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Application of Blockchain in e-commerce Markets

The impact of Blockchain on e-commerce and consumer trust

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Master Thesis

presented as partial requirement for obtaining a Master's Degree in Data-Driven Marketing

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APPLICATION OF BLOCKCHAIN IN E-COMMERCE MARKETS

por

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Master Thesis presented as partial requirement for obtaining the Master's degree in Data-Driven Marketing, with a specialization in Digital Analytics

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DECLARATION OF ORIGINALITY

I declare that the work described in this document is my own and not from someone else. All the assistance I have received from other people is duly acknowledged and all the sources (published or not published) are referenced.

This work has not been previously evaluated or submitted to NOVA Information Management School or elsewhere.

Filipe Miguel Feiteira Almas

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Acknowledgments

With the completion of this project, I have successfully concluded my master's studies at Nova Information Management School. As this exciting chapter of my life comes to an end, a new one is set to begin. I would like to thank my family from the bottom of my heart for all the support they have given me throughout my academic career, without them this achievement would not have been possible. Also, I want to thank my friends for their constant motivation and encouragement, which played a crucial role in helping me complete this dissertation. Finally, I extend my gratitude to my professors, Paulo Rita and Ian Scott, for their invaluable guidance and support throughout this journey.

ABSTRACT

The main aim of this work is to explore whether blockchain technology has the potential to increase consumer confidence, and if so, how. Some key constructs such as privacy, transparency, and cost-saving were studied to try to understand whether they affect consumer trust. A literature review was carried out followed by an empirical analysis using the SmartPLS 4 programme. In order to carry out the analysis, data was collected through a questionnaire aimed at all online shoppers, obtaining a total of 166 responses. The results revealed that transparency plays a significant role in increasing consumer confidence and the perception of security, while cost-saving has a significant impact on consumers' perceived value. Overall, it was possible to conclude that the structural model highlights that these mechanisms contribute to increasing consumer confidence, thus increasing the value proposition of blockchain-enabled platforms on e-commerce. The study provides actionable insights for e-commerce platforms, emphasizing the importance of transparency, cost-saving, and privacy strategies to cultivate trust and optimize user experiences.

KEYWORDS

E-commerce; Blockchain; Consumer Trust; Transparency; Privacy; Cost-Saving

Objetivos do Desenvolvimento Sustentável (ODS):

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LIST OF ABBREVIATIONS AND ACRONYMS

AVE	Average Variance Extracted
B2B	Business to Business
B2C	Business to Consumers
CA	Cronbach's Alpha
CR	Composite Reliability
CS	Cost-Saving
HTMT	Heterotrait-Monotrait
IT	Information Technology
M	Mean
P	Privacy
PLS	Partial Least Squares
PS	Perceived Security
PV	Perceived Value
R^2	R-squared
SD	Standard Deviation
SEM	Structural Equation Modelling
SRMR	Standardized Root Mean Square
TSP	Transparency
TRUST	Consumer Trust
VIF	Variance Inflation Factor

1. INTRODUCTION

The emergence of e-commerce led to a significant change in the retail sector. This period has brought with it extremely significant changes in the way consumers acquire their goods and services, as it has become much easier, quicker and more convenient to buy and sell products online (Singh et al., 2024). However, despite all this evolution, many researchers emphasize that consumer trust in e-commerce has been one of the main elements lacking in the platforms, which is seen as a significant barrier to the adoption of e-commerce (Qalati et al., 2021). Consumer trust in the online sphere is fundamental to the success of digital distribution channels such as e-commerce sites. Given that interactions between brands and customers take place indirectly (there is no physical contact), there are certain security and risk issues that can affect consumer trust (Zulauf et al., 2021).

Regarding next-generation technologies, blockchain has been gaining increasing attention from both researchers and companies. Since this technology is known for its decentralization, immutability, and cryptographic security, it offers a compelling opportunity to reshape the core principles of e-commerce (Nofer et al., 2017). By enabling transparent and tamper-proof transaction records, blockchain introduces a new framework for ensuring trust in the digital marketplace (Nofer et al., 2017).

Consumers still have some doubts about adopting this technology, largely since there are several concerns and challenges in the e-commerce sector (Felin & Lakhani, 2018). These challenges include issues such as fraud, opaque pricing, lack of transparency, limited contact between buyers and sellers, and abuse of data privacy (Van Heel et al., 2014)

However, despite the growing body of research on blockchain's technical advantages, the relationship between these features and consumer trust remains underexplored. While the technical attributes of blockchain, such as decentralization, data immutability and traceability have been examined (Esfahbodi et al., 2022), few studies have directly addressed how these features translate into consumer trust in online transactions. Trust is a vital component of consumer behavior in the digital marketplace, and the absence of research on this topic represents a significant gap in the literature (Esfahbodi et al., 2022) . So, this study aims to fill this gap by exploring the research question, “Does blockchain enhance consumer trust in e-commerce, and if so, through what mechanisms?”

2. LITERATURE REVIEW

2.1. THE E-COMMERCE INDUSTRY

Within the overall context of the digital age, electronic commerce, or e-commerce, has become a disruptive force that is changing the way that businesses operate and how customers engage with each other in a commercial setting (Rahman & Dekkati, 2022; Rita & Ramos, 2022). Raji et al., (2024) identifies e-commerce as one of the main key areas of digital transformation, that is, the online exchange of services and goods. More than just being convenient, it has the importance of providing access to a global marketplace, which integrates customers and businesses across the world without requiring regional constraint. The expansion of e-commerce has created new opportunities for smaller businesses to compete with larger entrepreneurs, levelling the playing field by allowing both to access a global market without the need to have a physical shop (Mahesh et al., 2022).

Initially, online shoppers were motivated and attracted by the convenience of being able to do their shopping from home, but with the development of e-commerce, expectations have expanded to include personalized and smoother experiences (Rosário & Raimundo, 2021). Thanks to smartphones, tablets, and laptops, modern consumers may now shop and make purchases anywhere, at any time (Nodirovna, 2024). With all this evolution retailers need to adjust to this changing environment as e-commerce develops quickly to remain competitive. E-commerce strategies are being adopted by both digitally native companies and traditional brick-and-mortar stores to increase revenue, draw in new clients, and enhance existing ones (Nodirovna, 2024).

According to Nodirovna (2024), the COVID-19 pandemic, shifting demographics, and increased computer knowledge have all contributed to the recent upsurge in the online shopping trend. Due to the restrictive measures imposed by governments worldwide in response to the COVID-19 pandemic that began at the end of 2019, there was a significant increase in consumer demand for online applications. Additionally, businesses outside the food sector could only continue their operations through e-commerce, leading to a surge in e-commerce retail sales that exceeded expectations (Aydogan & Aydemir, 2022). As per Statista[1], the pandemic caused a surge in global retail e-commerce volume from $1.3 trillion in 2014 to around $4.9 trillion in 2021. This amount is predicted to rise from 2021 levels by more than 50% by 2025, to over $7.4 trillion.

[1] https://www.statista.com/statistics/379046/worldwide-retail-e-commerce-sales/

2.2. BLOCKCHAIN TECHNOLOGY

This revolutionary idea first surfaced in 2008 with the release of Bitcoin by the anonymous figure Satoshi Nakamoto, which is frequently linked to the birth of blockchain technology (Nakamoto, 2008). It also marked the beginning of the use of cryptocurrencies in financial settings, especially digital payment networks (Tripathi et al., 2023).

Blockchain is essentially a distributed and decentralized ledger made up of blocks. These blocks provide safe, dependable, and real-time transactions by enclosing data chunks with extreme care (Chang et al., 2022). The immutability of the blocks is a fundamental component of this technique (Faria, 2019). A piece of information cannot be changed or tampered with once it is uploaded to the blockchain (Wasiq et al., 2023). A block on the blockchain is a storehouse for encrypted transaction data, which includes timestamps, location, financial transactions, the identities of the parties involved, and even multimedia (text, image, and audio). Every transaction in a block has an identical timestamp, and every block has a unique fingerprint called a hash (Risius & Spohrer, 2017). A unique identification for the block and all its contents is provided by this hash. Crucially, any change made to a block modifies its hash, strengthening the block's security with a cryptographic signature that is resistant to manipulation or unwanted access (Peres et al., 2023). The way the chain is constructed, every new block is connected to the one before it to form a continuous sequence in which the last entry in one block becomes the first entry in the following.

Blockchain transactions take place on a distributed worldwide network of peer-to-peer computers called nodes (Lopes et al., 2021). Every node maintains a copy of the blockchain and is essential to maintaining the security and functionality of the network (Peres et al., 2023). When a node tries to add a new block to the chain that already exists, all the other nodes in the network work together to confirm that the block is still intact. Each node adds the block to its own blockchain following this validation procedure. It is noteworthy that a transaction becomes final, and a block is formed only when all nodes in the network come to a consensus (Zheng et al., 2018). Any changes made to a block cause its hash to change, which disrupts the chain. The whole network notices this change very quickly. As a result, the historical information included in a block is fixed and cannot be altered in the past (Risius & Spohrer, 2017).

Users in the blockchain operate using pseudonyms or hidden identities. Instead, then using traditional usernames and passwords, transactions are associated with addresses created from user-held private

keys. This method allows users to remain anonymous while yet allowing protocol-level identity validations (Hansen et al., 2010).

2.3. DATA PRIVACY

According to Chang et al., (2023) the definition of privacy has to do with the fact that individuals have the right to be able to protect their personal information so that they can decide and control what data can be collected by channels. One of the major obstacles to the development of new media is the fact that there are privacy concerns regarding the processing of customers' personal information on the internet (Zhang et al., 2022) which is a key factor in online purchase intentions (Agag & Eid, 2019).

When making any kind of online payment, many users, consciously or not, end up revealing their personal information, and data such as their demographic information or even their telephone numbers can be compromised (Dinev et al., 2013). This leads many users to have concerns about the service provider, as they fear that it may collect their information and use it in a malicious way, thus increasing the risk to users' privacy (Gao et al., 2015) This remains one of the biggest problems in the eyes of consumers when making online payments (Martin & Shilton, 2016). According to Hoffman et al., (1999) privacy is one of the most important factors in creating consumer value, because in the eyes of the consumer, the greater the level of protection of their privacy, the less fear they will have of providing information about their personal data (Lwin & Williams, 2003), which will perhaps also increase their perceived value.

H1a: Privacy has a positive effect on the perceived value of online purchases.

