of supervisor, and 103 respondents (25.69%) held the position of top manager. These characteristics are presented in Table 4.3.

Table 4.3 Positions of the Respondents.

	Frequency	**Percentage**
Top manager (Executive)	103	25.69%
Middle manager	158	39.40%
Supervisor	140	34.91%
Total	401	100%

Regarding the locations of the respondents' organization, 127 (31.67%) were in Beijing, 117 (29.18%) were in Shanghai, 84 (20.95%) were in Guangzhou, and 73 (18.2%) were in Shenzhen.

Regarding the industry of the respondent's organization, 295 organizations (73.57%) were information technology enterprises, 68 organizations (16.96%) were finance enterprises, and 38 organizations (9.48%) were universities. The locations and industries of the organizations are presented in Table 4.4.

Table 4.4 Locations and Industries of the Respondent's Organization.

Measures	**Categories**	**Frequency**	**Percentage**
Locations	Beijing	127	31.67%
	Shanghai	117	29.18%
	Guangzhou	84	20.95%
	Shenzhen	73	18.20%
	Total	401	100%
Industries	IT	295	73.57%
	Academic/education	38	9.48%
	Finance	68	16.96%
	Total	401	100%

Regarding the number of employees in each respondent's organization, 71 organizations (17.71%) contained 51 to 100 people, 86 organizations (21.45%) contained 101 to 200 people, 101 organizations (25.19%) contained 201 to 500 people, 65 organizations (16.21%) contained 501 to 1000 people, and 78 organizations (19.45%) contained above 1000 people. The number of employees in each respondent's organization is reported in Table 4.5.

Table 4.5 Number of Employees in the Respondent's Organization.

	Frequency	**Percentage**
51~100 people	71	17.71%
101~200 people	86	21.45%
201~500 people	101	25.19%
501~1000 people	65	16.21%
Above 1000 people	78	19.45%
Total	401	100%

Regarding level of experience of using management information systems (MIS) in the respondent's organization, two respondents (0.5%) stated below 1 year, 52 respondents (12.97%) stated 1 to 3 years, 152 respondents (37.91%) stated 4 to 6 years, 94 respondents (23.44%) stated 7 to 9 years, and 101 respondents (25.19%) stated above 9 years. Respondents' level of experience of using MIS in their organization is reported in Table 4.6.

Table 4.6 Experience of Using MIS in the Respondent's Organization.

	Frequency	**Percentage**
Below 1 year	2	0.50%
1~3 years	52	12.97%
4~6 years	152	37.91%
7~9 years	94	23.44%
Above 9 years	101	25.19%
Total	401	100%

4.3 Measurement model evaluation

Before examining the structural model, a series of analyses were conducted to confirm that the data have an acceptable level of validity and reliability and are suitable for the Amos evaluation. These analyses included two validity tests (convergent validity and discriminant validity), two reliability tests (Cronbach's alpha coefficient (α) and composite reliability), and a normality test. The validity and reliability assessments ensure that the data collected from the questionnaires are valid and reliable, while the normality evaluation guarantees that the data are fit for the Amos analysis and that the results from the structural model analysis are non-biased (Joe F. Hair, Sarstedt, Ringle, & Mena, 2012). Convergent validity, normality evaluation, discriminant validity, as well as Cronbach's alpha and composite reliability, are elaborated sequentially in the following section, in accordance with the actual analysis sequence.

4.3.1 Convergent Validity

The validity test is used to evaluate how well constructs are measured (Joe F. Hair et al., 2012). According to Chin's (1998) research, the validity test of latent variables is necessary to confirm that constructs have measured what they need to measure and have not measured what they do not need to. This study performed two types of validity tests for all constructs, namely convergent validity and discriminant validity.

Convergent validity is used to evaluate how well indicators have measured their constructs (Hair et al., 2012). The factor loadings are usually employed to check convergent validity. According to Chin's (1998) research, the value of each item in the constructs should be over .70. However, Kline (2016) mentions that the value must be over .30, and that .50 is the acceptable value for the validity analysis.

In this study, the analysis of factor loadings was conducted using SPSS. The results of factor loadings for all latent variables are presented in Table 4.7.

Table 4.7 The Factor Loadings and Cross-loadings of All Latent Variables.

	Confidentiality	Security	Trust	Openness	Uncertainty	Rewards	Intention
C1	**.829**	.021	.013	-.049	.004	.050	-.015
C2	**.834**	.078	-.025	-.047	.006	-.052	.040
C3	**.827**	.020	-.101	.014	-.053	.047	-.067
C4	**.841**	-.023	-.062	-.007	.080	.029	.010
C5	**.609**	-.112	-.080	.061	.052	-.032	.025
C6	**.781**	-.088	-.011	-.132	.011	.007	.042
C7	**.704**	-.163	.013	-.036	.137	-.019	.119
S1	-.023	**.833**	-.026	-.088	.019	-.121	-.177
S2	-.164	**.721**	.060	-.085	.016	-.109	-.111
S3	.017	**.389**	-.135	-.057	.206	-.068	-.102
S4	-.152	**.510**	.070	-.046	.165	-.114	-.235
S5	.004	**.261**	.029	-.031	.081	-.022	-.212
S6	.035	**.081**	-.099	-.066	.053	-.111	-.155
S7	.032	**.048**	.042	-.161	.074	-.239	-.120
T1	-.064	.073	**.673**	.252	-.256	-.013	.019
T2	-.172	.010	**.692**	.166	-.245	-.024	.075
T3	.098	-.057	**.257**	-.020	-.020	.022	.266
T4	.163	-.092	**.125**	.029	-.074	.131	.074
T5	.117	.008	**.001**	.189	-.097	.140	.117
T6	-.045	-.008	**.675**	.205	-.132	.142	.090
T7	.003	-.044	**.596**	.224	-.223	-.001	.133
O1	-.030	-.009	.227	**.737**	-.154	.144	.097
O2	-.031	-.025	.121	**.737**	-.221	.008	.172
O3	-.021	-.083	.071	**.735**	-.062	-.036	.216
O4	-.019	-.030	.169	**.715**	-.125	.048	.233
O5	-.157	-.097	.284	**.657**	-.170	.163	.070
PU1	-.062	.075	-.049	-.284	**.540**	-.254	.008
PU2	-.040	.119	-.100	-.442	**.440**	-.139	-.124
PU3	-.026	.209	-.120	-.391	**.531**	-.350	.064
PU4	.117	.041	-.164	-.229	**.678**	.078	-.210
PU5	.085	.057	-.252	-.130	**.696**	.067	-.215
PU6	.046	-.034	-.301	-.111	**.670**	-.057	-.228
PU7	.112	.012	-.138	-.020	**.674**	-.080	-.144

Table 4.7 (*continued*)

	Confidentiality	Security	Trust	Openness	Uncertainty	Rewards	Intention
PR1	-.007	-.122	-.146	.079	-.204	**-.254**	.467
PR2	.041	-.033	-.028	.099	-.056	**-.046**	.642
PR3	-.020	-.180	.069	.031	-.063	**.721**	.066
PR4	-.017	-.039	.021	.200	-.055	**.727**	.227
PR5	.055	-.078	-.028	.064	-.107	**.715**	.219
PR6	0	-.001	.004	.020	-.055	**.237**	.570
I1	-.037	-.335	.222	.155	-.218	.299	**.428**
I2	.036	.043	-.110	.158	-.218	.084	**.580**
I3	.073	-.201	.046	.089	-.119	.125	**.525**
I7	-.074	-.049	.253	.196	-.017	.019	**.549**
I8	-.012	-.146	.096	.111	-.093	.087	**.713**
I9	.048	-.150	.167	.202	-.169	.102	**.632**
I10	.075	-.090	.143	.094	-.050	.094	**.712**

Note: Confidentiality = Information confidentiality concern, Security = Information security concern, Uncertainty = Perceived uncertainty, Rewards = Perceived rewards, Intention = Information-resource sharing intention.

The result shows that the security measure items—S5, S6, S7, the trust measure items—T3, T4, T5, and the perceived rewards items—PR1, PR2, PR6, were below .30; therefore, those items were deleted from the analysis. Moreover, the perceived uncertainty measure items—PU2, PU3, and intention measure item—I1, had significant cross-loading. Therefore, those items were also deleted.

After the first screening, most items had a value over a minimum requirement of .50 except one item, PU1, whose value was below .50. Therefore, this item was deleted from the analysis. After this deletion, all items had an acceptable level of convergent validity for analysis. The adjustment result of factor loadings is presented in Table 4.8.

Table 4.8 The Factor Loadings and Cross-loadings of All Latent Variables (Adjusted)

	Confidentiality	Security	Trust	Openness	Uncertainty	Rewards	Intention
C1	**.818**	.017	.040	-.068	.048	.053	-.026
C2	**.834**	.033	-.010	-.052	.001	-.018	.031
C3	**.819**	-.028	-.082	.015	-.040	.065	-.077
C4	**.843**	-.019	-.105	.012	.059	.022	.008
C5	**.610**	-.147	-.067	.048	.072	-.040	.049
C6	**.797**	-.063	-.042	-.114	-.011	-.008	.026
C7	**.717**	-.079	.004	-.041	.157	-.028	.119
S1	-.020	**.831**	-.025	-.095	-.028	-.110	-.154
S2	-.174	**.728**	.063	-.100	.004	-.115	-.098
S3	.038	**.587**	-.153	-.051	.200	-.116	-.143
S4	-.145	**.628**	.058	-.038	.141	-.130	-.285
T1	-.063	.004	**.715**	.231	-.230	.038	.055
T2	-.168	.009	**.728**	.146	-.202	-.015	.069
T6	-.022	-.022	**.670**	.202	-.129	.122	.116
T7	.016	-.038	**.656**	.186	-.161	-.011	.153
O1	-.024	-.021	.252	**.751**	-.112	.152	.075
O2	-.021	-.063	.128	**.754**	-.228	.032	.178
O3	-.010	-.106	.102	**.730**	-.039	-.021	.222
O4	-.015	-.063	.160	**.731**	-.133	.061	.244
O5	-.158	-.100	.284	**.673**	-.155	.176	.053
PU4	.093	.089	-.192	-.258	**.700**	.035	-.173
PU5	.075	.141	-.250	-.167	**.739**	.030	-.182
PU6	.043	-.006	-.278	-.148	**.693**	-.088	-.207
PU7	.089	.091	-.133	-.076	**.728**	-.150	-.095
PR3	-.027	-.190	.137	0	.033	**.744**	.070
PR4	-.005	-.134	.028	.216	-.074	**.774**	.218
PR5	.068	-.121	-.044	.097	-.134	**.786**	.191
I2	.058	.022	-.103	.156	-.240	.119	**.599**
I3	.111	-.183	.044	.104	-.131	.129	**.532**
I7	-.092	-.156	.216	.185	-.048	.041	**.613**
I8	-.029	-.142	.059	.101	-.095	.083	**.757**
I9	.031	-.170	.148	.189	-.152	.098	**.674**
I10	.053	-.104	.136	.063	-.021	.078	**.755**

Note: Confidentiality = Information confidentiality concern, Security = Information security concern, Uncertainty = Perceived uncertainty, Rewards = Perceived rewards, Intention = Information-resource sharing intention.

