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Influential factors for a secure perception of accounting management with blockchain technology

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ABSTRACT

The scope of blockchain technology, initially associated with the Bitcoin cryptocurrency, is greater due to the multiple applications in various disciplines. Its use in accounting lies mainly in the fact that it reduces the risks and the possibility of fraud, in addition to eliminating human error. This work presents a theoretical model that contributes to the understanding of the process of adoption of ICT innovations by business organizations, from the technological, organizational and environmental contexts. The result of the work provides knowledge for the empirical generalization of the topic of study and offers the academic community a starting point for carrying out future studies that confirm the validity of the results, and the business community a valid alternative of the aspects to be considered taken into account in making decisions derived from secure accounting management with blockchain. Hence, the implementation of blockchain presents challenges, its potential to improve reliability and efficiency in accounting management makes this technology a valuable investment for companies and accounting professionals seeking more secure and transparent financial management.

1. Introduction

The link between business strategy and information technologies (IT) is a key factor to improve the competitiveness of companies, because companies currently compete in markets characterized by dynamism and uncertainty, so that Technology becomes a critical factor to achieve and sustain a competitive advantage over time (Madu, 1989). The large and bureaucratized organizations that were developed before IT have turned out to be inefficient, rigid to change and less competitive than those created under the protection of IT. In this context, the ability to incorporate IT into the corporate strategy will decisively influence the company's results (Kretschmer et al., 2012).

In the business field, information and communication technologies (ICT) represent innovative and disruptive solutions to different ways of executing tasks, carrying out processes and measuring results. Its evolution has completely changed the way organizations conduct business. Hence, the drive in the implementation of new technologies in organizations is determined, fundamentally, by the growth of certain technological sectors (Mbuyisa and Leonard, 2017), such as electronic

commerce or emerging digital technologies, among which big data, artificial intelligence, cloud computing, robotics or blockchain stand out. However, investment in ICT implementation does not guarantee successful completion and sometimes generates low returns, especially in emerging markets (Bhattacharyya and Shah, 2022; Ebad, 2018).

In this work, technological innovation (TI) is considered to be the application whose result is a technological advance to obtain new products or production processes or substantial improvements to existing ones.

Several studies indicate that the adoption of new technologies in organizations represents an expected return on investment of less than 30% (Ali et al., 2022; Minakova and Nosachevsky, 2019). For several decades, the research community has expressed interest in technology acceptance factors in private and organizational contexts. Given the consequences of technology adoption on organizational performance and the cost and revenue structure, the gap between the acceptance and use of technology continues to be one of the main areas of research in the literature on this topic (Ax and Greve, 2017).

During these years, numerous models and theories have been

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introduced in order to understand the acceptance of technology. However, one of its drawbacks refers to the fact that these theories came from different disciplines, which limited their application to certain contexts. The models had different perspectives, reflecting the type of variables in them, such as subjective norm, motivational factors, attitudinal factors related to technological performance, social factors, experience and facilitating conditions (Shrestha et al., 2021). Hence, the selection of any model restricts research results to particular settings and conditions.

For example, the Theory of Planned Behavior and the Theory of Reasoned Action offer a psychological perspective on human behavior by examining variables such as perceived behavioral control, attitude, and subjective norms (Black et al., 2021; Hameed et al., 2012). In contrast, the Diffusion of Innovation Theory focuses on the specific factors of innovation that determine the behavior of users in the adoption of new technologies (Park and Choi, 2019). Consequently, a unified approach is needed to encompass variables that reflect different perspectives and disciplines and increase the applications of the theory to different contexts.

This scenario gives rise to the formulation of the research question: What are the critical factors that influence the process of adoption of blockchain technology related to a secure perception of the accounting management of companies?

Consequently, the main objective of the work is to determine the most influential factors that predict the secure perception of the company's accounting management through blockchain technology. To achieve this, the following specific objectives have been proposed: (1) Carry out a bibliographic review to identify the ideal methodology to analyze the determining factors in the adoption of a technological innovation by a company; (2) Identify the main thematic axes that have been developed and detect those emerging in the research of blockchain technology for secure accounting management; and (3) Conduct a review of the literature to determine the critical factors, according to the framework of the joint TOE model (Technology-Organization-Environment) and the Theory of Diffusion of Innovations (DOI), that influence the adoption of a technological innovation.

The study is structured as follows. Section 2 presents a broad theoretical framework on information technologies and their link with business management, focusing on blockchain technology. In Section 3, a bibliographic review has been carried out to identify the theories that support the adoption of new technologies in business organizations. Section 4 encompasses the critical factors in the secure perception of accounting management through blockchain. Finally, the Section collects the main conclusions.

2. Theoretical framework

2.1. Information technologies in the corporate sphere

The concepts IT and ICT are often confused in their use; However, IT refers to information technologies, while ICT implies information and communication technologies, so the term IT is a broader term and includes ICT (Caird and Lane, 2015; Erstad, 2010).

Thereby, IT is the set of technologies that allow access, production, processing, treatment, storage, transmission and communication of information presented in different codes. The importance of these tools and services lies in the fact that they allow society to become better informed and relate more effectively. Furthermore, IT is characterized by access to information, immediacy, communication, interactivity, innovation, efficiency, development of new activities and personalized experience (He et al., 2021; Kretschmer et al., 2012).