A big privacy concern came to the attention of consumers in 2010 when there was a security breach of users' personal information in the Facebook database (Agag & Colmekcioglu, 2020). There are a number of ways to increase user data protection levels, with companies handling customer data clearly and openly, obtaining explicit consent from users for the use of this data and clearly communicating how this information will be used (Hossain et al., 2020), thus helping to strengthen user security and privacy protection, removing some privacy concerns and reassuring users that their data is being used securely and in accordance with regulations (M. Zhang et al., 2019).

Privacy policies play an important role in informing users of how their data is being collected, protected and managed, as well as the security measures that companies implement to store all this information. By demonstrating all these practices and information, they end up nurturing a positive perception

among users of the effectiveness with which the platforms deal with privacy measures, which perhaps increases consumer trust in the platform (Nikkhah & Sabherwal, 2017).

Although there is a connection between privacy and security, each of these variables has specific characteristics and functions. Privacy protection involves following legal rules and best practices to ensure that users' personal data is managed in a safe and transparent manner, while security involves implementing protective measures to ensure that privacy rules are followed (Flavián & Guinalíu, 2006). For example, a company may promise that consumers data will not be shared with third parties without their consent, however, there is a risk that hackers will be able to access this same information and disclose it to malicious individuals, thus jeopardizing users' privacy (Flavián & Guinalíu, 2006).

Privacy and security concerns, while distinct and addressing different aspects of data protection, are closely connected and influence each other (Smith et al., 2011), because both are crucial for customers when engaging in online transactions, as they contribute to the overall trustworthiness of a platform (Pavlou et al., 2007). Bansal & Zahedi, (2014) also state that, when there is sensitive information that can worry the users, they are not only interested in whether their data can be protected from external attacks, but also whether their data is secure in the sense of privacy. For example, views on online security can vary depending on privacy issues and perceptions of security can influence how people consider the protection of personal information. In this way, the two concepts don't operate in isolation, but rather in an interconnected way, with one having an impact on the other (Riquelme & Román, 2014).

Chellappa, (2003) found evidence that in the context of e-commerce, user privacy perceptions positively influence their security perceptions but also the antecedents of privacy and security affect each other, identifying the need to further investigate the interaction between these two equally important constructs in privacy and security literature (Bonsón Ponte et al., 2015).

H1b: Privacy has a positive effect on the perceived security of online purchases.

Several studies have already confirmed that blockchain's unique characteristics can minimize security risks while protecting consumer privacy (Sadeghib et al., 2022). This is possible because blockchain can create pseudonymous users, meaning that users are not directly identified by their personal information, but rather by an alternative identifier, which makes it difficult to directly trace their identity in order to solve certain privacy and security problems (Bhushan et al., 2021).

2.4. COST SAVING

One of the most important benefits that users recognize when buying online is the possibility of saving money compared to physical shops (Khatibi et al., 2006). Consumers who are more price-sensitive are more motivated to shop online when they realize that the prices are more advantageous compared to other price channels (Koyuncu & Bhattacharya, 2004).

Cost savings are interpreted as a reduction in the price of a given product when compared to the alternatives available in other purchasing channels, such as physical stores (Kim, 2020). This concept is particularly attractive to consumers who shop online since, according to research (Reibstein, 2002), the prices of products sold online are generally lower than those found in traditional physical shops. This is due to several factors, such as the reduction in operating costs that online businesses face, compared to physical shops that must cover expenses such as rent and maintenance of their premises (Reibstein, 2002).

Consumers carry out more shopping online due to the cost-saving benefits and the ability to adjust purchases according to their needs. In addition, consumers have begun to realize a significant advantage in buying online, as the process is faster, more accurate and often cost-effective (Purba & Setiyaningrum, 2022). E-commerce also has the potential to reduce certain costs associated with the processing of information needed to manage business processes, as e-commerce offers companies the power of automation and digitalization, thus enabling them to save time and financial resources by having smoother operations to process all the data and information needed to manage a company (Purba & Setiyaningrum, 2022).

Instead of manual, time-consuming processes that involve more risk of human error, such as manual payment processing, companies can use automated systems to make processes faster and more efficient. By automating tasks such as approving payments, companies can not only reduce the time needed to complete transactions, but also minimize errors that could increase costs, both financial and operational (Purba & Setiyaningrum, 2022).

According to Wei et al., (2018) cost savings are one of the main factors that motivate consumers to buy online, as cheaper product prices can encourage consumers to switch their purchases from physical shops to online shops, generating a perception of saving money. In other words, one of the

main attractions for online shopping is the idea that you can save money compared to physical shops, leading consumers to prefer online commerce to feel that they are saving money (Wei et al., 2018).

Currently, e-commerce search engines deal with millions of customers queries every day, which means that an efficient matching mechanism is needed to reduce users' search costs (Liu et al., 2017). This means that to find products or services quickly and without complications, e-commerce platforms need systems that organize and match customer searches effectively, preventing them from wasting time or having difficulty finding what they are looking for (Liu et al., 2017).

Thanks to its transparency features, blockchain technology can reduce the cost of searching for and obtaining information, mainly because blockchain allows all information to be visible and accessible in a transparent register, people or companies spend less time and resources searching for data. In addition, the cost of searching is also reduced by eliminating dependence on third-party institutions and (Catalini & Gans, 2020).

Blockchain technology can also reduce transaction costs in e-commerce (Ullah et al., 2022) . Transaction costs, such as protection costs (e.g. data encryption) and distribution costs (e.g. electronic logistics services), can be reduced through the adoption of innovative and disruptive technologies (Liang et al., 2009).

According to Kim, (2020), he carried out a study to explore the motivational factors of Korean consumers in the online market and concluded that the fact that consumers were able to save money on their purchases had a significant and positive impact on their purchase intention. In addition, consumers not only realized the benefits of saving money, but also of saving time, and these factors influenced their perception of value.

H2a: Cost savings have a positive effect on the perceived value of online purchases.

2.5. TRANSPARENCY

Supply chain transparency can be defined as the level of clarity and precision at which all participants in the same chain have access to important information about products, processes and financial flows (Beulens et al., 2005). This same transparency must be achieved without any loss of information, interference, delays or distortions in the data shared. In other words, transparency ensures that all

those involved have access to correct and flawless information, enabling more efficient and reliable management (Trienekens et al., 2012).

Social chain transparency indicates the quality, accessibility, accuracy, availability and timeliness of data in the supply chain. In transparent supply chains, information is easily and quickly accessible. In addition, data can be shared clearly, comprehensively, reliably and efficiently with important members of the chain, such as customers, shareholders or regulatory authorities (Wognum et al., 2011).

Consumers consider a brand to be transparent when it demonstrates that it is open and responsible in its communications, in other words, it must provide detailed, truthful and understandable information about its activities and purposes, so that it does not hide important details (Kang & Hustvedt, 2014). The transparency that a business conveys is directly related to its ability to communicate in a clear and direct tone to its consumers, because when companies can use accessible and understandable language, rather than opting for technical and complicated terms, consumers generally tend to trust that company more, which ultimately results in better acceptance of its products and services in the eyes of consumers. This suggests that transparency has a significant impact on consumers' perception of the brand and its offerings, helping to reduce doubts or mistrust (Foscht et al., 2018).

Companies that prioritize transparency are at an advantage when it comes to maintaining a good image, especially in difficult situations, because by being transparent, brands convey a clear message of good faith, which causes consumers to have more positive perceptions of the brand's value (Eisingerich & Bell, 2008). This means that consumers tend to value a brand that is honest and open in its communications. Thus, by aligning their actions with consumers' expectations of openness and clarity, companies end up strengthening their relationship with them and obtaining more favorable evaluations (Eisingerich & Bell, 2008).

Similarly, in the context of B2B and B2C e-commerce, information transparency, in terms of the availability and accessibility of data on the website, reveals details about the online seller, the product and the transaction process. This fulfils consumers' needs in relation to these three essential elements for making a purchasing decision (Zhu, 2002). What many studies say is that there is transparency on behalf of a company when it manages to provide its consumers with their needs in an easy and accessible way that is easy to understand, which in turn increases their perceived value (Zhou et al., 2018).

H3a: Transparency has a positive effect on Perceived Value of online purchases.

Blockchain technology has many opportunities in supply chain management due to its decentralized characteristics (Kouhizadeh et al., 2020). The events that take place within a supply chain network can be added to the blocks of the blockchain in a chronological manner, i.e. the events or transactions that take place at different stages of the supply chain are recorded on the blockchain, where each new event is added in chronological sequence, as a new block of information (Kouhizadeh et al., 2020). In general, transactions carried out by any participant in the supply chain can be seen and verified by all the other participants. When a transaction takes place on the blockchain, it is recorded and can be verified by all the members of the network, and everyone has the possibility of checking the validity and authenticity of the transaction, thus increasing the trust of the participants because no part of the process is omitted. This process guarantees transparency throughout the network, as everyone involved can check the data and monitor transactions. As everything is recorded publicly and immutably, the trust and integrity of the supply chain is strengthened (Sunny et al., 2020). As a result, transparency is essential to creating and maintaining trust (Joo & Han, 2021).

Lamming et al., (2001) suggests that there are different levels of information sharing within the supply chain, also known as 'visibility'. The author refers to this as transparency, emphasizing that supply chains should provide information clearly to all involved, balancing the use of this information during negotiations and offering more details about the origin and processes of components. Awaysheh & Klassen, (2010) suggest that transparency in the supply chain drives the adoption of socially responsible practices by suppliers, both to influence customers' purchasing behavior and to create conditions that force competitors to match their actions. This is especially relevant for managers of valuable, high-profile brands. Transparency in the business context involves making clear and accessible information available to consumers. This helps to reduce uncertainties or doubts that consumers may have about the product or service, such as its quality, safety or legitimacy. Studies indicate that consumers are increasingly aware of the ethical and social reasons for each product (Trienekens et al., 2012). By being transparent, companies make it easier for customers to trust the information provided, which helps them make safer decisions and reduces the risks of dissatisfaction or mistrust (Venkatesh et al., 2016). According to Venkatesh et al., (2016), there is a positive and significant relationship between transparency and trust because it generates a sense of tranquility and clarity, which increases trust in transactions and interactions with the company.

H3b: Transparency has a positive effect on Consumer Trust on online purchases.

According to Tapscott et al., (2016), blockchain has the power to create transparency throughout the supply chain, as it can serve as a single source of truth for all participants in it, such as suppliers, manufacturers and distributors. As everyone has access to the same information, any discrepancies or doubts that may arise regarding transactions are eliminated. As all the blocks in the blockchain are cryptographically linked, any data that exists is protected by encryption, so any attempt to change the date would be quickly detected by the entire network, thereby maintaining the total integrity of the system. This feature eliminates the possibility of data manipulation, which is more common in centralized systems where a single entity has control over the information (Tapscott et al., 2016). Blockchain can reduce several common risks in the supply chain, such as information infrastructure failures, delays in data transmission and lack of transparency. The technology also has the capacity to resolve any compatibility between IT platforms that are used by its partners and to increase internet security, which ensures a more secure and efficient flow of information (Tseng et al., 2018).