4.3.2 Normality test

The normality test is applied to confirm whether the sample follows the normal distribution. This study used Amos with a maximum likelihood method to analyze the structure model. The sample's normality was checked using two indices, namely the normality of each measurement item and the multivariate normality of the sample. According to studies by Bollen and Long (1993) and Westfall and Henning (2013), the measurement item achieves normality when the skewness and kurtosis values are both less than two. The sample achieves multivariate normality when Mardia's coefficient is below p (p+2), where p is the number of all observed variables (Raykov & Marcoulides, 2008).

The results of CFA demonstrate that the skewness and kurtosis values of all 33 measurement items were less than two, and the Mardia's coefficient is 199.3, also lower than p (p+2) = 1155. Therefore, there is normality for all measurement items and multivariate normality. Therefore, the sample of this study follows the normal distribution and can be used for Amos with a maximum likelihood method.

The results of the normality test are shown in Table 4.9.

Table 4.9 Assessment of Normality

Item	Min	Max	Skewness	Kurtosis
C1	1	7	-0.768	0.069
C2	1	7	-0.787	-0.213
C3	1	7	-0.678	-0.251
C4	1	7	-0.741	-0.335
C5	1	7	-0.940	0.540
C6	1	7	-0.768	-0.024
C7	1	7	-0.850	0.061
S1	1	7	0.975	0.737
S2	1	7	0.696	-0.057
S3	1	7	0.540	-0.187
S4	1	7	0.724	0.399
O1	1	7	-0.422	-0.145
O2	1	7	-0.725	0.563
O3	1	7	-0.759	0.337
O4	1	7	-0.812	0.758
O5	1	7	-0.328	-0.423
PU4	1	7	0.559	0.007
PU5	1	7	0.610	0.118
PU6	1	7	0.596	0.136
PU7	1	7	0.597	-0.035
T1	1	7	-0.441	0.059
T2	1	7	-0.460	-0.248
T6	1	7	-0.588	0.541
T7	1	7	-0.717	0.406
PR3	1	7	-0.541	-0.326
PR4	1	7	-0.734	0.522
PR5	1	7	-1.005	1.070
I2	2	7	-0.518	0.178
I3	2	7	-0.758	0.436
I7	2	7	-0.645	0.224
I8	1	7	-0.774	0.513
I9	1	7	-0.683	0.312
I10	2	7	-0.886	0.926

Mardia’s coefficient = 199.348.

Since the normality test was conducted by CFA, it is necessary to check the model fit indices.

4.3.2.1 Model fit indices

The model fit indices are a set of indicators that measure the degree of fit between the hypothetical model and the data. These measurements provide information for whether the structural model is suitable for this study (Kock & Lynn, 2012). Amos provides nine indices to assess the model fit from four perspectives: relative chi-square (CMIN/DF); the standardized root mean square residual (SRMR) and the root mean square error of approximation (RMSEA); the goodness-of-fit index (GFI) and the adjusted goodness-of-fit index (AGFI); and the incremental fit measures including the normed fit index (NFI), Tacker-Lewis index (TLI), incremental fit index (IFI), and comparative fit index (CFI).

1) Relative chi-square (CMIN/DF)

Relative chi-square (CMIN/DF)—the ratio of chi-square (χ^2) with its degrees of freedom (df)—is an absolute fit measure to signify the goodness-of-fit to the proposed model. The recommendable value of CMIN/DF is equal to or below two, and the acceptable value is equal to or below three (Schermelleh-Engel, Moosbrugger, & Müller, 2003).

2) Standardized root mean square residual (SRMR)

The standardized root mean square residual (SRMR) is a badness-of-fit measure based on the fitted residuals to evaluate the model fit. The recommendable value of SRMR is less than .05 and the acceptable value is below .10 (Kline, 2016; Schermelleh-Engel et al., 2003).

3) Root mean square error of approximation (RMSEA)

The root mean square error of approximation (RMSEA) is an absolute fit measure to represent the goodness-of-fit of the proposed model. The value ranging from 0 to .05 is a good fit, ranging from .05 to .08 is deemed acceptable, and ranging from .08 to .10 as a mediocre fit (Kline, 2016; Schermelleh-Engel et al., 2003).

4) Goodness-of-fit index (GFI)

The goodness-of-fit index (GFI) is another absolute fit measure used to test how much better the model fits compared with the independence model. Its measure

ranges from 0 (poor fit) to 1 (perfect fit). The value of GFI is greater than .95 to indicate a good fit, and more than .90 is the acceptable value (Kline, 2016; Schermelleh-Engel et al., 2003).

5) Adjusted goodness-of-fit index (AGFI)

The adjusted goodness-of-fit index (AGFI) is a model fit measure used to evaluate the model complex. The value of AGFI also ranges between 0 and 1, with larger values indicating a better fit. Higher than .90 indicates a good fit and higher than .85 is considered an acceptable fit (Kline, 2016; Schermelleh-Engel et al., 2003).

6) Incremental fit index (IFI)

The incremental fit index (IFI) is a model fit measure used to evaluate the fit of the proposed model compared with the independence model. The value of IFI ranges from 0 to 1, with higher values indicating a better fit; higher than .90 is regarded as acceptable (Kline, 2016).

7) Normed fit index (NFI)

The normed fit index (NFI) is an incremental fit measure used to evaluate the best possible improvement over the independence model. The value of NFI ranges from 0 to 1, with larger values indicating a better fit. Higher than .90 is the acceptable value, and over .95 is the recommended value (Kline, 2016; Schermelleh-Engel et al., 2003). However, some scholars state that the marginal value can widen to .80 when other indices are acceptable (Ullman & Bentler, 2003).

8) Tacker-Lewis index (TLI)

Tacker-Lewis index (TLI), also called non-normed fit index (NNFI), is another incremental fit measure improved from NFI which solves the disadvantage of affecting by sample size. The value of TLI ranges from 0 to 1, with higher values indicating a better fit. Higher than .90 is deemed as the acceptable value, and higher than .95 is considered the recommendable value (Awang, 2015; Kline, 2016; Schermelleh-Engel et al., 2003).

9) Comparative fit index (CFI)

The comparative fit index (CFI) is an incremental fit measure used to evaluate the fit of the proposed model compared with the independence model, where the value ranges from 0 to 1 with larger values indicating a better fit. Greater than .90 is

deemed as the acceptable value and higher than .95 is considered the recommendable value (Kline, 2016; Schermelleh-Engel et al., 2003).

The results of CFA show that all indices are at a good-fit level except GFI, AGFI, and NFI, in which GFI and AGFI are at an acceptable level and NFI is a marginal fit. The model fit indices are shown in Table 4.10, and the results of standardized regression weights are presented in Appendix 1.

Table 4.10 Model Ft Indices of CFA.

Fit index	**Acceptable value**	**Model value**	**Model fit**
CMIN/DF	≤ 3	1.633	Good fit
SRMR	< .10	.049	Good fit
RMSEA	≤ .08	.040	Good fit
GFI	≥ .90	.895	Acceptable
AGFI	≥ .85	.876	Acceptable
IFI	≥ .90	.942	Good fit
NFI	≥ .80	.864	Marginal fit
TLI	≥ .90	.935	Acceptable
CFI	≥ .90	.942	Acceptable

4.3.3 Discriminant Validity

The discriminant validity is used to examine whether a latent variable is discriminated from other latent variables (Fornell & Larcker, 1981). The discriminant validity is tested by comparing both the square root of average variance extracted (AVE) of each construct and the correlation of itself to other variables (Kline, 2016). Fornell and Larcker (1981) suggest that the discriminant validity of the variable is acceptable if the variable's square root of AVE is greater than any correlation it involved.

This study performed the discriminant validity test for all latent variables to examine the internal validity. The result of the analysis performed by CFA showed that each indicator loads highest on the construct of intending to measure, implying that the structure does not overlap with other constructs. Moreover, the discriminant validity of all structures is acceptable through the comparison of each variable's square root of AVE and the correlations it involved. The results of discriminant validity are reported in Table 4.11.

Table 4.11 Correlations and Square Roots of AVE for All latent Variables.

	ISI	**ICC**	**ISC**	**Openness**	**Trust**	**PR**	**PU**
ISI	**.638**						
ICC	.027	**.746**					
ISC	-.527	-.157	**.649**				
Openness	.518	-.117	-.291	**.729**			
Trust	.390	-.181	-.116	.631	**.669**		
PR	.476	.032	-.476	.387	.209	**.712**	
PU	-.517	.161	.272	-.563	-.668	-.268	**.722**

Notes: ICC = Information confidentiality concern, ISC = Information security concern, PU = Perceived uncertainty, PR = Perceived rewards, ISI = Information-resource sharing intention.
The square root of AVE is displayed with bold style.

4.3.4 Reliability Test

The reliability test is used to ensure that variables are consistent and return the same result (Nunnally, 1978). This study applied two types of reliability test: Cronbach's alpha coefficient and composite reliability.

Cronbach's alpha coefficient is the indicator that measures the internal consistency of the scales (Joe F. Hair et al., 2012). It is usually used to evaluate the reliability of the constructs, and the expected level of reliability for each variable should meet or exceed the suggested level of .70 (Nunnally & Bernstein, 1994). However, other scholars have stated that .60 is also an acceptable level (Joseph F. Hair, 2019; Hinton, Brownlow, McMurray, & Cozens, 2004).