Likewise, in relation to these terms, an Information System (IS) refers to the set of interrelated components that work together to collect, process, store and disseminate information that supports both decision making and coordination, control, analysis and visualization of an organization (Druzhynina et al., 2020). While the Management Information System (MIS) is the IS that collects the internal data of the system

and summarizes them in useful formats, such as management reports, which will later be used to support management activities and decision making (Santos and Mayoral, 2020).

In the corporate context, IS surpasses technology and is used to make decisions, coordinate and control, so that management control has benefited from the breadth of its development, recognizing the importance of its involvement in the company. For all these reasons, IS is part of the organization that captures, processes, stores and distributes information, in addition to helping to improve the control and management of a company, since it has an economic, organizational and competitive impact. In addition to creating a competitive advantage (Guerrero Julio and Uc Rios, 2019; Mbuyisa and Leonard, 2017; Williams et al., 1997).

Currently, technology is a key resource for the company in the growth process, optimization and improvement of production processes, organization, sales and collection management, training, decision-making support system, improvement of communication with stakeholders, cost savings or marketing tool, among others.

In this sense, IT reduces the costs of retrieving and analyzing information, and helps companies reduce management expenses because it is easier for managers to supervise a greater number of workers. On the other hand, IT directs decision-making capacity to the lower levels of the organization, since workers at these levels receive the information they need to make decisions without supervision (Ballantine and Galliers, 2017).

2.2. Technologies in accounting

Nowadays, it is key for accounting professionals to have software experience, since professional knowledge of accounting technology will improve their professional activity. The differential value that IT provides is efficiency (Xie et al., 2020). In addition, technology in accounting facilitates financial principles, the management of accounting data and invoices, paying bills, calculating taxes, the theories that support profits, and speeds up decision making (King and McAulay, 1997).

The financial information provided by Accounting Information Systems (AIS) makes it possible to make investment and financing decisions, manage solvency and liquidity, in addition to evaluating the origins of resources and administration management. (Ballantine and Galliers, 2017).

IT has allowed us to reduce errors, comply with tax laws and reduce time in both the preparation and presentation of accounting reports. To verify and demonstrate that technology contributes to business development is when it becomes a measurable variable, that is, if it allows business management processes to maximize in percentage terms and real figures the profitability of its operation and the minimization of its costs. operational, administrative and productive expenses (Ballantine and Galliers, 2017).

The emergence of IT and technological tools has modified the accounting management processes of companies, forcing them to develop new strategies to adapt to the demands of technology and to achieve better results (Hodge et al., 2004).

2.3. Blockchain applications

In general terms, the application of technologies has redefined inter- and intra-organizational communication, simplifying business processes to guarantee benefits, in addition to increasing productivity, employee well-being and consumer satisfaction. For these reasons, in order to achieve these benefits, companies spend intensively on technologies (Druzhynina et al., 2020).

In the context of blockchain applications, these fundamentally consist of facilitating the movement of money or other financial instruments quickly and economically. Certain platforms use this technology to make the supply chain of the products we consume visible.

However, blockchain has also led to the evolution of numerous

productive sectors. For example, electoral processes also benefit from the application of blockchain technology, because decentralized accounting of the counting and registration of votes is an alternative to compensate for the errors of audit systems in elections (Giraldo et al., 2020). Likewise, some airlines have implemented blockchain in the management of information about flights, and in the implementation of the billing system that verifies the identity of travelers (Rahman et al., 2021).

In the healthcare field, numerous companies use blockchain for the protection and distribution of healthcare data, with the aim of both offering quality in the data provided to insurers and reducing administrative costs (Sharma et al., 2021). On the other hand, in the cybersecurity sector, blockchain is used for identity protection, data protection, infrastructure protection and traceability of information flow (Shin and Bianco, 2020).

2.4. Blockchain technology in corporate accounting management

Blockchain is a data structure that makes it possible to create a digital ledger of data and share it across a network of independent users. In other words, it is a chain of blocks, which contain encoded information of a transaction on the network and, when linked, allow the transfer of data through secure encryption with the use of cryptography.

This technology is composed of: (1) block: a list of transactions recorded in a digital ledger in a certain period; (2) chain: a "hash" that joins one block to another in a mathematical way; and (3) network: it is composed of nodes that contribute to the security of the network, such that each node contains a complete record of all transactions that were recorded on the blockchain.

One of its strengths is the creation of permanent and historical records of transactions, based on the permanence of the network, because, for this to happen, a large part of the network would be required to agree to change the information for this to happen. Consequently, it is considerably difficult to change or delete data once it is recorded on the blockchain. On the other hand, in relation to the security provided by the blockchain, its administration is decentralized, since there is no central authority that manages the flow of information from within.

On the other hand, one of the main problems of blockchain concerns scalability, or its ability to grow without consuming increasing amounts of central processing unit (CPU) capacity and to complete transactions in virtually real time, such as clearing payments through credit cards.

Generally, these blockchains use cryptocurrencies, which consist of digital tokens with market value. These use cryptographic encryption to guarantee ownership, ensure the integrity of transactions and control the creation of additional units. The transparency, security and traceability that they provide to transactions has allowed their integration into organizations.

2.5. Perceived security in corporate accounting management through blockchain technology

AIS involves the collection, storage and processing of financial and accounting data that is used by internal users to inform the organization's stakeholders. In general terms, the AIS provides accurate and timely information to business management about changes in the company's financial position.