By communicating security measures clearly and transparently, platforms can gain the trust of consumers, because when users receive detailed information about security practices, such as certifications, adherence to industry standards and protection mechanisms, they tend to feel safer. This transparency ultimately reduces the perception of risk and consequently also increases consumer confidence in online transactions, which encourages them to make purchases with a higher level of peace of mind. (Pathak, 2023).

Transparent communication gives consumers a clear view of the platform's commitment to safety, reinforcing the perception that the platform is reliable and safe. This is fully in line with the hypothesis that transparency positively influences perceived safety. The connection between transparency and perceived security is supported by the idea that the more consumers understand how the platform guarantees secure transactions, the safer they feel when using it (Pathak, 2023).

H3c: Transparency has a positive effect on Perceived Security of online purchases.

2.6. PERCEIVED SECURITY

Perceived security refers to consumers' perception that the online seller has adopted the necessary security measures to protect transactions. These measures include authentication, which guarantees that the customer is who they claim to be, protection, which ensures that personal and financial data is safe, verification, which confirms the legitimacy of transactions, encryption, which prevents unauthorized access to information and non-repudiation, which guarantees that the parties involved

cannot deny the completion or validity of a transaction. In short, when consumers realize that these practices are being used, it increases trust in online transactions (Kim et al., 2008).

According to (Linck et al., 2007), perceived security is the customer's personal assessment and perception of the security risks of an electronic payment system. On the other hand, (Yenisey et al., 2005) define perceived security as the level of security that users feel when making purchases on e-commerce sites. When consumers have a sense of perceived security, they can build trust in the electronic system to carry out online transactions.

When consumers perceive that an e-commerce site offers clear and visible security measures, such as those mentioned above, they tend to believe that the online seller is committed to guaranteeing security during the purchasing process (Kim et al., 2011). For example, if the site has security certificates or uses authentication methods to protect personal and financial data, this conveys to consumers that the site is concerned about their security process (Kim et al., 2011). This perception of security makes consumers trust the site and their transactions more. In short, when shoppers see that these security elements are present and in place, their trust in the seller and the purchases they make increases, as they feel more protected when making online transactions (Maqableh et al., 2021)

Perceived security is used to determine the effect on user confidence, as some surveys have revealed that users only feel comfortable sharing their information on public networks once they recognize the credibility of the technology provider. This means that as soon as consumers start to gain confidence in technology and the security guarantee that it offers, they start to feel more secure. So, their sense of security also increases, and consequently their perception of security has a positive impact on their confidence, making them feel comfortable using the platform or service in question. (Maqableh et al., 2021).

H4: Perceived Security has a positive effect on Consumer Trust in online purchases.

2.7. CONSUMER TRUST

Trust plays a fundamental role in interactions and is crucial for companies to build relationships with consumers (Bhalla, 2020). Furthermore, trust is an essential factor in consumers' interactions and decision-making in relation to e-commerce. With the growth of online shopping, trust has become even more important, especially given the lack of personal interaction, concerns about data privacy and the reliability of service providers, in other words, consumers need to know and trust that their

information will be safe and that the service they have chosen will be carried out reliably, considering that shopping online is a fairly impersonal act (Handoyo, 2024; Soleimani, 2022).

In the context of e-commerce, trust means the honesty, reliability and trustworthiness of the online seller in the eyes of the consumer. This includes the security of transactions and the protection of consumers' personal data, which means that for a consumer to be able to trust an online seller, they need to believe that the seller is reliable, that transactions have taken place in a secure manner and that their personal information is protected (Handoyo, 2024). Jiang et al., (2019) defines consumer trust as a person's confidence in the other party's ability and willingness to comply with the rules of the business relationship and keep their promises, i.e. trust is based on the belief that the party with whom one does business has the competence and willingness to follow the established rules and honor the commitments made during the exchange or transaction.

Trust is extremely fundamental to reduce the perceived risks of online shopping, because when consumers trust the security and integrity of a website or platform, they feel and believe that certain risks such as fraud or theft of information are much less likely to happen, and therefore feel encouraged to participate in e-commerce activities such as online shopping (Handoyo, 2024). Trust in the context of traditional commerce has always been an important factor, but when it comes to e-commerce it is even more important. The success and growth of online commerce platforms depend heavily on consumer trust (Al-kfairy et al., 2024). Previous research has revealed that trust plays a crucial role in online consumer behavior, having a critical impact on the success or failure of an e-commerce platform (Hoffman et al., 1999).

Trust plays a significant role in influencing attitudes and intentions towards online transactions (Gefen et al., 2003). When consumers trust an online commerce platform, the perceived risks associated with online transactions decrease, which ultimately encourages them to make more purchases (Mcknight et al., 2002). In addition, certain factors such as reputation, past experiences, website quality and third-party seals have been identified as important elements in building online trust (Kim et al., 2008).

Research indicates that trust is a very crucial factor in both the purchase intention and even the purchasing behavior of consumers in the context of e-commerce (Ashraf & Iqbal, 2023). In addition, the reliability of a platform has a significant influence on a consumer's intention to buy, and security and privacy are extremely important factors in establishing a greater degree of trust (Karunasingha & Abeysekera, 2022).

Consumers tend to be more inclined to make an online purchase when they have greater confidence in the platform in question (Jeon et al., 2021). Trust plays a crucial role in digital transactions, as it reduces perceived risks and strengthens loyalty. Therefore, online sellers should prioritize measures that cultivate consumer trust, as this can increase confidence and, consequently, increase sales (Sun et al., 2023).

Singh & Sirdeshmukh, (2000) says that when consumers trust an online platform or service, they gain specific advantages such as reliability, security, or consistent quality, which make their interactions more positive and fulfilling. This trust helps consumers reduce any doubts or fears they may have about transactions, such as fraud or the quality of the product itself. Because of this reduction in uncertainty or these additional benefits of the relationship, consumers' perception of value in their interactions with platforms or services increases, Bonsón Ponte et al., (2015) also emphasizes that when there is trust on both sides, they are more inclined to communicate openly and share relevant information. This openness allows knowledge and information to be exchanged more smoothly, leading to a better understanding and adaptation on both sides. As a result, the overall experience ends up being positive and consumers see an increase in their perceived value of the service in question.

Trust can improve the perceived value of a service by reducing the associated non-monetary costs, which refers to factors such as the time, energy and psychological effort consumers spend when choosing a service provider. When trust is established, consumers feel more confident in their choices, thus minimizing the need for intensive research or comparisons with other similar services. This reduction in time and effort allows consumers to make decisions more efficiently and with much less associated stress, thus increasing their perception of the value of the service in question (Bonsón Ponte et al., 2015).

2.8. PERCEIVED VALUE

The concept of perceived value is a tool that emerged from marketing, with the aim of understanding and predicting consumer choices and purchasing behavior (Jamal & Sharifuddin, 2015). Initial studies suggest that perceived value is made up of the perceived benefits, such as economic, social and relational gains, as well as the sacrifices that customers make, such as the price paid, the time, effort, risk and convenience involved in the purchase, in other words, the value perceived by a consumer is the balance between what they gain and what they have to sacrifice when purchasing a product or service (Hinterhuber, 2004).

From the point of view of motivation, perceived values can be divided into two types. Utilitarian values, which are related to functionality and practicality, and hedonic values, which are related to the pleasure and satisfaction that the consumer obtains (Aboelmaged et al., 2021). Furthermore, when analyzed from the perspective of objectives, values can be classified as extrinsic such as economic and social values, which are related to external benefits and intrinsic such as hedonic and altruistic values, which concern internal or personal rewards (Holbrook, 2006).

According to Dhar & Wertenbroch, (2000) utilitarian value is related to the use of a product with a focus on specific objectives, in a rational and functional way, i.e. utilitarian value refers to the practicality and efficiency that the product offers to fulfil its function. In contrast, hedonic value is linked to the pleasure and satisfaction that the consumer feels when using a service or product.

Perceived value can be measured in two ways. Using a unidimensional approach or a multidimensional scale (Chen & Chen, 2010), the unidimensional approach assumes that consumers have a uniform perception of value, i.e. it treats perceived value as a single dimension, while the multidimensional approach offers a more detailed view, considering the various components that make up perceived value, such as economic, social and emotional factors, among others (Zeithaml, 1988). Kim & Park, (2017) presented a comprehensive model of perceived value that includes economic, functional, emotional and social aspects. Extending this idea, Kim & Thapa, (2018) identified that perceived value is made up of four main dimensions: quality, emotional response, cost and social impact. In addition, Carvache-Franco et al., 2020) proposed that perceived value can be divided into three main dimensions: economic, functional and emotional/social.

Perceived value is one of the main criteria for evaluating users' consumption behavior, and this value directly influences customer behavior (Omelan & Raczkowski, 2020). When consumers perceive a high value in a product or service, they tend to show greater confidence in the act of purchase and, at the same time, show a strong intention to acquire the products. This in turn causes consumers' purchase intention to increase (Jamil et al., 2022), but on the other hand when consumers perceived usefulness is at a low level, their confidence and willingness to buy that same product also ends up falling, causing their purchase intention to decrease. In other words, it can be summarized that consumers' perceived value is positively correlated with their confidence and purchase intention. (Mustafa et al., 2022).

H5: Consumer Trust has a positive effect on Perceived Value in online purchases.