Composite reliability (CR) is another indicator that is recommended to ensure the internal consistency reliability of variables when using indicator loadings into consideration in the reliability analysis (Chin, 1998; Hair et al., 2012). The acceptable value of composite reliability is higher than .60 (Fornell & Larcker, 1981). Moreover, it is also acceptable if the value of composite reliability of each variable is higher than Cronbach's alpha, as the value of composite reliability is generally slightly higher.

Thus, to ensure the reliability of the constructs in this study, Cronbach's alpha and CR tests were conducted. The result indicates that the Cronbach's alphas of all measurement items were above the value of .70 and the CRs of all measurement items were above the value of .70, thus achieving the minimum acceptable level. Therefore, the measurement items of constructs used in this research are reliable.

The results of Cronbach's alpha and composite reliability of all constructs are summarized in Table 4.12.

Table 4.12 Cronbach's Alpha Coefficient and Composite Reliability of All Latent Variables.

Construct	**Cronbach's alpha**	**Composite reliability (CR)**
Information confidentiality concern	.895	.897
Information security concern	.727	.740
Openness	.847	.850
Perceived uncertainty	.810	.812
Trust	.758	.762
Perceived rewards	.737	.752
Information-resource sharing intention	.798	.801

4.4 Structural model estimation

This section illustrates the result of the model analysis, including model fit estimation, direct effects estimation, and indirect effects estimation. Amos 24 with the maximum likelihood method is used to analyze the conceptual framework proposed in this study.

To reduce random errors, stabilize parameter estimates, and improve model fit (Little, Cunningham, Shahar, & Widaman, 2002; Matsunaga, 2008), the subset-item-parcel approach was used on the constructs in which the measurement items exceed four. According to the "factorial algorithm", each parcel was built by alternately aggregating the items with the highest and the lowest factor loadings (W. M. Rogers & Schmitt, 2004). For example, the items of information confidentiality concern are C4, C2, C3, C1, C6, C7, and C5, according to the factor loadings from low to high. Thus, four parcels were built: C4-C5, C2-C7, C3-C6, and C1. Similarly, for the construct of openness, three parcels were built: O2-O5, O1-O3, and O4. For the construct of information-resource sharing intention, three parcels were built: I2-I10, I3-I8, and I7-I9.

To confirm the constructs' interpretation after item parcel, the CFA was conducted again to test the degree of model fit, the normality distribution, and the regression weights.

4.4.1 Model fit indices

The results of CFA show that all indices are at a good-fit level except GFI and NFI, which are at an acceptable level. This means that the model fit indices after item parcel are better than before. The model fit indices are shown in Table 4.13.

Table 4.13 Comparison of Model Fit Indices between Item-parcel and Normal.

Fit index	Acceptable value	Value for normal	Value for item-parcel	Model fit for item-parcel
CMIN/DF	≤ 3	1.633	1.584	Good fit
SRMR	< .10	.049	.047	Good fit
RMSEA	≤ .08	.040	.038	Good fit
GFI	≥ .90	.895	.927	Acceptable
AGFI	≥ .85	.876	.906	Good fit
IFI	≥ .90	.942	.964	Good fit
NFI	≥ .80	.864	.909	Acceptable
TLI	≥ .90	.935	.957	Good fit
CFI	≥ .90	.942	.964	Good fit

4.4.2 Normality test

The results of CFA show that the skewness and kurtosis values of all 25 measurement items are less than two and the Mardia's coefficient is 121.714, also lower than p (p+2) = 675 (Raykov & Marcoulides, 2008). Therefore, there is normality for all measurement items and multivariate normality. The results of the normality test are shown in Table 4.14.

Table 4.14 Assessment of Normality.

Item	Min	Max	Skewness	Kurtosis
C1	1	7	-0.768	0.069
C2-C7	1	7	-1.010	0.603
C3-C6	1	7	-0.916	0.348
C4-C5	1	7	-0.909	0.314
S1	1	7	0.975	0.737
S2	1	7	0.696	-0.057
S3	1	7	0.540	-0.187
S4	1	7	0.724	0.399
O4	1	7	-0.812	0.758
O1-O3	1	7	-0.617	0.254
O2-O5	1	7	-0.590	0.251
PU4	1	7	0.559	0.007
PU5	1	7	0.610	0.118
PU6	1	7	0.596	0.136
PU7	1	7	0.597	-0.035
T1	1	7	-0.441	0.059
T2	1	7	-0.460	-0.248
T6	1	7	-0.588	0.541
T7	1	7	-0.717	0.406
PR3	1	7	-0.541	-0.326
PR4	1	7	-0.734	0.522
PR5	1	7	-1.005	1.070
I3-I8	2	7	-0.707	0.589
I2-I10	2	7	-0.805	1.380
I7-I9	2	7	-0.899	1.112

Mardia’s coefficient = 121.714.

4.4.3 Regression weights by CFA with Item-Parcel

The results of CFA show that the regression weights of all variables exceed .50, meaning that all latent constructs are significantly represented by their respective observed variables. The results of regression weights are shown in Table 4.15.

Table 4.15 Regression Weights by CFA.

Construct	Item	Standardized estimates	t-Value
Information confidentiality concern	C1	.78	–[a]
	C2-C7	.87	18.96***
	C3-C6	.89	19.41***
	C4-C5	.78	16.54***
Information security concern	S1	.76	–[a]
	S2	.66	11.04***
	S3	.50	8.60***
	S4	.65	10.84***
Openness	O4	.75	–[a]
	O1-O3	.82	15.64***
	O2-O5	.84	15.81***
Perceived uncertainty	PU4	.73	–[a]
	PU5	.80	14.26***
	PU6	.73	13.24***
	PU7	.62	11.32***
Trust	T1	.73	–[a]
	T2	.70	11.96***
	T6	.63	11.07***
	T7	.60	10.58***
Perceived rewards	PR3	.57	–[a]
	PR4	.81	9.89***
	PR5	.73	9.80***
Information-resource sharing intention	I3-I8	.75	–[a]
	I2-I10	.72	13.19***
	I7-I9	.81	14.25***

Note: * = p < .05, ** = p < .01, *** = p < .001.

[a] = values were not calculated because loading was set to 1.0 to fix construct variance.

4.4.4 Test of Hypotheses

This study proposes 13 hypotheses related to the linear relationships between the constructs presented in Chapter 3. The path model was performed to evaluate those hypotheses. According to the results of model fit, the path model has a good fit level at the indices of CMIN/DF and RMSEA; an acceptable level at the indices of SRMR, GFI, AGFI, IFI, TLI, and CFI; and a marginal fit at the index of NFI. This means that the model achieved an acceptable level and can be used to explain the hypotheses.

The results of model fit indices of path model are shown in Table 4.16.

Table 4.16 Model Fit Indices of Path Model.

Fit index	**Acceptable value**	**Model value**	**Model fit**
CMIN/DF	≤ 3	1.968	Good fit
SRMR	< .10	.092	Acceptable
RMSEA	≤ .08	.049	Good fit
GFI	≥ .90	.908	Acceptable
AGFI	≥ .85	.885	Acceptable
IFI	≥ .90	.939	Acceptable
NFI	≥ .90	.883	Marginal fit
TLI	≥ .90	.929	Acceptable
CFI	≥ .90	.938	Acceptable

4.4.4.1 Analysis of direct effects

Several measurement indices are used to explain the results of path analysis.

The p-value and critical ratio (C.R.) — are used to determine whether the hypothesis is accepted or rejected. If the p-value is below .05 and the critical ratio is above ±1.96, the null hypothesis is rejected and the alternative hypothesis is accepted; consequently, the hypothesis is statistically significant. Conversely, if the p-value is above .05 and the critical ratio below ±1.96, the null hypothesis cannot be rejected, meaning that the hypothesis is not statistically significant (Kline, 2016).

Standardized regression weights (β) — are commonly used to illustrate the relationship and strength between two variables. The positive coefficient indicates the positive relation, the negative coefficient indicates the negative relation, and the value of the coefficient indicates the extent of the relationship (Kline, 2016).

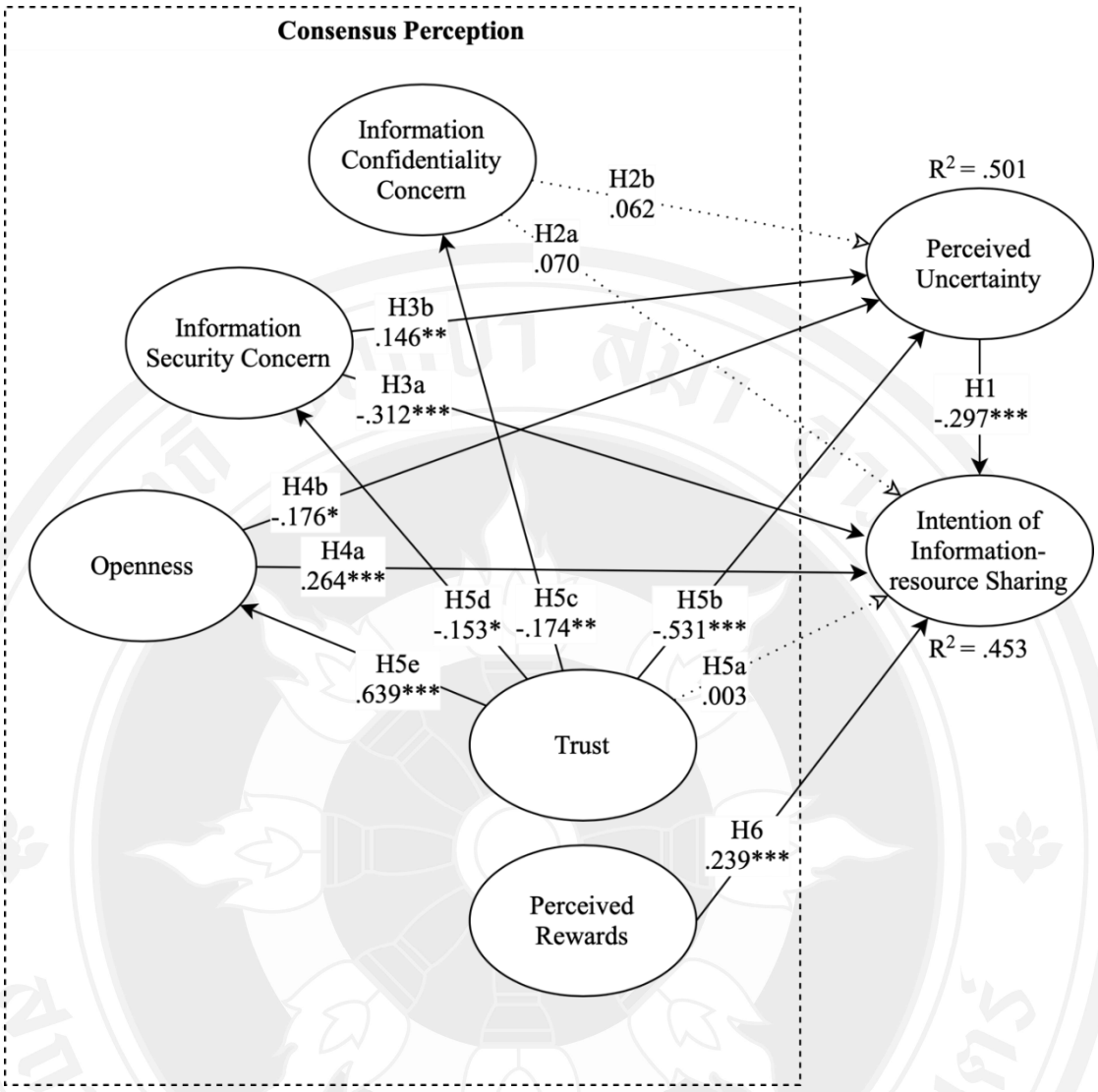
Squared multiple correlations (R^2) — are used to indicate the percentage of the variance explained, which reflects the level that can be predicted by the independent variables. The higher R^2 refers to the higher predictive power of the model (Kline, 2016).