Security risks perceived by an organization's stakeholders are fundamentally related to financial, performance, social, psychological and information losses, and are of great concern and can negatively influence adoption.

In the context of corporate technology, the security perceived by internal and external users in the treatment and management of a company's accounting information includes threats such as access or deletion of files, destruction or corruption of the blockchain by computer viruses, or the alteration of the logic of this technology to process data correctly.

Blockchain technology produces a data structure with inherent security qualities, based on principles of cryptography, decentralization and consensus, which guarantee trust in transactions. Although security has greatly reduced fraud, blockchain does not allow data to be easily modified once recorded, and requires rewriting the codes in all blocks, which entails high costs. Because it is difficult to correct an error or make the necessary adjustments.

Cryptography, that is, the method of protecting information and communications through the use of code, is not completely resolved in certain technologies; this is why crypto losses are common due to security deficiencies in parts of the crypto ecosystem. Hence, cryptography in blockchain refers to security, which makes it immutable and reliable; so this technology uses two types of cryptographic algorithms: asymmetric key algorithms and hash functions. The latter provide the functionality of a single view of the blockchain for each participant, the linking of blocks to each other, as well as the integrity of the data stored in each block.

Compatibility, perceived security, performance expectations, innovation, and social influence have a significant positive impact on mobile payment adoption. Furthermore, perceived security has a positive impact on adoption, while perceived privacy risk has a negative impact on perceived security.

3. Adoption of technological innovation

3.1. The adoption of new technologies in the organization

Technology adoption refers to the sociological model that describes the implementation or acceptance of a new product or innovation, according to the demographic and psychological characteristics of the defined adoption groups.

Whenever a company introduces new technology into the work culture, it needs to keep in mind that not all its stakeholders are the same and, specifically, to get the maximum benefit from the technology adopted, its launch approach must be customized to adapt to different types of company employees (Hall et al., 1975; Hord et al., 2013).

Currently, with the speed of technology and innovation it is tempting to implement a new system that could potentially revolutionize the business; however, business management must focus on allowing the adoption of technology to be an evolution and not distort its initial focus. Therefore, the technology adoption process is broken down into phases: (1) pilot programs, (2) initial test implementations, and (3) enterprise-wide implementation.

The company should start small with the people involved, so that a few trusted opinion leaders will lead the pilot group to solve the problems before extending it to other groups with less experience. This means that people get used to the new technology, thus facilitating incorporation prior to its adoption.

3.2. Models for the adoption of technological innovation

The theories and models developed during the last decades provide generic information on the foundations of individuals' attitudes, which makes them applicable to a wide range of research contexts, without being limited to the management of IS.

TI arises when the organization, technology and individuals are aligned, from design strategy and business management. When this process occurs, the technology is integrated into the company culture. The trinomial organization-technology-individuals is situated in the field of knowledge, work or even power relations. Hence, the technology factor includes technological objects, models and techniques, and technology specialists; the organization factor refers to the functional structure, decision schemes, managers and business culture; while the individuals factor refers to the company's personnel not included in the previous factors.

Innovation at the organizational level refers to the process of

developing and implementing new ideas. This process makes it possible for innovation to be directed towards the development or improvement of a product, a service, an organizational structure or a management system (Ali et al., 2022).

On the other hand, innovation at the individual level indicates that knowledge is conceived as a collective learning process, that is, as the sum of individual knowledge. In this way, individual innovations are connected to each other forming technological systems, and these systems, in turn, are interconnected in technological revolutions (Lewis and Seibold, 1993). Table 1 shows the most used models for the analysis of the adoption of a TI.

It is worth noting that in the scientific literature there is no consensus on the theoretical model that best explains the key factors in the process of adopting a TI in the business environment (Palos-Sanchez et al., 2019). Then, in the following section, each of these theoretical models is developed in detail.

3.2.1. Diffusion of Innovations (DOI) Theory

DOI theory, disclosed by the American sociologist, Everett M. Rogers, in 1962, is a model that consists of five stages: knowledge, persuasion, decision, implementation and confirmation. Likewise, the theoretical model points out five factors in the adoption of an innovation: (1) relative advantage: referring to the degree to which the innovation is perceived as superior to its predecessor; (2) observability: degree to which the benefits of this innovation are visible or tangible to the user; (3) compatibility: degree by which the innovation is perceived to be consistent with the current values, past experience and needs of potential users; (4) complexity: perceived level of difficulty in understanding and using the innovation; and (5) trialability: degree and ability to experiment with the innovation on a limited basis (Linton, 1998; Norris and Vaizey, 2018).

On the other hand, the theory hypothesizes a negative relationship between complexity and the adoption of innovations; while considering a positive relationship between the adoption of innovations with relative advantage, compatibility and trialability.

3.2.2. Technological-Organizational-Environmental Model (TOE)

TOE framework, developed by Louis G. Tornatzky and Mitchell Fleischer in 1990, is a useful model for analyzing the adoption and assimilation of a TI at the organizational level, both applied to technical tasks and to those of business administration and those integrated into the core business processes of an organization.

Likewise, TOE framework identifies three contexts (technological, organizational and external environmental), which influence the process of adoption and implementation of a TI of an organization, with its own characteristics inherent to the model.