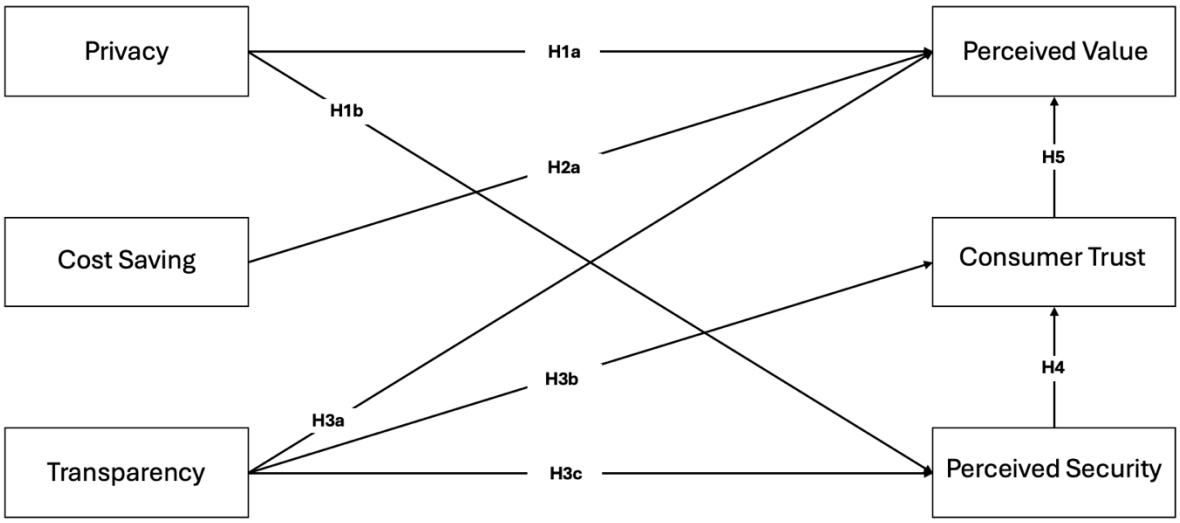


Figure 1. Conceptual Model

3. METHODOLOGY

3.1. QUESTIONNAIRE DESIGN

The questionnaire was designed to collect data on the constructs being studied, in table 1 it is possible to observe the constructs and measurement items. Firstly, the questionnaire began with an introduction in which the respondents were explained what blockchain technology was and how it could have an impact on e-commerce. Then the main body of the questionnaire was divided into seven sections, six of which referred to a specific construct being studied.

The first section was related to the demographic information of the participants, the purpose of this information was to better understand the composition of the sample and its relevance to the study. The second section addressed privacy in relation to blockchain technology in e-commerce, exploring respondents' perceptions, consisting of questions adapted from the study by El-Haddadeh et al. (2019). The third section focussed on cost-saving in blockchain e-commerce with questions adapted from the study by S. S. Kim (2020). The fourth section was adapted from the study of Shahzad et al. (2024) and addressed transparency in blockchain technology in e-commerce. The fifth section examined respondents' perceived value of blockchain technology in e-commerce and the questions were adapted from the study by Wang et al. (2023). The sixth section of the questionnaire explored respondents' perception of security in relation to blockchain technology in e-commerce and the

questions were adapted from the study by Escobar-Rodriguez & Carvajal-Trujillo (2014). Finally, the last section of the questionnaire focussed on consumer trust in blockchain technology in e-commerce and the questions were adapted from the work of Cheah et al. (2022).

Table 1. Constructs and measurement items

Construct	Item names	Measurement	Sources
Privacy	P1	Blockchain-enabled e-commerce platforms would not sell my personal information to other companies.	(El-Haddadeh et al., 2019)
	P2	Blockchain-enabled e-commerce platforms would not share my personal information with other companies unless I specifically authorize it.	
	P3	Blockchain-enabled e-commerce platforms would not use my personal information for any purpose not specifically authorized by me.	
	P4	Blockchain-enabled e-commerce platforms would prevent any unauthorized access to my personal information.	
	P5	Blockchain-enabled e-commerce platforms would take more steps to ensure that my personal information on their systems is accurate.	
Cost-Saving	CS1	I would purchase most products I want on blockchain-enabled e-commerce platforms because they are generally cheaper.	(S. S. Kim, 2020)
	CS2	Shopping on blockchain-enabled e-commerce platforms would be beneficial in terms of cost-saving.	
	CS3	Shopping on blockchain-enabled e-commerce platforms could save more money than purchasing at offline stores.	
Transparency	TSP1	Blockchain-enabled e-commerce platforms would be transparent.	(Shahzad et al., 2024)
	TSP2	Blockchain-enabled e-commerce platforms would be accountable to customers for their actions.	
	TSP3	Blockchain-enabled e-commerce platforms would provide detailed transaction information to customers.	
	TSP4	Blockchain-enabled e-commerce platforms would make it easy to find the information customers need.	
Perceived Value	PV1	I could reduce the cost of shopping by shopping on blockchain-enabled e-commerce platforms.	(Wang et al., 2023)
	PV2	I would shop efficiently on blockchain-enabled e-commerce platforms.	
	PV3	The product information on the blockchain-enabled e-commerce platforms would be complete.	
	PV4	Blockchain-enabled e-commerce platforms would offer a wider variety of products.	
Perceived Security	PS1	Blockchain-enabled e-commerce platforms would implement security measures to protect users.	(Escobar-Rodríguez & Carvajal-Trujillo, 2014)
	PS2	Blockchain-enabled e-commerce platforms would ensure that transactional information is protected from being accidentally altered or destroyed during a transmission on the Internet.	
	PS3	I would feel secure about the electronic payment system of blockchain-enabled e-commerce platforms.	
	PS4	I would be willing to use my credit card on blockchain-enabled e-commerce platforms to make a purchase.	
	PS5	I would feel safe making transactions on blockchain-enabled e-commerce platforms.	

Consumer Trust	**Trust1**	This blockchain-enabled e-commerce platform would be reliable.	(Cheah et al., 2022)
	Trust2	This blockchain-enabled e-commerce platform would be trustworthy.	
	Trust3	This blockchain-enabled e-commerce platform's products and services would be dependable.	
	Trust4	This blockchain-enabled e-commerce platform would offer secure Web transactions.	
	Trust5	It would be unnecessary to be cautious with this blockchain-enabled e-commerce platform.	

3.2. RESEARCH DESIGN

In order to study the consumer perception of trust of blockchain-enabled e-commerce platforms and to validate the hypothetical relationships it was applied a quantitative research method. This method was chosen because it can deliver unbiased and factual results, providing a clear and impartial understanding of the phenomenon being studied without subjective influences or personal biases (Dharmawan et al., 2024) and also it is associated with the positivist research perspective and testing of hypothesis (Sedmak & Longhurst, 2010).

A questionnaire survey was chosen to collect data for this research study because it is a medium of communication that allows for a remote conversation between the researcher and the participants (Brace, 2018), given the exploratory nature of blockchain in e-commerce and the need to gather insights from a wide range of participants, a questionnaire was the most effective tool to capture diverse perspectives efficiently and systematically. The items used in the questionnaire were all adapted from validated scales to guarantee their relevance and applicability to the study in question. It was necessary to adapt the items to align the questions with the hypothetical nature of this technology and to ensure that the respondents' perspectives were accurately measured in this specific context.

3.3. SAMPLING METHOD AND OPERATIONALIZATION

In terms of sampling collection, academic research stresses that, ideally, the research problem would be investigated across the entire population. However, in practice, researchers typically study a sample that is large and representative enough to reflect the larger population effectively (Acharya et al., 2013). The main target population for this study is all individuals who shop online, as they represent potential users of blockchain-enabled e-commerce platforms, and the convenience sampling method

was also chosen, due to time and financial constraints. This method allowed to access participants that were often readily and easily available (Taherdoost, 2016).

For the operationalization of the questionnaire, a five-point Likert scale was employed, ranging from (1) "strongly disagree" to (5) "strongly agree," to assess all survey items. This scale was used because it is widely recognized as an easy and reliable scaling technique (Royeen, 1985) with which it is easy to measure and understand respondent perception (Subedi, 2016). The questionnaire was distributed through various sources, such as social networks like Instagram, Facebook, WhatsApp and email.

3.4. DATA ANALYSIS APPROACH

The partial least squares (PLS) structural equation modelling (SEM) technique was used to carry out this analysis. The Smart PLS 4 method was chosen to be used as the main analysis tool because of its advanced capabilities in handling SEM and its suitability for evaluating complex models with multiple relationships.

The questionnaire received a total of 184 responses, of which 18 were incomplete answers. In order to maintain the integrity and reliability of the data, answers that were not completed by the end were eliminated from the final analysis. The analysis was focused on the 166 questionnaire responses that were complete, thus ensuring that only comprehensive and reliable data was analyzed. In Table 2 it is possible to observe the results.

About the age of the respondents, it was possible to observe that they were predominantly young, with 37% being in the 18-24 age group, 31% in the 25-34 age group, and these made up most of the sample's responses. Participants aged 35-44 made up 8%, while those in the 45-54 age group accounted for 11%. Finally, the 55-64 age group accounted for 9% and those 65 or older accounted for 2%.

Regarding gender distribution, the sample showed balanced results, with 51% identifying themselves as female and 49% as male, and none of the respondents identifying themselves as non-binary/third gender.

About educational background, the respondents' answers varied a little more, with almost half of the respondents having an undergraduate degree (bachelor's level) at 49%, showing that they were a well-educated group. In addition, 24% reported having completed postgraduate studies (master's level) and 27% reported having completed high school. Finally, only 1% of respondents had a doctoral degree and none of the participants reported having only elementary-level education.

About household annual income, responses varied between different income brackets, with the largest group (47%) reporting an income of between €15,000 and €30,000, followed by the €30,001 to €45,000 range with 26%, while 10 % reported an income of less than €15,000. Finally, there was the over €45,000 group with 9% and 8% of respondents preferred not to disclose their income.

In relation to the respondents' answers regarding familiarity with blockchain technology, it was possible to observe that 49% of the sample responded that they had "heard of it but don't know much", while 34% indicated that they were "not familiar at all". A smaller percentage of respondents, 14% replied that they were 'somewhat familiar' and only 3% reported being 'very familiar' with technology.

Finally, with regard to the frequency with which respondents shopped online, it was possible to observe that the majority (54%) reported that they shopped "occasionally (once a month)", 27% replied that they shopped "rarely (a few times a year)", 15% replied that they shopped "frequently (once a week)", 3% replied that they shopped "very frequently (multiple times a week)" and only 1% replied that they "never" shopped online.