The results of the path analysis are shown in Table 4.17 and Figure 4.1.

Table 4.17 Summarized results of the path analysis.

Path	**Hypothesis**	**Path coefficient**	**C.R.**	**Result**
uncertainty → intention	H1	-.297***	-3.397	Supported
confidentiality → intention	H2a	.070	1.378	Not supported
confidentiality → uncertainty	H2b	.062	1.278	Not supported
security → intention	H3a	-.312***	-5.096	Supported
security → uncertainty	H3b	.146**	2.758	Supported
openness → intention	H4a	.264***	3.428	Supported
openness → uncertainty	H4b	-.176*	-2.406	Supported
trust → intention	H5a	.003	0.028	Not supported
trust → uncertainty	H5b	-.531***	-6.177	Supported
trust → confidentiality	H5c	-.174**	-2.937	Supported
trust → security	H5d	-.153*	-2.368	Supported
trust → openness	H5e	.639***	9.287	Supported
rewards → intention	H6	.239***	4.146	Supported

Note: * = p < .05, ** = p < .01, *** = p < .001.



Note: * = p < .05, ** = p < .01, *** = p < .001.
Solid lines refer to significant paths and dashed lines refer to non-significant paths.

Figure 4.1 Path Coefficients for the Conceptual Framework.

H1. A high level of perceived uncertainty leads to a low level of information-resource sharing intention.

The result showed that these two variables have a negative relationship, implying that people who perceived a higher level of uncertainty tended to perform a lower level of intention to share information-resource. The result was also statistically significant ($\beta = -.297$, $p < .001$). Therefore, Hypothesis 1 is supported.

H2a. Information confidentiality concern negatively associates with information-resource sharing intention.

Unexpectedly, the result suggested a positive relationship between these two variables, and the p-value was not statistically significant at 5% ($\beta = .070$, $p = .168$). Hypothesis 2a is not supported.

H2b. Information confidentiality concern exerts a positive effect on perceived uncertainty.

The result showed that these two variables are positively related, meaning that people who have a higher level of information confidentiality concern will perceive a higher level of uncertainty. However, this relationship was not statistically significant ($\beta = .062$, $p = .201$). Therefore, Hypothesis 2b is not supported.

H3a. Information security concern exerts a negative effect on the intention to share information-resource.

The result showed that these two variables are negatively related, implying that people who possessed a higher level of information security concern tended to perform a lower level of intention to share information-resource. The result was also statistically significant ($\beta = -.312$, $p < .001$). Therefore, Hypothesis 3a is supported.

H3b. Information security concern positively relates to perceived uncertainty.

The result showed that these two variables have a positive relationship, meaning that people who have a higher level of information security concern will

perceive a higher level of uncertainty. Also, this relationship was statistically significant ($\beta = .146$, $p < .01$). Therefore, Hypothesis 3b is supported.

H4a. Openness has a positive relationship with the intention to share information-resource.

The result showed that these two variables have a positive relationship, implying that people in the environment with a higher level of openness tended to perform a higher level of intention to share information-resource. Also, this relationship was statistically significant ($\beta = .264$, $p < .001$). Therefore, Hypothesis 4a is supported.

H4b. Openness has a negative impact on perceived uncertainty about information-resource sharing.

The result showed that these two variables are negatively related, meaning that people in an environment with a higher level of openness will perceive a lower level of uncertainty. The result was also statistically significant ($\beta = -.176$, $p < .05$). Therefore, Hypothesis 4b is supported.

H5a. Trust has a positive relationship with the intention of sharing information-resource.

The result showed that these two variables are negatively related, meaning that people who possessed a higher trust with others tended to perform a higher level of intention to share information-resource. However, this relationship was not statistically significant ($\beta = .003$, $p = .978$). Therefore, Hypothesis 5a is not supported.

H5b. Trust reduces perceived uncertainty.

The result showed that these two variables are negatively related, meaning that people who possessed a higher level of trust in others will perceive a lower level of uncertainty. This result was also statistically significant ($\beta = -.531$, $p < .001$). Therefore, Hypothesis 5b is supported.

H5c. Trust exerts a negative impact on decreasing concern for information confidentiality.

The result showed that these two variables have a negative relationship, implying that people who possessed a higher level of trust in others will have a lower level of information confidentiality concern. Also, this relationship was statistically significant ($\beta = -.174$, $p < .01$). Therefore, Hypothesis 5c is supported.

H5d. Trust exerts a negative effect on reducing concern for information security.

The result showed that these two variables are negatively related, implying that people who possessed a higher level of trust in others will have a lower level of information security concern. Also, this relationship was statistically significant ($\beta = -.153$, $p < .05$). Therefore, Hypothesis 5d is supported.

H5e. Trust facilitates enterprise to build an environment with openness.

The result showed that these two variables are positively related, meaning that a high level of trust between people is conducive to building an environment with a high level of openness. This result was also statistically significant ($\beta = .639$, $p < .001$). Therefore, Hypothesis 5e is supported.

H6. Perceived rewards have a positive influence on information-resource sharing intention.

The result showed that these two variables have a positive relationship, meaning that people who have a higher desire toward rewards tended to perform a higher level of intention to share information-resource. The result was also statistically significant ($\beta = .239$, $p < .001$). Therefore, Hypothesis 6 is supported.

Besides, the results of the path analysis also showed that 45.3% of the variance in the intention of information-resource sharing is explained by the joint influence of the predictors of perceived uncertainty, information security concern, openness, and perceived rewards. Similarly, 50.1% of the variance in the perceived uncertainty is explained by the joint influence of the information security concern,

openness, and trust predictors. Moreover, trust also explained 40.8% of the variance in the openness.

4.4.4.2 Analysis of mediating effects

Except for the direct effects of constructs, the conceptual framework of this study also includes several implicit mediating effects on information-resource sharing intention. To investigate these mediating effects, the bootstrapping procedure with bias-corrected method (5000 iterations) was adopted, as scholars have stated that the Baron–Kenny test and Sobel test cannot provide sufficient information on this effect (Hayes, 2017; MacKinnon, Lockwood, Hoffman, West, & Sheets, 2002). The bootstrapping procedure is more appropriate and more powerful than either of the other tests (Hayes, 2009; Preacher & Hayes, 2004; Trenz et al., 2013). Bias-corrected confidence interval (CI) in a 95% confidence level excludes zero to indicate that the mediating effect is statistically significant and includes zero to indicate that it is not statistically significant.

The results of the bootstrapping procedure performed using AMOS 24 are shown in Table 4.18.

Table 4.18 Mediation Effects by Bootstrapping Procedure.

	Point estimation	Product of coefficients		Bias-corrected 95% CI		Result
		SE	Z	Lower	Upper	
Indirect effects						
Openness → Uncertainty → Intention	.036	.025	1.440	-.001	.098	Not supported
Security → Uncertainty → Intention	-.029	.020	-1.450	-.082	0	Not supported
Trust → Uncertainty → Intention	.119	.052	2.288	.038	.246	Supported
Trust → Openness → Intention	.127	.060	2.117	.030	.264	Supported
Trust → Security → Intention	.036	.023	1.565	.002	.095	Supported
Trust → Openness → Uncertainty	-.123	.070	-1.757	-.260	.026	Not supported
Trust → Security → Uncertainty	-.024	.018	-1.333	-.076	0	Not supported
Trust → Openness → Uncertainty → Intention	.025	.017	1.471	0	.070	Not supported
Trust → Security → Uncertainty → Intention	.005	.004	1.440	0	.019	Not supported
Direct effects						
Trust → Intention	.002	.105	0.019	-.211	.207	Not supported
Total indirect effects						
Trust → Intention	.306	.091	3.362	.155	.513	Supported

Note: 5,000 bootstrap samples.
Security = Information security concern, Uncertainty = Perceived uncertainty, Intention = Information-resource sharing intention.