Hence, the technological context considers aspects of technological development, and a set of internal and external factors to the organization, linked to technology. The organizational context, for its part, considers the scope of the business, management support, organizational culture, the complexity of the management structure in terms of centralization, formalization, verticalization, the quality of human resources, size, and the available resources. While the environmental context assumes as variables the competitive presence of the sector,

Table 1
Main theoretical models for the adoption of TI.

Level	Title	Acronym
Organizational	Theory of Diffusion of Innovations	DOI
	Technological-Organizational-Environmental Framework	TOE
	Resource and Capability Theory	RBT
	Economic Growth Stages Model	EGS
Individual	Technology Acceptance Model	TAM
	Theory of Planned Behaviour	TPB
	Unified Theory of Acceptance and Use of Technology	UTAUT

market scope, sociocultural problems, government support and technological support infrastructure. A notable aspect of TOE framework is its consistency with DOI theory (Hiran and Henten, 2020; Palos-Sanchez et al., 2019).

3.2.3. Resources and capabilities theory (RBT)

RBT provides a management framework to determine the key resources for a company to achieve sustained competitive advantage, as well as to explain and predict the foundations of a company's performance and competitive advantage (Leiblein, 2011).

This theory proposes that strategic resources, that is, those that are valuable, scarce, difficult to imitate, and non-substitutable, best position a company for long-term success. These resources provide the basis for developing stable capabilities over time that can increase the company's performance. These capabilities are necessary to group, manage and exploit resources, providing added value to customers and creating advantages over competitors. For this reason, RBT is considered an influential approach in strategic management (Grant, 1991; O'Cass & Sok, 2012).

3.2.4. Economic Growth Stages Model (EGS)

Until the 1960 s, development approaches assumed that modernization was directly associated with the Western world, which could be reached from the initial stages of underdevelopment. Consequently, the rest of the countries should follow the Western model, with the aim of aspiring to a state marked by capitalism and liberal democracy.

At this point, the American economist, Walt Whitman Rostow, developed in his work *Stages of Economic Growth* (Rostow, 2013), five stages that all countries must go through to achieve development: (1) traditional society, characterized by a subsisting economy with intensive labor and low levels of trade, and a population that does not have a scientific perspective of the world and technology; (2) preconditions for takeoff, where a society begins manufacturing with a more national and international focus; (3) takeoff, referring to the beginning of industrialization; (4) impulse to maturity, because as living standards increase, consequently, the use of technology increases and the national economy grows and diversifies; (5) era of high mass consumption, at this stage, Rostow understood that the economy of a country should be strengthened in a capitalist system, characterized by mass production and consumerism.

3.2.5. Technology Acceptance Model (TAM)

TAM explains the acceptance of IS by individuals and, along these lines, postulates that the acceptance of technology is predicted by the behavioral intention of users, which in turn is determined by the perception of the usefulness of the technology. the technology to perform the task and the perceived ease of its use (Davis, 1989).

This model has been one of the most influential models of technology acceptance, with two main factors influencing an individual's intention to use a new technology: perceived ease of use and perceived usefulness. Despite having received criticism for several reasons, this model represents a useful general framework and is consistent with a series of research on the factors that influence adults' intention to use new technologies (Alshahrani et al., 2023; Hameed et al., 2012).

3.2.6. Theory of Planned Behavior (TPB)

TPB, from the Theory of Reasoned Action (Ajzen, 1985), predicted an individual's intention to engage in a behavior at a specific time and place (Ajzen, 1991). The key component of this model is behavioral intention, establishing that behavioral achievement depends on both motivation (intention) and ability (behavioral control). Therefore, according to the TPB, behaviors are influenced by intentions, determined in turn by three factors or beliefs: attitudes, subjective norms and perceived behavioral control. It is also possible for external factors to directly force or prevent behaviors, regardless of intent, depending on the degree to which the individual actually controls a behavior and the

degree to which perceived behavioral control is an accurate measure of actual behavioral control.

This theory has been successfully applied to predict and explain a wide range of technology-related behaviors and intentions (Buchan, 2005; Chang et al., 2020; Lee and Schmidt, 2014). However, the TPB has a number of limitations, such as: (1) it assumes that the person has acquired the opportunities and resources to succeed in performing the desired behavior, regardless of the intention; (2) it does not consider other variables that influence the intention and motivation of the behavior, such as fear, threat, mood or past experience; (3) although it considers normative influences, it does not take into account environmental or economic factors that may influence a person's intention to perform a behavior; (4) assumes that behavior is the result of a linear decision-making process and does not consider that it can change over time; or (5) does not address the time frame between intention and behavioral action (Gieure et al., 2020; Madden et al., 1992).

3.2.7. Unified Theory of Acceptance and Use of Technology (UTAUT)

UTAUT examines technology acceptance, determined or explained by a series of factors: the effects of performance expectancy, effort expectancy, social influence, and facilitating conditions. Likewise, UTAUT offers greater predictive power compared to the rest of the models that examine technology acceptance (Al-Zoubi and Ali, 2019; Alqahtani et al., 2014).

Furthermore, the theory provides an empirical view of technology acceptance by comparing prominent models of technology acceptance, which offer competing or partial perspectives on the topic. The interactive effect of some constructs with personal and demographic factors demonstrates the complexity of the technology acceptance process, which depends on people's age, gender, and experience (Kumari and Devi, 2022).