Table 2. Participants Demographics

Variable	Answer	Frequency	Representative %
Age	18-24	62	37%
	25-34	52	31%
	35-44	14	8%
	45-54	19	11%
	55-64	15	9%
	65 or older	4	2%
Gender	Male	82	49%
	Female	84	51%
	Non-binary/Third gender	0	0%
	Prefer not to say	0	0%

Education level	Elementary school	0	0%
	High school	44	27%
	Undergraduate (i.e. Bachelor)	81	49%
	Postgraduate (i.e. Master)	40	24%
	Doctoral or equivalent	1	1%
Household Annual Income	Less than €15,000	16	10%
	€15,000 - €30,000	78	47%
	€30,001 - €45,000	43	26%
	More than €45,000	15	9%
	Prefer not to say	14	8%
Blockchain Familiarity Level	Not familiar at all	56	34%
	Heard of it, but don't know much	82	49%
	Somewhat familiar	23	14%
	Very familiar	5	3%
Online Shopping Frequency	Never	2	1%
	Rarely (a few times a year)	44	27%
	Occasionally (once a month)	90	54%
	Frequently (once a week)	25	15%
	Very frequently (multiple times a week)	5	3%

Descriptive statistics were analyzed for each question or item in the constructs being studied. This analysis calculated the Mean (M) and Standard Deviation (SD) for each item and the results can be summarized in Table 3. Regarding the items related to Privacy, the mean values are between 4.50 and 4.68 and the standard deviation values between 0.56 and 0.76 indicating that there is a high privacy perception with low variability among participants. Regarding the Cost Savings construct, the mean values ranged from 2.99 to 3.31, and the standard deviation values for this construct were between 0.59 and 0.80, reflecting moderate cost-saving perception with some variability. For Perceived Value, the mean scores ranged from 3.05 to 3.67, and the standard deviations ranged from 0.59 to 0.91, showing moderate to high transparency perception with moderate variability. For the Perceived Security construct, the mean values ranged from 3.67 to 4.10, and the standard deviations ranged from 0.59 to 0.75, indicating moderate perceived value with variability. Finally, for Consumer Trust, the mean scores ranged from 2.55 to 3.92, and the standard deviations varied from 0.50 to 0.99, indicating moderate to high consumer trust with varying levels of consistency.

Table 3. Descriptive Statistics

Construct	Item	M	SD
Privacy	P1	4,50	0,76
	P2	4,61	0,61
	P3	4,63	0,60
	P4	4,68	0,56
	P5	4,51	0,65
Cost-saving	CS1	2,99	0,80
	CS2	3,31	0,59
	CS3	3,26	0,73
Transparency	TSP1	3,86	0,64
	TSP2	3,84	0,81
	TSP3	3,76	0,81
	TSP4	3,72	0,74
Perceived value	PV1	3,37	0,69
	PV2	3,64	0,59
	PV3	3,67	0,64
	PV4	3,05	0,91
Perceived security	PS1	4,10	0,59
	PS2	3,95	0,66
	PS3	3,81	0,68
	PS4	3,67	0,75
	PS5	3,77	0,65
Consumer trust	TRUST1	3,92	0,50
	TRUST2	3,84	0,56
	TRUST3	3,67	0,67
	TRUST4	3,80	0,61
	TRUST5	2,55	0,99

4. RESULTS AND DISCUSSION

The results of this study are structured into two main sections. The first section assessed the measurement model to establish reliability and validity. Assessing indicator reliability, as well as construct reliability. The second section evaluated the structural model to test the hypotheses proposed in the conceptual framework.

Firstly, the results of the measurement model were assessed to ensure that the variables used in the study are reliable and are measured accurately, and then, after confirming the reliability and validity of the constructs, the structural model was estimated, which involves testing the research hypotheses and presenting the results in a clear and detailed manner.

4.1. MEASUREMENT MODEL

To assess the internal consistency and validity of the proposed research model, a comprehensive reliability analysis was carried out. The analysis focused on the variables of interest to the study, and the results can be seen summarized in Table 4, which shows the Cronbach's Alpha (CA), the Composite Reliability (CR) and the Average Variance Extracted (AVE) for each construct.

Cronbach's Alpha (CA) was used to evaluate the reliability of the measurement scales. This coefficient ranges from 0 to 1, with a benchmark of 0.70 or higher indicative of satisfactory internal consistency (Hair et al., 2021). In the present study, most constructs surpassed this 0.70 threshold, demonstrating reliable internal consistency. However, the construct for cost-saving (CS) had a Cronbach's Alpha value of 0.641, which falls below the benchmark but is still close enough to be considered acceptable in some exploratory research contexts.

To further confirm internal consistency, Composite Reliability (CR) was examined. CR values that are above 0.70 are considered acceptable (Hair et al., 2021), and all the constructs in this study meet or exceed this criterion, so we can conclude that there is internal consistency.

Convergent validity was also assessed using the AVE, which tells us the proportion of the variation captured by the construct relative to the variance due to measurement error. An AVE value of 0.50 or more is required to be considered adequate convergent validity (Henseler et al., 2009). In this analysis,

all the constructs had AVE values above 0.50, thus establishing that they adequately capture the variance of the respective items.

The AVE values shown in Table 4 confirm the convergent validity of the constructs. However, at this stage, indicators with loading values below the generally accepted threshold of 0.70 will be identified as potential candidates to be removed in order to improve the reliability and validity of the constructs (Hair et al., 2021). That said, item TRUST5 revealed a factor loading value of 0.309 and was therefore removed after assessing its theoretical importance for this study.

Regarding Privacy (P), Cost Savings (CV), Transparency (TSP), Perceived Value (PV), Perceived Security (PS) and Consumer Trust (TRUST) constructs, all of them showed values above the requirements, thus supporting the validity of the measurement model. Overall, it can be concluded that the results of this analysis indicate that the proposed model shows strong internal reliability and convergent validity between its constructs.

Table 4. Construct Reliability and Validity

Construct	CA	CR	AVE
Privacy (P)	0,902	0,928	0,721
Cost-saving (CS)	0,641	0,807	0,583
Transparency (TSP)	0,746	0,840	0,567
Perceived value (PV)	0,721	0,827	0,545
Perceived security (PS)	0,803	0,864	0,560
Consumer trust (TRUST)	0,866	0,909	0,715

To assess discriminant validity, the Fornell-Larcker criterion, cross-loadings and the Heterotrait-Monotrait ratio (HTMT) were used (Henseler et al., 2015).

To assess discriminant validity, the Fornell-Larcker criterion was used, with the square root of the AVE of each construct having to exceed its correlation with another construct (Fornell & Larcker, 1981). Table 5 shows that this criterion has been met, as all the diagonal values in bold represent the square

roots of the AVE. It can also be seen that each construct's value exceeded the correlations with other constructs, indicating acceptable discriminant validity.

Table 5. Fornell-Larcker criterion

Construct	P	CS	TSP	PV	PS	TRUST
P	**0,849**					
CS	-0,068	**0,764**				
TSP	0,228	0,324	**0,753**			
PV	-0,000	0,559	0,373	**0,738**		
PS	0,255	0,198	0,620	0,369	**0,749**	
TRUST	0,134	0,206	0,457	0,512	0,573	**0,846**

Cross-loadings should demonstrate that each indicator loads higher on its respective construct than on any other. Looking at table 6 it is possible to observe the cross-loadings of all items. In reviewing the data, all items showed the highest loading on their assigned construct, confirming that the cross-loading criterion was satisfied.

In addition, the Heterotrait-Monotrait (HTMT) ratio must not exceed 0.90 to assert discriminant validity (Henseler et al., 2015). The data presented in Table 7 shows that all the HTMT values are below the recommended threshold, which means that it is possible to conclude that discriminant validity is supported and has been established across all the constructs in the model.

Table 6. Cross Loadings

Construct	P	CS	TSP	PV	PS	TRUST
P1	0,790					
P2	0,918					
P3	0,867					
P4	0,921					
P5	0,734					
CS1		0,713				
CS2		0,834				
CS3		0,739				

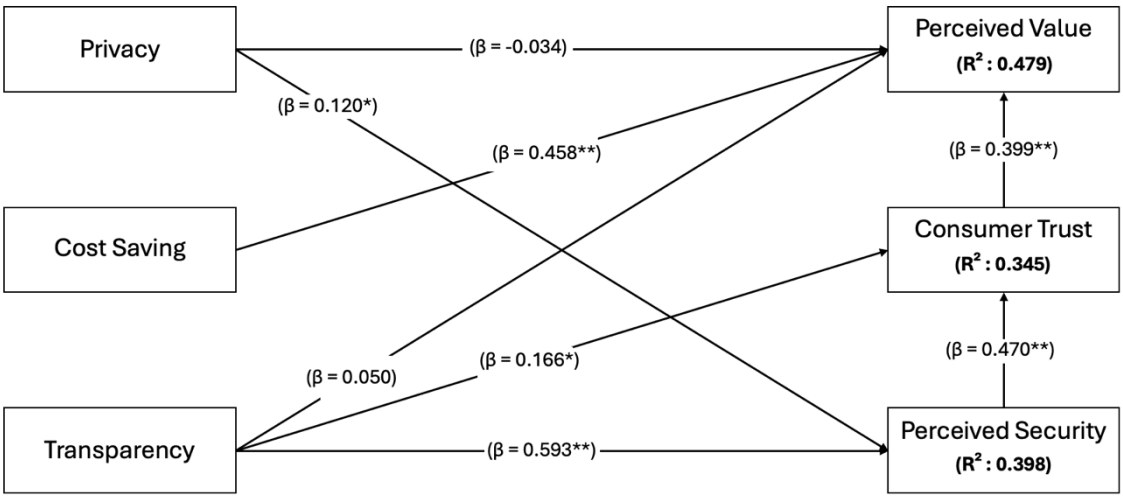
TSP1	0,752				
TSP2	0,718				
TSP3	0,775				
TSP4	0,766				
PV1		0,781			
PV2		0,743			
PV3		0,735			
PV4		0,690			
PS1			0,713		
PS2			0,678		
PS3			0,783		
PS4			0,739		
PS5			0,822		
TRUST1				0,871	
TRUST2				0,886	
TRUST3				0,772	
TRUST4				0,849	

Table 7. Heterotrait-Monotrait ratio (HTMT)

Construct	P	CS	TSP	PV	PS	TRUST
P						
CS	0,131					
TSP	0,269	0,467				
PV	0,117	0,806	0,511			
PS	0,290	0,284	0,794	0,488		
TRUST	0,170	0,284	0,562	0,655	0,670	

4.2. STRUCTURAL MODEL

After confirming the reliability and validity of the measurement model, the next step was to evaluate the structure model to examine the relationships and hypotheses proposed by the study in question, in figure 2 it's possible to observe the results of the structural model.



Note: Standardized coefficients (β); ** p< 0,001; * p< 0,05

Figure 2. Structural model for Blockchain E-commerce Trust Model results

A multicollinearity evaluation was carried out using the Variance Inflation Factor (VIF). VIF is a diagnostic tool used to detect multicollinearity between the predictor variables in regression models. A VIF value below 5 normally indicates that there is an acceptable level of multicollinearity, thus implying that the predictor variables do not exhibit excessive correlation, which can skew results and reduce reliability if this criterion is not met (Hair et al., 2021) The VIF values for the constructs in this analysis are shown in Table 8 and it can be seen that all the values are in the acceptable range, thus confirming that multicollinearity is not a problem in this model.