The indirect effects of openness on information-resource sharing intention (indirect effect = .036, 95% bias-corrected CI [-.001, .098]) and information security concern on information-resource sharing intention (indirect effect = -.029, 95% bias-corrected CI [-.082, 0]), both mediated by perceived uncertainty, are not statistically significant due to the inclusion of zero. Similarly, the indirect effects of trust on perceived uncertainty mediated by both openness (indirect effect = -.123, 95% bias-corrected CI [-.260, .026]) and information security concern (indirect effect = -.024, 95% bias-corrected CI [-.076, 0]) are not statistically significant. Moreover, the indirect effects of trust on information-resource sharing intention mediated both by openness and perceived uncertainty (indirect effect = .025, 95% bias-corrected CI [0, .070]), and trust on information-resource sharing intention mediated both by information security concern and perceived uncertainty (indirect effect = .005, 95% bias-corrected CI [0, .019]), are also not statistically significant.

However, the indirect effects of trust on information-resource sharing intention mediated by openness (indirect effect = .127, 95% bias-corrected CI [.030, .264]), trust on information-resource sharing intention mediated by perceived uncertainty (indirect effect = .119, 95% bias-corrected CI [.038, .246]), and trust on information-resource sharing intention mediated by information security concern (indirect effect = .036, 95% bias-corrected CI [.002, .095]) are statistically significant. Additionally, the direct effects of trust on information-resource sharing intention are not statistically significant (direct effect = .002, 95% bias-corrected CI [-.211, .207]). Therefore, openness, perceived uncertainty, and information security concern have full mediating effects on the indirect influence of trust on information-resource sharing intention.

4.5 Discussion

The present study finds several significant factors of information-resource sharing intention from the perspectives of the consensus perception of blockchain. These factors can be used as indicators of information-resource sharing intention to explore how to encourage information-resource sharing between departments, as well as whether adopting blockchain technology can promote information-resource sharing and thus resolve the issue of information silo. The results obtained using Amos analysis indicate that 10 out of 13 hypotheses in this research are statistically supported. The results are reported in Table 4.19.

This study will now outline the variable of perceived rewards, which has the simplest influence path, and discuss each variable from simple to complex in the sequences of perceived uncertainty, information security concern, openness, and trust. Finally, it will discuss the insignificant variable, information confidentiality concerns, thereby improving the organization of the entire analysis process.

Table 4.19 Summary of Hypothesis Testing Results

	Hypothesis	**Beta**	**Result**
H1	A high level of perceived uncertainty leads to a low level of information-resource sharing intention.	-.297***	Supported
H2a	Information confidentiality concern negatively associates with information-resource sharing intention.	.070	Not supported
H2b	Information confidentiality concern exerts a positive effect on perceived uncertainty.	.062	Not supported
H3a	Information security concern exerts a negative effect on the intention to share information-resource.	-.312***	Supported
H3b	Information security concern positively relates to perceived uncertainty.	.146**	Supported
H4a	Openness has a positive relationship with the intention to share information-resource.	.264***	Supported
H4b	Openness has a negative impact on perceived uncertainty about information-resource sharing.	-.176*	Supported
H5a	Trust has a positive relationship with the intention of sharing information-resource.	.003	Not supported
H5b	Trust reduces perceived uncertainty.	-.531***	Supported
H5c	Trust exerts a negative impact on decreasing concern for information confidentiality.	-.174**	Supported
H5d	Trust exerts a negative effect on reducing concern for information security.	-.153*	Supported
H5e	Trust facilitates enterprise to build an environment with openness.	.639***	Supported
H6	Perceived rewards have a positive influence on information-resource sharing intention.	.239***	Supported

Note: * = $p < .05$, ** = $p < .01$, *** = $p < .001$.

4.5.1 Discussion of effects of perceived rewards

Perceived rewards significantly and positively influence information-resource sharing intention (H6, beta = .239, $p < .001$). This is consistent with previous studies by Pazaitis et al. (2017), Saberi et al. (2019), Shabani (2019), and Zhang et al. (2017), who state that rewards including economic rewards (e.g., money) and social rewards (e.g., reputation, and reciprocity) have significant effects on interactions among members of an enterprise. They can facilitate cooperation and mutually supportive relations building, and can also encourage people to share information or knowledge with others.

This finding indicates that perceived rewards are the factor that can promote information-resource sharing intention within the enterprise (Lin, 2007). Additionally, the standardized correlation coefficient of .239 represents a certain role in promoting information-resource sharing intention. Therefore, if an enterprise wants to promote information-resource sharing between departments, designing reward mechanisms is an effective method to achieve this (Shabani, 2019; Vilnai-Yavetz & Levina, 2018). Furthermore, adopting blockchain technology can help an enterprise to implement internal reward mechanisms easily. Enterprise managers can design reward mechanisms as the terms of the smart contract, then add them to the blockchain as the blockchain execution principles to guarantee its automatic execution through the blockchain (Pournader et al., 2020; Saberi et al., 2019). For example, the application of Bitcoin designed a mining mechanism based on the smart contract as the reward mechanism to attract users' participation. Moreover, a Chinese enterprise called “OneThing Cloud” also designed a similar reward mechanism, let people can gain cash by providing Idle computing resources and network bandwidth (OneThingCloud, n.d.).

4.5.2 Discussion of effects of perceived uncertainty

Perceived uncertainty, as the mediation factor, significantly and negatively influences information-resource sharing intention (H1, beta = -.297, $p < .001$). This is consistent with previous studies by Dinev and Hart (2006), Gibbs et al. (2013), Pavlou et al. (2007), Saberi et al. (2019), and Slyke et al. (2006), who state that perceived uncertainty is a main factor that reduces people’s sharing intention, especially in an Internet environment. If people are unable to assess the risks in the physical and Internet

environments and predict the future impacts of these risks, they will perceive more uncertainties. This in turn reduces their willingness to share information and knowledge online.

This finding indicates that perceived uncertainty could reduce employees' intention to share information-resource. When employees have insufficient information to evaluate the risks in the Internet environment of the enterprise and predict the behaviors of other departments, they will perceive more uncertainties, which in turn makes them less willing to share information-resource with other departments. Moreover, the standardized correlation coefficient of -.297 represents that perceived uncertainty can significantly reduce employees' intention of sharing information-resource. Therefore, reducing employees' perception of uncertainty is an effective way to encourage employees to share information-resource with other departments.

However, as for how to reduce the perceived uncertainty, this will be elaborated when discussing antecedent variables of perceived uncertainty, such as information security concern, openness, and trust.

4.5.3 Discussion of effects of information security concern

Information security concern has a significant influence on both information-resource sharing intention and perceived uncertainty. Firstly, information security concern can significantly diminish information-resource sharing intention (H3a, beta = -.312, $p < .001$). This is congruent with previous studies by Fan et al. (2019) and Trenz et al. (2013), who propose that information security is a major concern when people adopt information technology to integrate data and share information across agencies and departments. People who are more concerned about Internet security, including the security of the network environment and computer equipment in addition to the service provider's security awareness and capacity, will be less willing to purchase and share information through the Internet. Secondly, information security concern is positively related to perceived uncertainty (H3b, beta = .146, $p < .01$). This coincides with earlier studies by Kim and Kim (2018), Pavlou et al. (2007), and Trenz et al. (2013), who state that information security concern could increase the perceived uncertainty of transactions, information sharing, and technology use in the online environment. People

who have more concerns about the network equipment security and the service provider's security awareness and capacity will perceive more uncertainty.

These findings indicate that information security concern is an inhibitor that can increase employees' perceived uncertainty and reduce their intention of information-resource sharing. Moreover, the standardized correlation coefficients of -.312 for information-resource sharing intention and .146 for perceived uncertainty reflect the substantial role of information security concern in influencing information-resource sharing intention. In enterprise, employees who have a high information security concern will consider more issues related to information security, such as computer and network environment security, and the security awareness and capability of other departments (Salisbury et al., 2001). This causes them to perceive more uncertainty and reduce their intention of sharing information-resource with other departments (Chang, 2014; Singh & Srivastava, 2018; Taherdoost, 2018; Trenz et al., 2013). Therefore, if an enterprise intends to promote information-resource sharing between departments, the following aspects can reduce the employees' information security concerns. Firstly, the enterprise's security levels of computer software and hardware should be improved. For example, anti-virus software should be deployed; regular virus and vulnerability scanning should be performed; and system patches should be updated in a timely manner. Secondly, network security within the enterprise should be increased. For instance, a network firewall should be employed and a more reasonable network structure should be adopted. Thirdly, the enterprise should develop and implement effective information security management and control mechanisms. Finally, it should increase departments' security awareness and capability by encouraging or requiring employees to participate in learning and training activities related to information security.

Moreover, due to the characteristics of the distributed structure, consensus mechanism, and smart contract, blockchain technology can provide network environment and mechanism guarantees for enterprise information security from the network and algorithm levels, thereby reducing employees' information security concerns (Hughes et al., 2019; Zheng et al., 2018). Therefore, adopting blockchain technology can also promote information-resource sharing to a certain extent. For example, the China Association of Automobile Manufacturers (CAAM) wants to build

a car's data integrity attestation blockchain platform to guarantee and share manufacturers' car data due to the benefits of blockchain technology on information security (CAAM, 2021).

Additionally, while information security concern has significant effects on both information-resource sharing intention and perceived uncertainty, perceived uncertainty also has a significant influence on information-resource sharing intention. The mediation effect of information security concern on information-resource sharing intention mediated by perceived uncertainty is insignificant, according to the results of mediating effects analysis (indirect effect = -.029, 95% bias-corrected CI [-.082, 0]) (see Table 4.18). This can be attributed to several reasons. Firstly, the direct influence of information security concern on information-resource sharing intention (β = -.312, $p < .001$) is larger than its effect on perceived uncertainty (β = .146, $p < .01$) and the effect of perceived uncertainty on information-resource sharing intention (β = -.297, $p < .001$) (see Table 4.17). Secondly, other factors significantly affecting perceived uncertainty weakened the impact of information security concern on perceived uncertainty. This finding indicates that reducing employees' concerns about information security issues related to the security of the network environment, the security of computer software and hardware, and the security awareness and capability of other departments, can decrease their perceived uncertainty. However, this decrease in perceived uncertainty cannot increase employees' intention to share information-resource with other departments. However, the influence of the antecedent variable of the information security concern, namely trust, will be elaborated when discussing the factor of trust.