3.3. Optimal model for the adoption of technological innovation

The technology adoption life cycle is a sociological model that describes the adoption or acceptance of a new product or innovation, according to the demographic and psychological characteristics of the defined adoption groups. The adoption process over time behaves like a classic normal distribution. This model is often divided into (1) innovators, who are the first to accept it; (2) early adopters; (3) early majority; (4) late majority and (5) laggards, which is the last group of adopters (Li et al., 2022; Liao et al., 2009).

In the reviewed literature, various studies have been found, described in the previous section, related to the main models of technology acceptance in various disciplines in both mandatory and voluntary environments. Table 2 includes a non-exhaustive list of studies that have used the models mentioned above in Table 1.

TOE model has been used successfully in numerous studies (Bhattacharyya and Shah, 2022; Clohessy and Acton, 2019; Fernando et al., 2022; Henderson et al., 2012; Hiran and Henten, 2020; Luu et al., 2019; Nath et al., 2022; Nguyen et al., 2022; Oliveira and Martins, 2010) on the determining factors in the adoption of a TI. Likewise, this study includes two practical dimensions as a unified framework: TOE model and DOI theory. In this way, this work, by focusing on the corporate field, that is, at the organizational level, and with the purpose of analyzing the concepts and literature, will apply the methodology integrated by TOE model and DOI theory, with the purpose of delve into the technological factors that relate to the willingness to adopt blockchain technology in the company. This decision is mainly due to the limitation that TOE framework poses in the analysis of user perception factors.

From the bibliographic review, the main factors that studies related to the adoption of new technologies have pointed out are extracted, using a method that combines TOE framework with DOI theory, for a better understanding of IT adoption decisions (Hiran and Henten, 2020).

Table 2

Literature review of the main models for the adoption of a TI.

Reference	Article title	Applied model
(Madu, 1989)	Transferring technology to developing countries—Critical factors for success	EGS
(Oliveira and Martins, 2010)	Understanding e-business adoption across industries in European countries	TOE
(Henderson et al., 2012)	The determinants of inter-organizational and internal in-house adoption of XBRL: A structural equation model	TOE
(Claudy et al., 2015)	Consumer resistance to innovation: a behavioral reasoning perspective	DOI
(Ax and Greve, 2017)	Adoption of management accounting innovations: Organizational culture compatibility and perceived outcomes	DOI
(Al-Zoubi and Ali, 2019)	E-mobile acceptance using unified theory of acceptance and use of technology (UTAUT): Research on universities in Jordan	UTAUT
(Clohessy and Acton, 2019)	Investigating the influence of organizational factors on blockchain adoption	TOE
(Kamble et al., 2019)	Understanding the Blockchain technology adoption in supply chains-Indian context	TPB
(Luu et al., 2019)	Factors affecting the adoption of social media in business: Evidence from individual and household retailers in Vietnam	TAM - TOE
(Hiran and Henten, 2020)	An integrated TOE-DI framework for cloud computing adoption in the higher education sector: case study of Sub-Saharan Africa, Ethiopia	TOE - DOI
(Bhattacharyya and Shah, 2022)	Emerging technologies in Indian mining industry: an exploratory empirical investigation regarding the adoption challenges	TOE
(Dionysis et al., 2022)	Examining the influential factors of consumer purchase intentions for blockchain traceable coffee using the theory of planned behaviour	TPB
(Fernando et al., 2022)	Blockchain technology adoption for carbon trading and energy efficiency: ISO manufacturing firms in Malaysia	TOE - DOI
(Nath et al., 2022)	Factors affecting blockchain adoption in apparel supply chains: does sustainability-oriented supplier development play a moderating role?	TOE - DOI
(Nguyen et al., 2022)	An Extended Technology-Organization-Environment (TOE) Framework for Online Retailing Utilization in Digital Transformation: Empirical Evidence from Vietnam	TOE
(Hashimy et al., 2023)	Determinants of blockchain adoption as decentralized business model by Spanish firms: an innovation theory perspective	TAM

4. Critical factors in the secure perception of accounting management through blockchain

Among the barriers to the adoption of blockchain technology in the company, privacy and security stand out; resistance to computer attacks that could expose, alter or eliminate valuable assets for the organization; data authentication; access control; and the protection of customer data. Therefore, TOE framework will be used together with DOI theory as a basis for extracting the factors that are the subject of this study.

Next, based on the bibliographic review carried out, the contexts of this unified framework are analyzed, in order to relate the factors that have a greater influence on the decision to adopt a new technology, such as blockchain.

4.1. Technological context

The technological context refers to the technological infrastructure available in the company that adopts the innovative technology and contains the structural aspects and specialized human resources.

Therefore, it represents the technical issues that will influence the decision on blockchain adoption in an organization. This context includes the critical factors, according to the unified TOE-DOI framework and the bibliographic review carried out (see Table 3).

T1. Relative advantage: It is defined as the degree to which an innovation provides more benefits than its predecessor (Lundblad, 2003), and is considered one of the key characteristics of new technologies that influence the adoption behavior of a natural or legal person. DOI theory researchers suggest that new technologies with a clear advantage in increased efficiency, economic benefits, convenience, and satisfaction are more easily adopted and implemented (Mahakittikun et al., 2021; Norris and Vaizey, 2018). In this sense, relative advantage can be interpreted as the potential utility value of using a new technology (Linton, 1998).