Table 8. Model Estimation (VIF)- Blockchain E-commerce Trust Model

	VIF
P -> PS	1,055
P -> PV	1,083
CS -> PV	1,151
TSP -> PS	1,055
TSP -> TRUST	1,625
TSP -> PV	1,431
PS -> TRUST	1,685
TRUST -> PV	1,273

To assess the overall model fit, the Standardized Root Mean Square Residual (SRMR) was used to assess the discrepancy between the observed and model-implied correlation matrices, as shown in Table 9. SRMR values between 0.08 or 0.10 are usually indicative of a good model fit (Schermelleh-Engel, 2003). When analysing the Blockchain E-commerce Trust Model, the SRMR value for the saturated model was 0.087 and for the estimated model was 0.090, suggesting a fit close to the acceptable threshold.

The chi-square values, which estimate the difference between the observed and model-implied covariance matrices, showed values of 646.419 for the saturated model and 645.502 for the estimated model, with lower chi-square values generally being indicated for a more optimal fit.

Finally, the Normalised Fit Index (NFI), which aims to compare the chi-squared value of the model with that of a null model, showed values of 0.710 for the saturated model and 0.711 for the estimated model. Although values closer to 1 indicate a better fit (Ding et al., 1995), these results suggest a moderate fit.

Table 9. Model Fit- Blockchain E-commerce Trust Model

	Saturated model	**Estimated model**
SRMR	0,088	0,088
d_ULS	2,495	2,520
d_G	0,687	0,688
Chi-square	646,896	643,521
NFI	0,710	0,711

Another essential element in evaluating the structural model is determining the coefficient of determination (R^2), which reflects the proportion of variance in the endogenous latent variables that is explained by the exogenous constructs related to them (Sarstedt et al., 2017) whereby R^2 values above 0.50 are normally considered moderate. For this study, the R^2 values were as follows: Perceived Security (0.398), indicating that 39.8% of its variance is explained by the model, Consumer Trust (0.345), suggesting 34,5% of its variance is accounted for and Perceived Value (0.479), demonstrating

that 47.9% of its variance is captured by the model. These findings, presented in Table 10 collectively indicate that the model provides a moderate level of explanatory power for the dependent constructs.

Table 10. R-squared

	R-square	R-square adjusted
PS	0,398	0,391
TRUST	0,345	0,337
PV	0,479	0,466

To assess the relationship between the proposed hypotheses and their constructs, the structural model was subjected to a bootstrapping analysis. This statistical method was used to estimate the path coefficients and assess the significance of the relationship between each hypothesis, using 5000 bootstrap samples for reliability (Sarstedt et al., 2017). Regarding the results of this analysis, these can be found in Table 11, which provides detailed information on the significance levels of the t-values and p-values for the Blockchain E-Commerce Trust Model.

Table 11. Bootstrapping results- Blockchain E-commerce Trust Model

	Original Sample (O)	Mean (M)	Standard Deviation (STDEV)	T statistics	P values
P -> PV	-0,034	-0,029	0,057	0,587	0,557
P -> PS	0,120	0,124	0,050	2,383	0,017
CS -> PV	0,458	0,461	0,068	6,775	0,000
TSP -> PV	0,050	0,056	0,083	0,607	0,544
TSP -> TRUST	0,166	0,172	0,084	1,971	0,049
TSP -> PS	0,593	0,598	0,053	11,222	0,000
PS -> TRUST	0,470	0,470	0,086	5,489	0,000
TRUST -> PV	0,399	0,390	0,081	4,908	0,000

4.3. HYPOTHESES TESTING

The structural model results revealed that 34.5% of the variance in Consumer Trust ($R^2 = 0.345$) was explained by Privacy, Transparency, and Perceived Security. Moreover, 47.9% of the variance in Perceived Value ($R^2 = 0.479$) was explained by Consumer Trust and Cost Saving. Lastly, 39.8% of the variance in Perceived Security ($R^2 = 0.398$) was explained by Privacy and Transparency. These results are summarized in Table 12.

The first analysis refers to H1a, which tests the relationship between Privacy (P) and Perceived Value (PV) in the context of blockchain-enabled e-commerce, and it was possible to observe that the results showed a negative association ($\beta = -0.034$; $p = 0.557$). However, this relationship was not statistically significant because the t-value was 0.587, which means that it was below the critical threshold of 1.96 for a 95% confidence interval and the p-value of 0.557 exceeded the standard significance level of 0.05.

H1b measures the relationship between Privacy (P) and Perceived Security (PS), and a positive association was observed ($\beta = 0.120$; $p = 0.017$). The t-value of 2.383 exceeds the threshold of 1.96 for a 95% confidence level, and the p-value is below the standard significance threshold of 0.05, confirming the statistical significance of this relationship.

Looking now at hypothesis H2a, which tests the relationship between Cost-saving (CS) and Perceived Value (PV) within the context of blockchain-enabled e-commerce platforms, we can see that the results indicate a positive association ($\beta = 0.458$; $p < 0.001$). This relationship has statistically significant results because the t-value exceeds the critical threshold of 1.96 at a 95% confidence level and the p-value is below the standard significance level of 0.05.

Moving on to analyze hypothesis H3a, which is related to the relationship between Transparency (TSP) and Perceived Value (PV), the results indicated a weak positive relationship ($\beta = 0.050$; $p = 0.544$), these values suggest a relationship that is not statistically significant, as the p-value exceeds the standard threshold of 0.05 and the t-value of 0.607 does not meet the critical value of 1.96 for a 95% confidence level, so this hypothesis is not supported.

Regarding the hypothesis H3b the relationship between Transparency (TSP) and Trust (TRUST), indicated a positive and significant relationship ($\beta = 0.166$; $p = 0.049$). The t-value of 1.971 meets the

critical threshold of 1.96 for a 95% confidence level, and the p-value is below the standard significance threshold of 0.05. These results support H3b, suggesting that transparency positively contributes to consumer trust in the context of blockchain e-commerce.

About hypothesis H3c, the relationship between Transparency (TSP) and Perceived Security (PS) showed a very strong association ($\beta = 0.593$; $p < 0.001$). The t-value was 11.222, thus exceeding the critical threshold of 1.96 for a 95% confidence level, and the p-value is well below the standard significance level of 0.05, thus confirming the statistical significance of this relationship. These findings allow us to conclude that H3c is supported, indicating that transparency positively impacts perceived security in the context of blockchain e-commerce.

Moving on to hypothesis H4, the relationship between Perceived Security (PS) and Trust (TRUST) shows a strong and positive association ($\beta = 0.470$; $p < 0.001$), the t-value is 5.489 and is therefore well above the critical threshold of 1.96 for a 95% confidence level, and the p-value is significantly below the standard significance level of 0.05, thus confirming that there is statistical significance in this relationship. It is therefore possible to conclude that these results support H4, indicating that perceived security has a significant positive impact on trust in the context of blockchain e-commerce.

Finally analyzing now the last hypothesis H5, it is possible to see that the relationship between Trust (TRUST) and Perceived Value (PV) demonstrated a significant positive association ($\beta = 0.399$; $p < 0.001$). The t-value of 4.908 is also well above the critical threshold of 1.96 for a 95% confidence level, and the p-value is significantly below the standard significance level of 0.05. These findings confirm that higher levels of trust positively influence consumers' perception of value in the context of blockchain e-commerce.

Table 12. Summary of hypotheses

Description	Model	Hypothesis	t-value	p-value	Conclusion
P positively influences PV	Blockchain Trust Model	H1a	0.587	0.557	Not Supported
P positively influences PS	Blockchain Trust Model	H1b	2.383	0.017	Supported
CS positively influences PV	Blockchain Trust Model	H2a	6.775	0.000	Supported

TSP positively influences PV	Blockchain Trust Model	H3a	0.607	0.544	Not Supported
TSP positively influences TRUST	Blockchain Trust Model	H3b	1.971	0.049	Supported
TSP positively influences PS	Blockchain Trust Model	H3c	11.222	0.000	Supported
PS positively influences TRUST	Blockchain Trust Model	H4	5.489	0.000	Supported
TRUST positively influences PV	Blockchain Trust Model	H5	4.908	0.000	Supported

This study was designed to investigate the role of blockchain technology in e-commerce and develop new knowledge to understand the most significant constructs influencing consumer trust. Through the conducted study, it was found that three out of the three dimensions of blockchain technology (Privacy, Transparency and Cost-Saving) had a positive impact on key consumer perceptions, such as Perceived Value and Perceived Security. However, Privacy and Transparency did not demonstrate a significant influence on Perceived Value. The literature emphasizes the strong relationship between blockchain technology dimensions and their role in shaping consumers' trust in blockchain e-commerce platforms.

According to Balapour et al., (2020) the results from their study suggest that perceived privacy risk negatively affects consumers' perceived security, which is in line with the results regarding the relationship between privacy and perceived security and with the literature studied which indicates that greater perceived privacy is associated with increased perceived security among users in online transactions because when a user feels that their privacy is being protected, they are more likely to have a higher level of perceived security in their interactions (Gao et al., 2015; Hoffman et al., 1999).

Regarding the cost-saving construct, the results confirm the studies by Purba & Setiyaningrum, (2022) and also by Rodríguez & Fernández, (2017) which say that cost-saving has a positive effect on perceived customer value. These findings reveal that consumers perceive blockchain technology as a possible way to be more efficient or even save money when making online purchases. The literature supports this finding as it emphasizes that cost-saving benefits are a substantial motivator for consumers when

engaging in e-commerce transactions. According to Purba & Setiyaningrum, (2022), consumers favor e-commerce because it allows them to compare costs efficiently and make purchases while saving time and money. This perception is in line with Wei et al., (2018), who say that lower product prices and even overall savings encourage consumers to change their shopping behavior by switching from physical to online shops.

With regard to the transparency construct, two of the three hypotheses were validated, the first being the direct relationship between transparency and consumer trust. The study by Kang & Hustvedt, (2014) revealed that consumer perception of transparency was a factor that positively influenced trust, which is in line with the results presented in this study, however, a study carried out in China by Zhou, (2015) showed that this hypothesis was not supported. This discrepancy in the results can be explained by the influence of the government in China, where it has superior supervision and consumers end up trusting practices that are regulated by the government more than the transparency mechanisms of companies. The literature also reinforces the supported hypothesis findings by emphasizing the importance of transparency in promoting trust among consumers. Transparency, as described by Venkatesh et al., (2016), plays a crucial role in transmitting information in an easy and accessible way, thus reducing certain uncertainties regarding the product or service. This clarity creates a sense of security and trust among consumers, encouraging them to trust the product or service more, Trienekens et al., (2012) also points out that with the growth in consumer awareness of ethical issues and social standards, transparency becomes even more important for maintaining trust. Regarding the mediating effect of perceived security on the relationship between transparency and consumer trust, there is a strong relationship, which means that users' sense of security increases when the levels of transparency by blockchain e-commerce platforms are high, this finding is in line with the literature which states that by communicating transparently, companies are not only reassuring their customers but also affirming the platform's commitment to security, reinforcing its reliability, which according to Pathak, (2023), this form of transparency reduces perceived risks and strengthens consumer confidence, encouraging more confident online transactions.