4.5.4 Discussion of effects of openness

Openness also has significant effects on both information-resource sharing intention and perceived uncertainty. Firstly, openness can promote information-resource sharing intention (H4a, beta = .264, $p < .001$). This is consistent with prior studies by Gibbs et al. (2013), Haesevoets et al. (2019), Toffolutti and Stuckler (2019), and Yu et al. (2010), who state that environmental factors such as the openness levels of management systems and information can facilitate purchases, information sharing, and knowledge sharing by encouraging communication and disclosing information. Secondly, openness can mitigate perceived uncertainty (H4b, beta = -.176, $p < .05$).

This coincides with prior research by Gu et al. (2019), Phung and Mai (2017), and Shropshire et al. (2017), who state that people in an environment with a higher level of openness will perceive a lower level of uncertainty as an open environment can encourage people to communicate with each other, which reduces their perceived uncertainty due to information asymmetry.

These findings indicate that openness is an essential environmental factor of an enterprise that influences perceived uncertainty and information-resource sharing intention. Moreover, the standardized correlation coefficients of .264 for information-resource sharing intention and -.176 for perceived uncertainty represent that the open environment is important for an enterprise. It allows employees to communicate with each other more easily and clearly, thereby making it easier to absorb new experiences and accept changes; it also reduces information asymmetry between each other. These advantages will increase employees' intention to share information-resource and reduce their perceived uncertainty (Toffolutti & Stuckler, 2019). Thus, if an enterprise wants to promote information-resource sharing between departments, it can create an open environment through two aspects. The first is to change the enterprise's management systems to open management, to create its organizational culture with the goal of open innovation, and to improve the transparency of its internal information (D. P. Rogers, 1987). The second is to create an office environment that is conducive to communication (e.g., designing an open-space office or establishing a communication space within the office), to encourage communication between employees (Breen et al., 2005).

Moreover, due to the characteristics of the consensus mechanism, blockchain technology can provide comprehensive audit trails. That allows all participants to know who accessed the shared data and used it for what purpose, thereby promoting an open environment by guaranteeing the transparency of information use (Pournader et al., 2020; Wang et al., 2019). Therefore, adopting blockchain technology also can help an enterprise to build an open environment. For example, a technology company in China released a blockchain O2O social e-commerce platform called "LanlanPocket", which provides an open and transparent community atmosphere for merchants and customers (LanlanPocket, n.d.).

Additionally, while openness has significant effects on both information-resource sharing intention and perceived uncertainty, perceived uncertainty also has a significant influence on information-resource sharing intention. The mediation effect of openness on information-resource sharing intention mediated by perceived uncertainty is insignificant, according to the results of mediating effects analysis (indirect effect = .036, 95% bias-corrected CI [-.001, .098]) (see Table 4.18). This is caused by the following two reasons. Firstly, the direct influence of openness on information-resource sharing intention ($\beta = .264$, $p < .001$) is larger than its effect on perceived uncertainty ($\beta = -.176$, $p < .05$) (see Table 4.17). Secondly, other factors that have significant effects on perceived uncertainty weakened the impact of openness on perceived uncertainty. This finding indicates that the open environment of an enterprise can reduce employees' perceived uncertainty by decreasing information asymmetry through communication and information disclosure. However, the decrease of perceived uncertainty cannot positively influence employees' intention to share information-resource. Moreover, trust, the antecedent variable of openness, may have a mediating effect on openness. This influence will be examined when discussing the factor of trust.

4.5.5 Discussion of effects of trust

Trust is an important factor of this study and has four significant direct influence paths. Firstly, trust decreases perceived uncertainty (H5b, $\beta = -.531$, $p < .001$). This is consistent with prior studies by Thusi and Maduku (2020) and Zhi Yang et al. (2019), who state that trust is one of the most effective factors that can decrease perceived uncertainty; by providing a sense of assurance to reduce employees' perception of risks, trust can reduce their perceived uncertainty. Secondly, trust reduces information confidentiality concern (H5c, $\beta = -.174$, $p < .01$). This aligns with prior research by Pavlou et al. (2007) and Singh and Srivastava (2018), who state that trust can decrease employees' information confidentiality concerns by providing a sense of assurance to mitigate the influence of information asymmetry on an information-resource provider. Thirdly, trust reduces information security concern (H5d, $\beta = -.153$, $p < .05$). This is congruent with previous research by Luo (2002) and Trenz et al. (2013), who state that trust can decrease employees' information security concerns by providing a sense of

assurance to diminish the impact of information asymmetry on an information-resource provider. Fourthly, trust facilitates openness environment building in the enterprise (H5e, $\beta = .639$, $p < .001$). This corresponds with previous studies by Breuer et al. (2016) and Costa and Anderson (2011), who state that trust can encourage communication and interchange between employees by reducing opportunistic behavior.

These findings present trust as a crucial factor that can reduce employees' perceived uncertainty; diminish their concern for information confidentiality and security; and promote the development of open environments in enterprise. Although its influence on information-resource sharing intention is insignificant, the standardized correlation coefficients of -.531 for perceived uncertainty, -.174 for information confidentiality concern, -.153 for information security concern, and .639 for openness represent that trust is an important consciousness factor for enterprises and plays an important role in environment building. Not only can it prominently promote open atmosphere sharing and significantly reduce employees' perceived uncertainty, but it can also effectively diminish employees' concern for information confidentiality and security.

Moreover, trust also has five indirect influence paths except for direct influences (see Table 4.18). First, trust can indirectly impact information-resource sharing intention by influencing employees' perceived uncertainty (indirect effect = .119, 95% bias-corrected CI [.038, .246]). Second, trust can indirectly impact information-resource sharing intention by influencing employees' information security concern (indirect effect = .036, 95% bias-corrected CI [.002, .095]). Third, trust can indirectly impact information-resource sharing intention through the open atmosphere of an enterprise (indirect effect = .127, 95% bias-corrected CI [.030, .264]). The indirect effect through openness is the most significant (indirect effect = .127), followed by the indirect effect through perceived uncertainty (indirect effect = .119) and the indirect effect through information security concern (indirect effect = .036). Nevertheless, the fourth, the indirect effect of trust on information-resource sharing intention through information security concern and perceived uncertainty (indirect effect = .005, 95% bias-corrected CI [0, .019]), and fifth, the indirect effect of trust on information-resource sharing intention through openness and perceived uncertainty (indirect effect = .025, 95% bias-corrected CI [0, .070]), are insignificant. The reason for these two

results is that the indirect influence of information security concern on information-resource sharing intention and the indirect impact of openness on information-resource sharing intention are insignificant. Therefore, although the direct influences of trust on information security concern and trust on openness are significant, the effect cannot be passed to the information-resource sharing intention through two-layer mediations.

These findings indicate that if an enterprise wants to promote information-resource sharing between departments, establishing the trust systems of an enterprise to enhance the trust between employees and between departments would be an effective approach. Trust can indirectly encourage employees to share information-resource with other departments by reducing their perceived uncertainty and information security concerns and facilitating an open atmosphere. However, establishing trust systems is the most challenging for an enterprise as it involves two stages: initial trust establishment and trust accumulation (Gefen, 2000). Initial trust establishment is the most difficult, as it requires the enterprise to invest a significant amount of effort. Trust accumulation is a lengthy process which the enterprise must guarantee by formulating corresponding systems and mechanisms, as dishonest behavior will soon cause the accumulated trust to disappear (Gefen, 2000).

Additionally, the new trust mechanism of blockchain technology, "trust machines", can provide people with a trust-free platform without third-party guarantees. Blockchain technology can facilitate initial trust establishment by using technical means to reduce people's concerns about trust (Hawlitschek et al., 2018; Pournader et al., 2020). Moreover, the comprehensive audit trails provided by consensus mechanism of blockchain technology also guarantee trust accumulation (Wang et al., 2019). Therefore, adopting blockchain technology can facilitate the establishment of an enterprise's trust systems by helping it to reduce the investment of initial trust establishment and providing technical guarantees for trust accumulation between employees and departments. For example, the blockchain application of "Huibao Assistance" provides a trusted online assistance platform for the community users, let users giving or receiving assistance without arbitration (ThunderChain, 2020).

However, the direct influence of trust on information-resource sharing intention is not supported in this study (H5a, $\beta = .003$, $p = .978$). This finding is inconsistent with prior studies (Curado & Vieira, 2019; Huang et al., 2011; Rasdi & Tangaraja, 2020), in

which trust can directly promote the intention of knowledge sharing, online purchase, and online services using. The reasons for this result are as follows. First, due to the particularity of information-resource as both information and assets, information-resource sharing behaviors are different from knowledge sharing behaviors, purchase behaviors, and technology-adopting behaviors. Consequently, the direct effect of trust on sharing intention is insignificant. Second, this study investigates the sharing behavior within the enterprise. In the enterprise, although trust can provide employees a sense of assurance, employees may consider the impact of objective factors (e.g., information security, rewards, and open environment) rather than the sense of assurance when sharing information-resource with other departments due to the particularity of information-resource. That has been proven by this study. Third, the direct effect of trust on openness, perceived uncertainty, and information security concern is significant. This is another reason why the effect of trust on information-resource sharing is insignificant, and the findings of this study have indirectly proven that trust can indirectly influence information-resource sharing intention through openness, perceived uncertainty, and information security concern.

4.5.6 Discussion of effects of information confidentiality concern

Although prior studies have found that information confidentiality concern is a predictor that can impact behavior intention in the Internet environment (Dinev & Hart, 2006; Kshetri, 2017; Pavlou et al., 2007; Valkenburgh, 2016; Zhou, 2011), the effects of information confidentiality concern in this study, including those on information-resource sharing intention (H2a) and perceived uncertainty (H2b), were not supported. There are two possible reasons for these results.

The first is that the research context is China. In China, the value of sensitive information has not been adequately acknowledged by the citizenry, and thus, there is not enough awareness to protect sensitive information (Liu et al., 2019; Zhang, Yi, & Tang, 2016; Zhao, Huo, & Fan, 2018). Therefore, employees will assess the relationship between potential risks and potential benefits before providing sensitive information. When the benefits of providing sensitive information outweigh the risks of disclosing sensitive information, they usually ignore the impact of sensitive information, such as whether other departments would use sensitive information

appropriately and whether sensitive information is disclosed due to the other department's inability to protect it, and focus on other more influential factors (Liu et al., 2019; Zhang et al., 2016). Moreover, the convenience of the Internet also makes employees more likely to ignore the possible risks caused by information confidentiality issues, such as the risk of sensitive information misuse (Zhang et al., 2016; Zhao et al., 2018).