T2. Compatibility: The degree to which an innovation is perceived as consistent with current values, with the needs of potential adopters and their previous experiences, is considered a key factor in the adoption of a TI by companies. (Linton, 1998; Lundblad, 2003; Park and Choi, 2019).

T3. Observability and visibility: In IT, observability refers to software tools and practices for aggregating, correlating, and analyzing a constant stream of performance data from a distributed application along with the hardware and network on which it runs. Its purpose is to monitor, troubleshoot, and debug the application and network to meet customer experience expectations and other business requirements. Technology visibility refers to the degree to which a technology is visible to stakeholders through communication and dissemination. Thereby, the visibility and metrics it provides limit problem resolution, while observability provides rich contextual data for deeper insights and understanding based on raw data collected from the network or system (Aslam et al., 2021; Liu et al., 2021).

T4. Technological complexity: indicates the technological level necessary for the implementation of innovation in an organization, considering its characteristics and benefits, that is, it refers, in general terms, to the level of perceived difficulty in understanding and using the technology (Mahakittikun et al., 2021; Park and Choi, 2019; Sonnenwald et al., 2001).

T5. Perceived cost: It refers to the costs that organizations incur for the adoption of TI. The perceived cost is a key factor due to the negative effect it has on the adoption of blockchain by organizations (Kulkarni and Patil, 2020; Wang et al., 2022).

T6. Perceived technological security: Blockchain technology has an impact on the security and privacy of data, the organization and the IS. Blockchain manages a high transaction log and additional data hidden in multiple layers of data security, which is why these systems are generally considered safe and secure (Gürkaynak et al., 2018; Pieters et al., 2022). The degree to which a party involved believes that the use of a certain technology will be secure refers to privacy and the perceived risk of the transaction, especially when the party does not have experience with the technology in question. The technological security perceived by the parties involved can constitute a factor that can

Table 3
Technological Context.

Code	Factor or dimension	References
T1	Relative advantage	(Linton, 1998; Lundblad, 2003; Mahakittikun et al., 2021; Norris and Vaizey, 2018)
T2	Compatibility	(Linton, 1998; Lundblad, 2003; Park and Choi, 2019)
T3	Observability or Visibility	(Aslam et al., 2021; Liu et al., 2021)
T4	Technological complexity	(Mahakittikun et al., 2021; Park and Choi, 2019; Sonnenwald et al., 2001)
T5	Perceived cost	(Kulkarni and Patil, 2020; Wang et al., 2022)
T6	Perceived technological security	(Gürkaynak et al., 2018; Hernández Moreno, 2017; Pieters et al., 2022)

influence the decision to adopt it (Hernández Moreno, 2017).

4.2. Organizational context

The organizational context represents the availability in the company of resources that are considered essential for the adoption of TI in the company, such as financial or human resources, among others.

The literature includes research on the influence of various elements of the organizational context for the adoption of IT, related to compatibility, costs, communicability, company size, global reach of the company, employee knowledge about TI, supply chain pressure, resource shortages or lack of vision. In general, the characteristics of a company that, in combination with others, will affect the adoption of IT in the organization.

The analysis of this context must consider the perception of the competitive advantage of the technology to be adopted, technical compatibility, complexity and the learning curve inherent to technology adoption. Table 4 shows the factors identified in relation to the organizational context of the unified TOE-DOI framework.

O1. Manager characteristics: The manager must lead the way in the implementation of innovative ideas that transform the way the company is managed. From people to product, they analyze their processes, research and gather ideas, before selecting, implementing and measuring the best ones (Unsworth et al., 2012). Likewise, gender, age, training, experience, social influence and leadership attitude influence IT adoption (Zhu et al., 2006).

O2. Perceived trustworthiness of blockchain: This factor is directly related to the organization's confidence in new technologies, in relation to the benefits it brings to it (Garg et al., 2021), since the uncertainty it generates could reduce them. In a blockchain network system, the strong consistency model means that all nodes have the same ledger at the same time, and during the time that the distributed ledger is updated with new data, any subsequent read/write requests will have to wait until we commit this update (Karamchandani et al., 2021).

O3. Senior management support: Technology has enabled blockchain innovation to be technically feasible and economically viable. However, the support of senior management is key in shaping a company's strategies and decisions; For this reason, its leadership must position the activities under its responsibility, to demonstrate this authority and commitment to the accounting management system (Avgouleas and Kiayias, 2019). Therefore, senior management must safeguard the results obtained and verify that the stated requirements have been achieved and what improvements the management system has after the adoption of blockchain technology (Druzhynina et al., 2020).

O4. Size of the company: Generally speaking, larger companies can better manage their adoption of technologies than smaller companies

Table 4
Organizational Context.