Regarding the relationship between the construct perceived security and consumer trust, it was possible to conclude that PS is an essential concept for understanding CS in the context of blockchain technology in e-commerce. The results of the study showed a strong correlation between the two constructs, which is in line with the studies carried out by Chellappa & Pavlou, (2002) and Kim et al., (2011) where these relationships were also tested and confirmed. The literature also supports these findings highlighting that when consumers see clear security measures such as certifications to data protection protocols, they feel reassured that platforms prioritize their security (Kim et al., 2011). This

perception leads consumers to place greater trust in the service, as it demonstrates the platform's commitment to protecting user data and transactions. Maqableh et al., (2021) also states that when users have a high perception of security, they are more comfortable using the platforms, as they know that their information is safe.

Finally, regarding the relationship between consumer trust and perceived value, this relationship is positive, which is in line with the results of the study carried out by Wang et al., (2023). This finding proves that when consumers trust an e-commerce platform based on blockchain technology, they tend to feel more secure in using it, which increases their perception of value. These results are in line with the literature which indicates that trust enhances consumer experience by providing relational benefits such as reliability, security and consistent quality (Singh & Sirdeshmukh, 2000). When consumers trust an online platform, their concerns about potential issues like fraud or product quality decrease. This reduction in perceived risk contributes to a more positive interaction and strengthens the perceived value of their experience. Bonsón Ponte et al., (2015) further argue that trust facilitates open communication and information sharing between the consumer and the service provider. This mutual exchange leads to better understanding and smoother transactions, enhancing the perceived value as consumers feel more supported and satisfied with their interactions.

5. CONCLUSION

As per the findings, blockchain transparency made a promising impact on promoting consumer confidence and a perceived level of security, and thus acted as a trust-building driver for e-commerce. Due to blockchain's power to offer verifiable, irrefutable records, consumers have a higher degree of confidence in the security and authenticity of their transactions. In addition, privacy made a positive contribution to a sense of perceived security, and thus seemed to mediate the effect of privacy on trust on e-commerce platforms.

Cost-saving also emerged as a key factor in driving perceived value. The paper demonstrates how blockchain effectiveness to optimize the number of intermediaries and the cost of transactions can help on the consumer side to increase the perceived value, and thus it is a representational proposal to the e-commerce players. These findings emphasize, therefore, the critical importance of disseminating the operational value that blockchain provides to consumers, as they have direct impact on the perceptions of value for consumers. In terms of trust, this one is a key factor, leveraging

blockchain's technical capabilities and consumer acceptance and adoption. Based on trust as the foundation, blockchain e-commerce sites can well address the issues and build long-term loyalty.

In general, this thesis contributes to the field of blockchain technology by linking its technical aspects to consumer-related constructs. It shows how blockchain is not simply a technical invention, but a strategic solution for addressing important consumer concerns with e-commerce. These observations are not only of interest to academia, but they also offer concrete recommendations to companies looking to effectively incorporate blockchain in the future into their platforms and business operations.

5.1. THEORETICAL IMPLICATIONS

First and foremost, the outcomes of this research have allowed for an expansion of our knowledge in terms of the constructs that have been studied. By integrating all these variables into a single framework, this study has made it possible to create a perspective on how blockchain and its unique characteristics transform consumer behaviors and perceptions. One of the most important highlights is the importance of transparency as a driver of perceived security, emphasizing its role in mitigating consumer uncertainties in e-commerce.

Secondly, while the existing literature focuses mainly on studying blockchains applications in the financial markets or supply chain management, this study expands on that a little, as it focuses more on e-commerce and its development. By incorporating concepts such as privacy, cost savings or even transparency, it is possible to present a new perspective, showing how blockchain efficiency and secure data handling can improve perceived value and security in the eyes of consumers.

Thirdly, while many of the studies already carried out focus very much on the technical aspects of blockchain, this work shifts the focus a little towards consumer-oriented constructs. Offering new insights into how transparency can influence trust and perceived security, and how cost saving can contribute to the growth of consumers' perceived value. By exploring these variables, the research improves the theoretical framework in both blockchain and e-commerce literature, thus providing a greater understanding of how consumer behavior works in decentralized systems.

Furthermore, the results found in this research have contributed to enriching the existence of consumer behavior models to demonstrate how blockchain and its features can interact with traditional constructs such as privacy and trust. By combining these two aspects of blockchain, its

technical aspect and its impact on consumers, this research adds a new understanding to existing theories, thus linking innovative blockchain technologies to consumer perceptions and behaviors in digital environments. This link has helped to explain how blockchain influences consumer trust and decision-making on online platforms.

5.2. PRATICAL IMPLICATIONS

By understanding how these constructs influence consumer perception, companies can refine their blockchain platforms, marketing messages and operations strategies in order to better understand and get to know consumer perceptions and expectations. This allows companies to leverage their insights to personalize their strategies that emphasize the key benefits of blockchain studied in this research, such as security, cost reduction and greater transparency. This allows many companies to attract new customers and even retain existing ones, as many of them prioritize trust and value their e-commerce experience, for example, e-commerce platforms can communicate and demonstrate the advantages of blockchain to their customers, showing features such as the possibility of verifying the history of transactions, showing cost savings by reducing fees, or demonstrating the improvement of data privacy protections.

With regard to e-commerce based on blockchain technology, transparency plays an extremely important role in promoting and publicizing trust and the perception of security for consumers. Companies can use this to their advantage, as they can make the blockchain interfaces and its capabilities much easier and user-friendly for consumers, for example, companies can create dashboards on their platforms that allow and facilitate users to easily check any transaction or even monitor supply chain processes because this creates greater confidence in their systems and their integrity. Features that improve consumer privacy, such as user-controlled data sharing and anonymous transactions, can also be emphasized to reassure consumers that their personal data is being handled securely.

The research also highlights the importance of cost savings as a driver of perceived value because many companies can capitalize on this by passing blockchain-enabled savings directly to consumers through lower prices or through loyalty rewards or discounts. When carrying out marketing campaigns, companies can also emphasize these same financial benefits to attract consumers who are price-sensitive, and at the same time, they can also show how the efficiency of blockchain can contribute to a more seamless and smooth shopping experience.

In addition, this study also revealed the importance of the constant need to educate clients and consumers about blockchain technology. Companies also could develop some campaigns to simplify and demonstrate some of the concepts of blockchain technology and explain how this technology can serve to increase their security, transparency or cost efficiency. For companies to encourage a higher adoption rate and to help grow trust, they can develop content that addresses the concerns of their consumers, such as privacy and security.

With regard to retailers operating through digital or even hybrid e-commerce, they can also adapt certain strategies in order to improve and attract their target audience. Platforms can use personalized marketing strategies and even targeted ads to highlight their products and services to leverage the benefits of blockchain.

Finally, with the results of this study, marketers can run campaigns highlighting the unique capabilities of blockchain technology to showcase the skills it can provide through security, cost effectiveness and transparency of transactions. With these findings, they can effectively appeal to consumers and provide the incentive to achieve a greater adoption of this technology in e-commerce platforms.

5.3. LIMITATIONS OF THE STUDY AND FUTURE RESEARCH

The area of this study was limited to several aspects of blockchain and its application in e-commerce. Blockchain is a big and dynamically developing area of work, which includes many technological and operational applications that lay outside the scope of the present study. Consequently, many critical fields, including technical issues with blockchain, or applications of blockchain to industries beyond the e-commerce sector, were not addressed at all. This delimitation restrains the scope of the results to one context, which may exclude their generalization to more general applications in blockchain.

Second, the study also suffered from certain limitations in the process of data collection, mainly because of time limitation and the number of questionnaire respondents was limited to a small sample size. Another problem that may have occurred was the fact that most respondents were from Portugal, which may have caused the results to be geographically biased. Because of this, the results may not have presented the range of all types of consumers around the world, making the generalization of the results limited.

Thirdly, another limitation that occurred when carrying out the questionnaire was that it depended on the co-operation and honesty of the respondents. Despite efforts to ensure that respondents answered the questionnaire in a non-biased way, they were informed of the purpose of the study before they started, which may have had some influence on their final answers. They may have been inclined to provide socially desirable answers rather than their true answers or views.

These limitations emphasize areas that can be improved in future research, as outlined in the following chapter.

Based on the results and limitations of this research, it was possible to identify some aspects that may be relevant for future exploration. Firstly, future studies should increase the demographic range and the sample size, as this will provide a more comprehensive view of the effects of blockchain on consumer perceptions. This study predominantly collected responses from participants in the Portuguese context, which may not accurately represent the behaviors and attitudes of consumers in other cultural, economic or regional contexts. A larger and more diverse sample would allow researchers to test potential differences according to demographics and geographical area, thus increasing the generalizability of the results.

Secondly, it is also suggested that more studies are still needed to understand the relationship between privacy and security in depth because, although these constructs are widely discussed in literature, there is still a gap in the number of studies analyzing their interconnection. Studying the impact of privacy on security attitudes could provide a more detailed understanding of how blockchain can be used to build trust and acceptance of e-commerce infrastructures.

Finally, future research could also expand this study by examining the impact of blockchain from a different perspective, given that this research was focused on the consumer's point of view, exploring how blockchain features such as transparency, cost saving and privacy influence consumer trust. Further research could explore how businesses perceive the implementation of blockchain technology, thus analyzing the main challenges as well as the benefits.