Second, information security and information confidentiality are integral to each other. According to AlSulaimi's (2018) study, the focus of people's concern for information confidentiality is twofold: first, whether sensitive information could be disclosed or misused and thus cause adverse effects, and second, the desire to retain control over sensitive information. The focus of people's concern for information security is the security degree of the software and hardware of information systems and the network environment, as well as the security awareness of system users. Whether sensitive information is disclosed depends upon the security of information systems, since sensitive information is also stored in the information system like other information. Therefore, although information confidentiality and information security are two different concepts, information confidentiality is based on information security, and people's control of sensitive information must also be based on information security. When people's awareness of sensitive information protection is low, the focus of information confidentiality and information security will overlap; thus, people will consider whether sensitive information will be disclosed and abused from the perspective of information security.

According to the two reasons outlined above, when simultaneously involving the issues of information confidentiality and security in the enterprise, employees may consider that information security already covers information confidentiality and concentrate predominantly on information security (AlSulaimi, 2018). Additionally, the significant influences of other factors (e.g., openness and perceived rewards) on information-resource sharing intention, as well as the risks of disclosing sensitive information within the enterprise, are lower than disclosing it in the public network. Consequently, employees do not pay sufficient attention to the factors related to information confidentiality, such as whether other departments correctly use sensitive information, whether sensitive information is disclosed due to the other department

being incapable of protecting it, and whether risks arise due to abuse of sensitive information (Liu et al., 2019; Zhang et al., 2016; Zhao et al., 2018). Thus, the influences of information confidentiality concern on both information-resource sharing intention and perceived uncertainty are insignificant.

4.5.7 Summary

The current study model explained 45.3 percentages of variance on information-resource sharing and five factors that influence it. Three factors that influence information-resource sharing directly are information security concern, openness, and perceived rewards. The influence of the information security concern is the most significant, with a standardized regression coefficient of -.312, followed by openness (.264) and perceived rewards (.239). Moreover, perceived uncertainty as a mediator was also found to significantly influence information-resource sharing intention, with a standardized regression coefficient of -.297 (see Table 4.17). Finally, trust can indirectly influence information-resource sharing intention through perceived uncertainty, information security concern, and openness. However, the effect of information confidentiality concern on information-resource sharing intention is not supported in this study, although it has been validated in other studies.

Considering the extent and scope of the impact on the information-resource sharing intention, if an enterprise wishes to promote information-resource sharing between departments, the most effective approach would be to increase levels of trust between employees and between departments through the construction of enterprise trust systems. Although the direct impact of trust on information-resource sharing intention is insignificant, it significantly affects perceived uncertainty and openness with a standardized regression coefficient of -.531 and .639 (see Table 4.17). Moreover, it can indirectly influence information-resource sharing intention through the three most influential factors: perceived uncertainty, information security concern, and openness (total effect = .306, 95% bias-corrected CI [.155, .513]) (see Table 4.18). However, the construction of enterprise trust systems requires a long implementation period, as trust needs time to accumulate.

Secondly, the enterprise should reduce employees' concern for information security. Information security concern has the greatest impact on information-resource

sharing intention and reducing employees' information security concern is relatively easy for an enterprise to achieve. There are several ways to reduce employees' information security concern: (1) improving the security of computer software and hardware within the enterprise; (2) improving the security of the internal network environment; (3) developing and implementing effective information security management and control mechanisms; and (4) increasing the security awareness and capabilities of all departments through information security learning and training (Salisbury et al., 2001; Singh & Srivastava, 2018; Taherdoost, 2018).

Third, the enterprise is recommended to design some effective reward mechanisms based on information-resource sharing. Although the influence of perceived rewards on information-resource sharing intention is below that of openness and perceived uncertainty, providing rewards is the easiest way for the enterprise to promote information-resource sharing.

The fourth method is to create an open environment for the enterprise. The impact of openness on information-resource sharing intention is less significant than that of perceived uncertainty; however, compared with reducing employees' perceived uncertainty, the creation of an open environment is a more direct way to achieve the goal.

Finally, perceived uncertainty is a mediator. Its influence on information-resource sharing intention is second only to information security concern, and it has direct relationships with trust, openness, and information security concern. Moreover, according to the findings of this study, the three methods of creating an open environment, reducing employees' concern for information security, and increasing trust between employees can effectively reduce employees' perceived uncertainty and explain 50.1 percentages of variance on perceived uncertainty. However, only one method of increasing trust between employees can indirectly promote information-resource sharing between departments through the reduction of perceived uncertainty (indirect effect = .119, 95% bias-corrected CI [.038, .246]) (see Table 4.18).

CHAPTER 5

CONCLUSION

5.1 Conclusion

This study established an integrated model based on the principal-agent theory and motivational model to investigate and explain the relationships among consensus perception, perceived uncertainty, and information-resource sharing intention. The principal-agent theory was used to study the behaviors of information-resource providers and recipients in the uncertain environment caused by information asymmetry, while the motivational model was used to explain the direct influences of consensus perception on information-resource sharing intention.

The results support the theoretical model, our assumption, and the existing study outcomes regarding information-resource sharing in organizations. This study has thus revealed several important findings for scholars and enterprise managers who are seeking to encourage information-resource sharing within their enterprise and considering whether adopting blockchain technology could address the problem of information silo.

Firstly, trust is the most critical factor influencing the willingness to share information-resource. Trust can decrease employees' perceived uncertainty by providing a sense of assurance; reduce their concern for information security and confidentiality by mitigating the impact of information asymmetry; and promote the development of an open atmosphere by reducing opportunistic behavior among employees. Moreover, it can indirectly increase information-resource sharing intention between departments by influencing perceived uncertainty, information security concern, and openness. This provides a valuable clue for encouraging information-resource sharing within the enterprise (Gefen et al., 2003; Kim et al., 2008; Li et al., 2019; Liébana-Cabanillas, Marinković, & Kalinić, 2017; Nicolaou & McKnight, 2006;

Pavlou & Gefen, 2004; Pavlou et al., 2007; Queiroz & Wamba, 2019; Ridings et al., 2002). Thus, increasing trust between employees and between departments is the most effective way for enterprises to encourage information-resource sharing. However, the establishment of trust systems is a long-term process and accompanies enterprise development (Gefen, 2000; Hawlitschek et al., 2018). An enterprise must develop appropriate systems and mechanisms to guarantee the continuous accumulation of trust. The enterprise can additionally adopt blockchain technology to promote the development of its trust systems, as blockchain technology provides a new trust pattern, "trust machines", which removes employees' worries about integrity. This pattern provides a trust-free platform for enterprise and thus reduces people's worries about trusting each other.

Secondly, information security concern is a negative environmental factor which influences the willingness to share information-resource. Employees' perception of online security, including the security of the network environment and computer equipment as well as the security awareness and capabilities of service providers, can significantly increase employees' perceived uncertainty and reduce their willingness to share information-resource with other departments (Fan et al., 2019; Kim & Kim, 2018; Kshetri, 2017; Oliveira et al., 2016; Pavlou et al., 2007; Trenz et al., 2013). Therefore, another effective strategy for encouraging information-resource sharing would be to reduce employees' concern for information security by creating a secure computer and network environment; enhance employees' security awareness and capabilities; and increase trust between employees. Moreover, adopting blockchain technology is another effective solution to promote information-resource sharing. Blockchain technology can provide a secure network environment and trust-free platform for participants, thereby reducing employees' concern for information security.

Thirdly, openness is a positive environmental factor impacting the willingness to share information-resource. It can increase the willingness to share information-resource by providing an open communication environment and disclosing information and can also reduce perceived uncertainty by absorbing new experiences and accepting changes (Gibbs et al., 2013; Gu et al., 2019; Haesevoets et al., 2019; Phung & Mai, 2017; Shropshire et al., 2017; Toffolutti & Stuckler, 2019; Yu et al., 2010). Therefore, shaping an open atmosphere within the enterprise through such methods as establishing

an open organizational culture, increasing the transparency of the internal information, creating an office environment conducive to communication, and enhancing trust between employees is another effective way to promote information-resource sharing between departments. Moreover, blockchain technology adoption can help an enterprise to shape an open atmosphere, as the consensus mechanism of blockchain can ensure information transparency and thus promotes the establishment of an open environment.

Fourthly, perceived rewards are the motivational factor promoting the willingness to share information-resource. This factor can influence employees' willingness to share information-resource by impacting their motivation (Pazaitis et al., 2017; Saberi et al., 2019; Shabani, 2019; Zhang et al., 2017). Therefore, implementing a reward mechanism within an enterprise is an effective method to promote information-resource sharing between departments. Moreover, adopting blockchain technology can help an enterprise to implement an internal reward mechanism easily, as the smart contract of blockchain can guarantee its automatic execution.

Additionally, perceived uncertainty is a mediator that negatively influences information-resource sharing intention, thereby reducing employees' willingness to share information-resource with other departments (Dinev & Hart, 2006; Gibbs et al., 2013; Pavlou et al., 2007; Saberi et al., 2019; Slyke et al., 2006). An enterprise can reduce employees' perceived uncertainty using several methods such as creating an open environment; providing more secure computer software, hardware, and network environment; and enhancing trust between employees and between departments. However, not all perceived uncertainty reduction caused by these methods can indirectly and effectively promote information-resource sharing; only the perceived uncertainty reduction caused by enhancing trust between employees and departments is effective.

Finally, two influences of information confidentiality concern, namely its influence on information-resource sharing intention and perceived uncertainty, are insignificant, although their connections have been verified by previous studies in other research contexts (Dinev & Hart, 2006; Kshetri, 2017; Pavlou et al., 2007; Valkenburgh, 2016; Zhou, 2011). The major reasons for this study's results its research

context of China (Liu et al., 2019; Zhang et al., 2016; Zhao et al., 2018) and the integral relationship between information security and confidentiality (AlSulaimi, 2018).