Code	Factor or dimension	References
O1	Manager characteristics	(Unsworth et al., 2012; Zhu et al., 2006)
O2	Perceived trustworthiness of blockchain	(Garg et al., 2021; Karamchandani et al., 2021)
O3	Senior management support	(Avgouleas and Kiayias, 2019; Druzhynina et al., 2020)
O4	Size of the company	(Clohessy and Acton, 2019; Hojnik and Ruzzier, 2016)
O5	Technological organizational preparation	(Clohessy and Acton, 2019; Iacovou et al., 1995; Zhu et al., 2006)
O6	Competitive pressure	(Kretschmer et al., 2012; Satar and Alarifi, 2022)
O7	Financial resources	(Brophy and Shulman, 1993; Iacovou et al., 1995; Omrani et al., 2022)
O8	Partner training	(Brogaard, 2017; Zablah et al., 2005)
O9	Global reach	(Ali et al., 2022; Zagurskiy and Titova, 2019; Zhu et al., 2006)

because they have the capabilities to achieve economies of scale, provide a broad resource base, have more bargaining power, and manage risks (Hojnik and Ruzzier, 2016). For these reasons, company size is considered an important driver of the adoption of TI and, consequently, is considered an organizational factor that influences its readiness to implement IT (Clohessy and Acton, 2019).

O5. Technological organizational preparation: This factor indicates the availability of the organizational resources necessary for the adoption of technology by a company (Iacovou et al., 1995). These resources must include both physical resources, or infrastructure, and specialized humans, that is, those who have the knowledge and capabilities to implement TI (Clohessy and Acton, 2019; Zhu et al., 2006).

O6. Competitive pressure: Competition is key to innovation. In open and competitive markets, companies are driven to adopt more efficient production processes and offer innovative products and services to customers (Satar and Alarifi, 2022). In the case of two companies with a similar technological level, rivalry will induce investment in innovation to achieve leadership. Therefore, competition encourages companies that compete closely to innovate (Kretschmer et al., 2012).

O7. Financial resources: For businesses, adopting and implementing new technologies can be difficult and expensive. In general, the company's readiness to adopt technology is negatively affected by costs (Iacovou et al., 1995; Omrani et al., 2022). The cost of setting up equipment, installing hardware and software, and training employees are considered barriers to adoption by certain companies (Brophy and Shulman, 1993).

O8. Partner training: Nowadays, business leaders are tasked with measuring and improving partner and employee productivity while driving the experience of TI, while ensuring workers collaborate securely. However, not all organizations have the resources or capabilities available to encourage the adoption and training of new solutions (Zablah et al., 2005). Organizations require investment in new technologies to support work and TI environments. Hence, the key to a successful technological change is adoption by the user, who is more likely to adopt the new technology if they understand how it works and how it makes their work easier (Brogaard, 2017).

O9. Global reach: Technology has brought about changes in the way we produce, manage organizations or the way we connect (Zagurskiy and Titova, 2019); it has also allowed the development of new products and ideas, such as blockchain, associated with the reduction of costs and risks of innovation at a global level (Ali et al., 2022). Likewise, the horizontal expansion of a company's operations, that is, the scope of the company, is related to the increase in external coordination costs, inventory holding costs, and search costs in a company (Zhu et al., 2006).

4.3. Environmental context

The literature has described various aspects of the environmental context that influence the adoption and implementation of a TI within companies. Generally, this context involves the impact of the external environment including competitors, customers, and government policies and regulations. Consequently, there has been research on the influence of industry pressure which collectively includes the influence of socio-commercial, competitive pressure and government policies. Alternatively, the competitive landscape puts pressure on companies to adopt similar technologies to maintain business relationships (see Table 5).

E1. Competitive pressure: In this situation the company faces pressure from its competitors, and depends on the supply and demand of a certain product or a particular industry (Lu et al., 2021). The context of competitive pressure will encourage companies to innovate, such as developing new products/services in the market, improving production processes, using new technologies or applications in business processes (Laforet, 2011). Competition is key to innovation, as companies are driven to adopt more efficient production processes and offer new and improved products/services to customers (Kretschmer et al., 2012;

Table 5

Environmental Context.

Code	Factor or dimension	References
E1	Competitive pressure	(Kretschmer et al., 2012; Laforet, 2011; Lu et al., 2021; Wong et al., 2020)
E2	Business partner pressure	(Abed, 2020; Fosso Wamba et al., 2020)
E3	Customer pressure	(Dholakia and Kshetri, 2004; Ronaghi, 2022)
E4	Government pressure or incentives	(Jena, 2022; Lu et al., 2021; Mariappan, 2019)
E5	Supplier Assistance	(Clohessy and Acton, 2019; Daylami et al., 2005)
E6	Regulatory environment	(Park and Choi, 2019; Zhu et al., 2006)
E7	External task environment	(Minakova and Nosachevsky, 2019; Polas et al., 2022)

Wong et al., 2020).

E2. Business partner pressure: The benefits of technology expansion depend on both diffusion channels and absorptive capacity, that is, the ability to assimilate and apply new information, which encompasses a range of policy agendas that go beyond typical policy issues. commercial (Abed, 2020). Multilateral trade liberalization, including tariff and non-tariff liberalization, as well as intellectual property protection, help ensure the link between trade and innovation. For this reason, relationships with business partners have a strong and positive association with the adoption of TI, which means that organizations will usually implement it synchronously (Fosso Wamba et al., 2020).

E3. Customer pressure: Customers perceive new technology, such as blockchain, in terms of perceived security, perceived cost, perceived risk, and trust (Ronaghi, 2022), in order to understand in depth how a new IS can influence its effective use (Dholakia and Kshetri, 2004).