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APPENDIX

Appendix A

Original Constructs

Construct	Item names	Measurement	Sources
Information Privacy	IP1	IoT service providers should not sell my personal information to other companies.	(El-Haddadeh et al., 2019)
	IP2	IoT service providers should not share my personal information with other companies unless I specifically authorize them to do so.	
	IP3	IoT service providers should not use my personal information for any purpose not specifically authorized by me.	
	IP4	IoT service providers should prevent any unauthorized access to my personal information.	
	IP5	IoT service providers should take more steps to ensure that my personal information on their systems is accurate.	
Cost-Saving	CS1	I purchase most products I want in the online open market because they are generally cheaper.	(S. S. Kim, 2020)
	CS2	Shopping in the online open market is beneficial in terms of cost saving.	
	CS3	Shopping in the online open market can save more money than purchasing at offline stores.	
Transparency	TSP1	BT-enabled MFDAs procedures are transparent.	(Shahzad et al., 2024)
	TSP2	BT-enabled MFDAs are accountable to customers for their actions.	
	TSP3	BT-enabled MFDAs provide detailed transaction information to customers.	
	TSP4	BT-enabled MFDAs make it easy to find the information customers need.	
Perceived Value	PF1	I could reduce the cost of shopping by shopping on cross-border e-commerce platforms.	(Wang et al., 2023)
	PF2	I shop efficiently on cross-border e-commerce platforms.	
	PF3	The product information on the cross-border e-commerce platform is complete.	
	PF4	Cross-border e-commerce platforms offer a wider variety of products.	
Perceived Security	PS1	The LCC e-commerce websites implement security measures to protect users.	(Escobar-Rodríguez & Carvajal-Trujillo, 2014)
	PS2	The LCC e-commerce websites usually ensure that transactional information is protected from accidentally being altered or destroyed during a transmission on the Internet.	
	PS3	I feel secure about the electronic payment system of the LCC e-commerce websites.	
	PS4	I am willing to use my credit card on these websites to make a purchase.	
	PS5	I feel safe in making transactions on these websites.	
Consumer Trust	Trust1	This retailer is reliable.	(Cheah et al., 2022)
	Trust2	This retailer is trustworthy.	
	Trust3	This retailer's products and service are dependable.	
	Trust4	This retailer offers secure Web transactions.	
	Trust5	It is unnecessary to be cautious with this retailer.	

Adapted Constructs

Construct	Item names	Measurement	Sources
Privacy	P1	Blockchain-enabled e-commerce platforms would not sell my personal information to other companies.	(El-Haddadeh et al., 2019)
	P2	Blockchain-enabled e-commerce platforms would not share my personal information with other companies unless I specifically authorize it.	
	P3	Blockchain-enabled e-commerce platforms would not use my personal information for any purpose not specifically authorized by me.	
	P4	Blockchain-enabled e-commerce platforms would prevent any unauthorized access to my personal information.	
	P5	Blockchain-enabled e-commerce platforms would take more steps to ensure that my personal information on their systems is accurate.	
Cost-Saving	CS1	I would purchase most products I want on blockchain-enabled e-commerce platforms because they are generally cheaper.	(S. S. Kim, 2020)
	CS2	Shopping on blockchain-enabled e-commerce platforms would be beneficial in terms of cost-saving.	
	CS3	Shopping on blockchain-enabled e-commerce platforms could save more money than purchasing at offline stores.	
Transparency	TSP1	Blockchain-enabled e-commerce platforms would be transparent.	(Shahzad et al., 2024)
	TSP2	Blockchain-enabled e-commerce platforms would be accountable to customers for their actions.	
	TSP3	Blockchain-enabled e-commerce platforms would provide detailed transaction information to customers.	
	TSP4	Blockchain-enabled e-commerce platforms would make it easy to find the information customers need.	
Perceived Value	PV1	I could reduce the cost of shopping by shopping on blockchain-enabled e-commerce platforms.	(Wang et al., 2023)
	PV2	I would shop efficiently on blockchain-enabled e-commerce platforms.	
	PV3	The product information on the blockchain-enabled e-commerce platforms would be complete.	
	PV4	Blockchain-enabled e-commerce platforms would offer a wider variety of products.	
Perceived Security	PS1	Blockchain-enabled e-commerce platforms would implement security measures to protect users.	(Escobar-Rodríguez & Carvajal-Trujillo, 2014)
	PS2	Blockchain-enabled e-commerce platforms would ensure that transactional information is protected from being accidentally altered or destroyed during a transmission on the Internet.	
	PS3	I would feel secure about the electronic payment system of blockchain-enabled e-commerce platforms.	
	PS4	I would be willing to use my credit card on blockchain-enabled e-commerce platforms to make a purchase.	
	PS5	I would feel safe making transactions on blockchain-enabled e-commerce platforms.	
Consumer Trust	Trust1	This blockchain-enabled e-commerce platform would be reliable.	(Cheah et al., 2022)
	Trust2	This blockchain-enabled e-commerce platform would be trustworthy.	
	Trust3	This blockchain-enabled e-commerce platform's products and services would be dependable.	
	Trust4	This blockchain-enabled e-commerce platform would offer secure Web transactions.	
	Trust5	It would be unnecessary to be cautious with this blockchain-enabled e-commerce platform.	

Appendix B

Questionnaire

Welcome! Let's Talk About Blockchain-Enabled E-Commerce

Thank you for joining this survey! Before we begin, let’s take a moment to introduce some important ideas. You might have heard the word "blockchain" before, but what does it actually mean, and how could it change the way we shop online? Don’t worry—we’ll explain everything in simple terms.

What is Blockchain?

Imagine a digital notebook where every time something happens, like a purchase or a payment, it gets written down. But here’s the cool part: this notebook isn’t stored by just one person or company. Instead, it's shared across many computers all over the world, and once something is written down, it can’t be erased or changed. This makes it very secure and trustworthy because everyone can see and agree on what’s in the notebook.

How does Blockchain help in E-Commerce?

So how does this help with online shopping? Well, blockchain technology can make online shopping much safer and more transparent. For example, when you make a purchase on a blockchain-enabled platform, the details of that transaction are recorded in a way that can’t be tampered with. This means your payment is secure, your personal information is protected, and you can even trace where your products come from. It’s like having a digital receipt that’s verified by many people, ensuring everything is accurate and reliable.

How is this different from existing approaches?

Right now, when you shop online, the company or website you’re using controls all your data. You have to trust them to keep it safe. But with blockchain, no single company holds all the power. Instead, the information is shared and verified by a network of computers. This makes it much harder for anyone to hack into or alter your transaction details, making the whole process more secure and transparent.

As these platforms are still evolving, this survey will focus on your thoughts about the potential benefits of using such technology in the future. So, think of these questions as asking, “How would you feel if this kind of platform were available?” Let’s get started!

Demographics questions

What is your age?
18-24
25-34
35-44
45-54
55-64
65 or older

What is your gender?
Male
Female
Non-binary/Third gender
Prefer not to say

What is the highest level of education you have completed?
Elementary school
High school
Undergraduate (i.e. Bachelor)
Postgraduate (i.e. Master)
Doctoral or equivalent

What is your annual household income?
Less than €15,000
€15,000 - €30,000
€30,001 - €45,000
More than €45,000
Prefer not to say

How familiar are you with blockchain technology?
Not familiar at all
Heard of it, but don't know much
Somewhat familiar
Very familiar

How often do you shop online?
Never
Rarely (a few times a year)
Occasionally (once a month)
Frequently (once a week)
Very frequently (multiple times a week)

Privacy related questions

Based on the small description and your consumer behaviour experience, please indicate the extent to which you agree with the following statements. (1= "highly disagree" to 5= "highly agree")

	Highly disagree	Disagree	Neither disagree nor agree	Agree	Highly agree
Blockchain-enabled e-commerce platforms should not sell my personal information to other companies.					
Blockchain-enabled e-commerce platforms should not share my personal information with other companies unless I specifically authorize it.					
Blockchain-enabled e-commerce platforms should not use my personal information for any purpose not specifically authorized by me.					
Blockchain-enabled e-commerce platforms should prevent any unauthorized access to my personal information.					
Blockchain-enabled e-commerce platforms should take more steps to ensure that my personal information on their systems is accurate.					

Cost-saving related questions

Based on the small description and your consumer behaviour experience, please indicate the extent to which you agree with the following statements. (1= "highly disagree" to 5= "highly agree")					
	Highly disagree	Disagree	Neither disagree nor agree	Agree	Highly agree
I would purchase most products I want on blockchain-enabled e-commerce platforms because they are generally cheaper.					
Shopping on blockchain-enabled e-commerce platforms would be beneficial in terms of cost-saving.					
Shopping on blockchain-enabled e-commerce platforms could save more money than purchasing at offline stores.					

Transparency related questions

Based on the small description and your consumer behaviour experience, please indicate the extent to which you agree with the following statements. (1= "highly disagree" to 5= "highly agree")					
	Highly disagree	Disagree	Neither disagree nor agree	Agree	Highly agree
Blockchain-enabled e-commerce platforms would be transparent.					
Blockchain-enabled e-commerce platforms would be accountable to customers for their actions.					
Blockchain-enabled e-commerce platforms would provide detailed transaction information to customers.					
Blockchain-enabled e-commerce platforms would make it easy to find the information customers need.					

Perceived value related questions

Based on the small description and your consumer behaviour experience, please indicate the extent to which you agree with the following statements. (1= "highly disagree" to 5= "highly agree")					
	Highly disagree	Disagree	Neither disagree nor agree	Agree	Highly agree
I could reduce the cost of shopping by shopping on blockchain-enabled e-commerce platforms.					
I would shop efficiently on blockchain-enabled e-commerce platforms.					
The product information on the blockchain-enabled e-commerce platforms would be complete.					
Blockchain-enabled e-commerce platforms would offer a wider variety of products.					

Perceived security related questions

Based on the small description and your consumer behaviour experience, please indicate the extent to which you agree with the following statements. (1= "highly disagree" to 5= "highly agree")					
	Highly disagree	Disagree	Neither disagree nor agree	Agree	Highly agree
Blockchain-enabled e-commerce platforms would implement security measures to protect users.					
Blockchain-enabled e-commerce platforms would ensure that transactional information is protected from being accidentally altered or destroyed during a transmission on the Internet.					
I would feel secure about the electronic payment system of blockchain-enabled e-commerce platforms.					
I would be willing to use my credit card on blockchain-enabled e-commerce platforms to make a purchase.					
I would feel safe making transactions on blockchain-enabled e-commerce platforms.					

Consumer trust related questions

Based on the small description and your consumer behaviour experience, please indicate the extent to which you agree with the following statements. (1= "highly disagree" to 5= "highly agree")					
	Highly disagree	Disagree	Neither disagree nor agree	Agree	Highly agree
This blockchain-enabled e-commerce platform would be reliable.					
This blockchain-enabled e-commerce platform would be trustworthy.					
This blockchain-enabled e-commerce platform's products and services would be dependable.					
This blockchain-enabled e-commerce platform would offer secure Web transactions.					
It would be unnecessary to be cautious with this blockchain-enabled e-commerce platform.					