In conclusion, when enterprises want to promote information-resource sharing, from the perspective of the extent and the scope of influence on the willingness to share information-resource, enhancing trust between employees and between departments is the most effective way to achieve this. The next most effective methods are to reduce employees' concern for information security, to build an open environment, and to implement reward mechanisms. From the perspective of implementation difficulty, reducing employees' concern for information security and implementing reward mechanisms are the preferred methods, as they are the easiest to perform. The third most preferred method is to build an open environment, and the last is to establish trust systems within the enterprise. Moreover, blockchain technology can reduce employees' information security concern by providing a secure network; facilitate the development of an open environment by ensuring information transparency; promote the establishment of trust systems by providing a trust-free platform without third-party guarantees, and consequently reduce employees' concerns about trusting each other; and guarantee the automatic execution of reward mechanisms through the smart contract. The blockchain implementations in China, such as the "OneThing Cloud", the "LanlanPocket", the "Huibao Assistance", and the car's data integrity attestation blockchain platform, also provided concrete evidence that blockchain technology can reduce information security concern, facilitate open environment shaping, and promote the trust systems building. Therefore, adopting blockchain technology is another feasible method of promoting information-resource sharing within the enterprise.

5.2 Research contributions

To facilitate better understanding of the influence factors of information-resource sharing intention, this study proposed a new concept, consensus perception, based on the characteristics and advantages of blockchain technology and prior studies of blockchain. It then established a study framework to investigate the factors that influence information-resource sharing intention from the perspective of consensus

perception. The results provided an explanation of the willingness to share information-resource within the enterprise.

This study provided an empirical study based on the characteristics and advantages of blockchain technology. Thus, it attempted to close the gap in the blockchain literature identified by Ying et al. (2018), who argues that current blockchain research is chiefly conceptual and exploratory (Francisco & Swanson, 2018; Hughes et al., 2019; Lu, 2019; Queiroz, Telles, & Bonilla, 2019; Ying et al., 2018) and must therefore be supported by empirical evidence. Moreover, due to the narrow focus of the empirical evidence of some blockchain studies (Francisco & Swanson, 2018; Kamble et al., 2019; Queiroz & Wamba, 2019; Wang et al., 2019), the present study expected to contribute to the current literature by adding a new research direction: using an empirical approach to the study of blockchain technology from the perspective of consensus perception.

The research model of this study was derived from the principal-agent theory and motivation model proposed in prior literature (Pavlou et al., 2007; Trenz et al., 2013; Vilnai-Yavetz & Levina, 2018). It provided some new insights into the research of information-resource management and sharing from the perspective of consensus perception. Research on information management can be conducted from the five aspects of trust, openness, information confidentiality concern, information security concern, and perceived rewards. Moreover, prior studies have focused primarily on the direct effects of trust (Kim et al., 2008; Li et al., 2019; Liébana-Cabanillas et al., 2017; Nicolaou & McKnight, 2006; Pavlou et al., 2007; Queiroz & Wamba, 2019), the finding that trust can indirectly impact information-resource sharing intention through information security concern, openness, and perceived uncertainty provides a unique insight into the field of information management and consequently extends previous research. Additionally, considering the statement made by prior scholars that information confidentiality concern has significant effects on both perceived uncertainty and information-resource sharing intention (Dinev & Hart, 2006; Kshetri, 2017; Pavlou et al., 2007; Valkenburgh, 2016; Zhou, 2011), the current study found that these two effects are insignificant in the context of China. Scholars may advance their research based on the results indicating that information confidentiality concern is a non-predictor.

5.3 Practical contributions

The present study offered some new insights into practitioners of information management and information systems. It also provided guidance regarding whether blockchain technology can be used to promote information-resource sharing and thus resolve issues of information silo. Firstly, this study presented an extended model based on the principal-agent theory and motivation model in the field of information management. This model was used to investigate blockchain technology application and information-resource sharing from the perspective of consensus perception. The consequent results revealed interrelationships among the constructs of consensus perception, information-resource sharing intention, and perceived uncertainty. These interrelationships provide managers with a new direction for promoting information-resource sharing and breaking information silo.

Secondly, this study found that environmental factors such as openness and information security are crucial determinants for influencing information-resource sharing between departments. An environment characterized by openness can encourage employees to communicate with each other; more easily absorb new experiences, accept changes, and effectively use strategies to deal with unknowns; and consequently increase their willingness to share information-resource (Gu et al., 2019; Retzbach et al., 2016; Shropshire et al., 2017; Thomas et al., 2009). Moreover, security issues related to computer software, hardware, and network environment increase employees' concern for information security, and decrease their willingness to share information-resource (Kshetri, 2017, 2018; Oliveira et al., 2016; Topaloğlu, 2012). Therefore, creating an open and secure environment can help an enterprise to effectively promote information-resource sharing. When an enterprise cannot provide a secure and open environment or has insufficient capacity to ensure information security, it is preferable to adopt blockchain technology to share information-resource, as blockchain technology can offer an open and secure platform (Aste et al., 2017; Hughes et al., 2019; Ølnes & Jansen, 2017; Saberi et al., 2019; Yli-Huumo et al., 2016).

Thirdly, trust was found to have a critical effect on the willingness to share information-resource. Increasing trust between employees and departments can

significantly promote information-resource sharing within an enterprise, as trust directly facilitates the creation of an open environment (Hofhuis et al., 2016; Meng, 2015); reduces employees' information confidentiality, security concern (Dhillon, Syed, & Sá-Soares, 2017; Kisekka & Giboney, 2018), and perceived uncertainty (Thusi & Maduku, 2020; Yang et al., 2019); and indirectly increases information-resource sharing intention via the mediators of openness, information security concern, and perceived uncertainty (Curado & Vieira, 2019; McNeil, 2016; Trenz et al., 2013). Therefore, the establishment of trust systems requires long-term consideration from the enterprise. If the level of trust between employees and departments is low and the trust systems are not well established, another option would be to adopt blockchain technology to share information-resource. Since blockchain technology provides a "trust machines" model, it not only enables enterprises to solve trust issues between employees and between departments but also helps to establish trust systems (Hawlitschek et al., 2018; Pournader et al., 2020).

Fourthly, reward, as a motivation of promoting employees to share information-resource, can effectively improve employees' willingness to share information-resource (Pazaitis et al., 2017; Saberi et al., 2019; Shabani, 2019; Zhang et al., 2017). Therefore, developing and implementing an internal reward mechanism is another way in which an enterprise can promote information-resource sharing between departments. Additionally, adopting blockchain technology can help an enterprise to implement this reward mechanism with ease, as the smart contract of blockchain can guarantee its automatic execution (Pournader et al., 2020; Saberi et al., 2019).

Finally, this study proposed the concept of consensus perception based on the characteristics and advantages of blockchain technology, which include five constructs of trust, openness, information confidentiality concern, information security concern, and perceived rewards. The concept of consensus perception can be used as a predictor of the willingness of blockchain technology adoption to evaluate the behavior of blockchain technology adoption, to provide practical guidance for the application of blockchain technology in the field of information-resource sharing.

5.4 Limitations

While this study provides several contributions, some limitations still need further investigation and additional scrutiny. Firstly, this study explained information-resource sharing intention within the sole context of an organization. Whether the results can be generalized between organizations and agencies will require additional research.

Secondly, the sample was collected from Chinese enterprises. It is uncertain whether cultural and national diversity will cause the influence on each factor of information-resource sharing intention to differ, especially the impact of information confidentiality concern on perceived uncertainty and information-resource sharing intention. Therefore, the research model should be further examined using samples from other countries.

Thirdly, this study did not evaluate the importance levels of information-resource. The different importance levels of information-resource may instill employees with different levels of willingness to share information-resource. Therefore, information-resource sharing intention should be examined further, particularly regarding the different importance levels of information-resource, to verify its universality.

Finally, further aspects of the research on using blockchain technology to assist information-resource sharing are not discussed in this study. These aspects include how to design the essential components of blockchain consensus mechanisms, such as the trust degree of the blockchain application, the relative openness of the blockchain application, and the confidentiality and security degree of the blockchain application, as well as how to design the reward mechanism within the smart contract. These issues are related to whether blockchain applications can meet enterprises' requirements and need further research.

5.5 Future research

According to the limitations of this study, there are some suggestions for future research. Firstly, further studies can examine information-resource sharing intention between organizations or agencies from the perspective of the consensus perception of blockchain.

Secondly, further studies can use samples from other countries to examine this research model, especially regarding the effects of information confidentiality concern. Alternatively, they could combine information confidentiality concern and information security concern to investigate their joint effects on information-resource sharing intention.

Thirdly, future studies can investigate whether the behaviors of information-resource sharing vary based on the different importance levels of information-resource, to expand the practical scope of this study model.

Finally, future research can study how to use blockchain technology to assist information-resource sharing from the perspective of blockchain technology application. For example, future studies could investigate how to design the essential components of blockchain consensus mechanisms and the reward mechanism within the smart contract.

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APPENDICES

Appendix 1: Regression Weight of Standard Measurement Model

Construct	**Item**	**Standardized estimates**	**C.R.**
Information confidentiality concern	C1	.79	–[a]
	C2	.81	17.51***
	C3	.79	16.95***
	C4	.82	17.79***
	C5	.55	11.18***
	C6	.75	16.01***
	C7	.67	14.01***
Information security concern	S1	.76	–[a]
	S2	.66	11.04***
	S3	.50	8.58***
	S4	.65	10.85***
Openness	O1	.75	–[a]
	O2	.76	14.59***
	O3	.66	12.60***
	O4	.75	14.34***
	O5	.72	13.82***
Perceived uncertainty	PU4	.73	–[a]
	PU5	.80	14.26***
	PU6	.73	13.24***
	PU7	.62	11.33***
Trust	T1	.74	–[a]
	T2	.70	11.98***
	T6	.63	11.08***
	T7	.60	10.57***
Perceived rewards	PR3	.57	–[a]
	PR4	.81	9.91***
	PR5	.73	9.81***

Appendix 1 (*continued*)

Construct	**Item**	**Standardized estimates**	**C.R.**
Information-resource sharing intention	I2	.52	–[a]
	I3	.52	7.82***
	I7	.60	8.58***
	I8	.73	9.53***
	I9	.74	9.60***
	I10	.68	9.21***

Note: * = p < .05, ** = p < .01, *** = p < .001.

[a] = values were not calculated because loading was set to 1.0 to fix construct variance.

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