E4. Government pressure or incentives: Government support is found as a relevant environmental characteristic that impacts the adoption of IT by companies (Jena, 2022; Yang et al., 2018).

E5. Supplier Assistance: Generally speaking, companies tend to postpone the adoption of IT innovation due, fundamentally, to the lack of experience, technical skills and knowledge about a specific TI (Daylami et al., 2005). These companies will require the services of IS providers, which facilitate the adoption (Clohessy and Acton, 2019).

E6. Regulatory environment: Legislative support, opening legislation for blockchain utilization, and legal protection for businesses are examples of government regulatory assistance (Park and Choi, 2019; Zhu et al., 2006). In the present study, government support represents both government resource and regulatory support.

E7. External task environment: From the potential of blockchain technology to optimize processes and add value to services, and the perceived pressure of the external environment, managers must be aware that the success of the implementation of TI will be in the medium term (Minakova and Nosachevsky, 2019). Furthermore, profitable results should not be expected directly after implementation and this time frame should be considered when deciding to use the technology strategically (Polas et al., 2022).

5. Conclusions

Under the current economic conditions of an organization, it is difficult to operate independently and in isolation, since its economic activities are articulated in a network of multiple and varied economic, administrative and social agents, forming part of the supply chain.

Companies are aware of the need and importance of investing in ICT, even more so if these investments result in tangible benefits at a strategic, operational and opportunity level. Despite this situation, there are barriers that inhibit the ICT adoption process, sometimes related to the perception of risks linked to insecurity in different business contexts.

This area of study has led to the development of this topic with research that aims, from various perspectives, to understand the aspects that can influence ICT adoption decisions by companies. These works

have been based on widely known theories such as the DOI theory, the theory of resources and capabilities, the economic growth stages model, the TOE model or the TAM model, among others, from which it is possible to identify, on the one hand, the evolutionary process that follows the adoption of ICT innovations in organizations, and on the other hand, the existence of aspects that may affect said process. The results of these studies have influenced the contribution of elements to understanding the adoption of new technologies by companies.

However, there is no comprehensive and specific model that allows analyzing the aspects that influence the process of adopting ICT innovations, so companies may encounter difficulties when determining which factors are linked to the security of accounting management related to the use of new technology.

In this way, the adoption of blockchain technology for a secure perception of accounting management in a company represents a revolution in the way financial transactions are managed and reported. The immutability of records in a blockchain, which ensures that transactions once recorded cannot be altered or deleted, establishes a solid foundation of reliability in financial information. This significantly reduces the risk of accounting manipulation or fraud, and simplifies the audit task by providing an unalterable history of all transactions.

The full transparency offered by blockchain allows all interested parties to access accounting records securely, improving trust and data integrity. The elimination of intermediaries and the decentralization of consensus ensure that there is no single point of control or vulnerability in the process, further decreasing the risk of accounting errors or fraud. The advanced cryptographic security behind blockchain technology protects financial data with an unprecedented level of security, making any attempt at unauthorized access or alteration of the information difficult.

One of the most notable benefits of blockchain adoption in accounting management is the improved efficiency in asset management. The ability to track asset ownership and history in real time prevents disputes and dramatically reduces the risk of fraud related to asset ownership. Additionally, this technology has the potential to simplify auditing and regulatory compliance by providing a transparent, high-integrity record of all financial transactions. At the same time, the automation of accounting processes driven by blockchain can lead to significant savings in operational costs, due to the reduction of the need for human resources in reconciliation and verification tasks.

Notwithstanding the above, it is important to recognize that the adoption of blockchain technology in accounting management is not a simple task. As organizations look to implement this innovative technology, they face critical challenges and considerations. Blockchain is still in its early stages of adoption, which means it must deal with scalability and interoperability issues as it evolves. Furthermore, in data privacy management, records on blockchain are public and permanent. Companies must find ways to comply with data privacy regulations and protect sensitive information.

Training and education of accounting professionals is critical to ensuring successful implementation of blockchain technology. Understanding how blockchain works and how existing accounting processes can be integrated effectively is essential to making the most of this innovation. Organizations must also consider how to manage the transition from traditional accounting systems to blockchain-based solutions, which can be a complex process.

Although blockchain implementation presents challenges, its potential to improve reliability and efficiency in accounting management makes this technology a valuable investment for companies and accounting professionals seeking more secure and transparent financial management. Ultimately, the adoption of blockchain in accounting management not only revolutionizes the way finances are handled, but also lays the foundation for a stronger and more reliable future in the world of financial transactions.

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Alfonso Infante-Moro: Conceptualization, Data curation, Formal analysis, Funding acquisition, Investigation, Methodology, Project administration, Resources, Software, Supervision, Validation, Visualization, Writing – original draft, Writing – review & editing. **EMILIO ABAD-SEGURA:** Conceptualization, Data curation, Formal analysis, Funding acquisition, Investigation, Methodology, Project administration, Resources, Software, Supervision, Validation, Visualization, Writing – original draft, Writing – review & editing. **Eloy López-Meneses:** Conceptualization, Funding acquisition, Investigation, Methodology. **Mariana-Daniela González-Zamar:** Conceptualization, Formal analysis, Investigation, Methodology, Project administration, Resources, Software, Supervision, Validation, Visualization, Writing – original draft, Writing – review & editing.

Declaration of Competing Interest

The authors declare no conflict of interest.

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