The role of Trust in the adoption of Blockchain

A systematic literature review

Presented by

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Regarding the obtention of Master 2 MIAGE

Paris 1 Panthéon - Sorbonne

Academic year : 2022–2023

Defence date : 21/09/2023

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Abstract

In this master thesis, we look into the role of trust in blockchain adoption by examining relevant literature. A total of 21 studies were reviewed using Kitchenham guiding principles for a systematic literature review. Our results showed that the most frequently acceptance model used in the literature is the TAM model. Looking into the factor of adoption, “Trust” and “Social influence” were found to be the most influential factor in the context of Blockchain. Delving deeper and comparing different domains, “Trust” emerged as the most influential factor in both Business and Finance sector and globally in our list of articles. In the comparison of the surveys, we found that the methodology was mostly similar by using online surveys and likert scale for the responses, but that the target populations were diverse. Additionally, we examined the way the trust questions were asked. Trust was found to be an influence in three ways : a direct influence, as a mediating factor, and as a moderating factor. Finally, we classified the type of trust questions and found that the most common type of trust was digital trust.

Acknowledgements

I would like to thank all the people, who have helped me with the writing of my master thesis, helped me correct it through numerous rereading and allowed me to improve my work thanks to their helpful suggestions.

Additionally, thank you to my professor, Irina RYCHKOVA, for her guidance in the structuring, her insights on the subject and support throughout the writing process.

Finally, to my family, friends and especially A., whose support became my anchor during the most challenging phases, thank you for carrying me through to the end.

Contents

1—Introduction

1.1. Context

The apparition of blockchain technology marked a new era in the digital world. Blockchain's innovation was to implement a system in which there was no need for a centralized authority or third party, therefore creating a trustless environment in which transactions could take place. Instead of placing their faith in an intermediary, users could trust the blockchain. The history of digital innovation reveals that trust has always played an important role in the adoption of new technologies. For example, in 1999, Hoffman discovered that the main barrier to the adoption of online shopping was distrust in its security [1].

While blockchain can offer a lot of advantages for any organizations, from enhancing their transparency, reducing operational costs, and improving traceability, its adoption isn't as widespread as we could expect. A survey of 2018 found that "only 34 percent say their company has initiated some sort of blockchain deployment." [2]. A significant barrier for many organizations is the lack of trust. In 2018, a PWC survey found that "45 % of companies investing in blockchain technology believe that lack of trust among users will be a significant obstacle in blockchain adoption" [3].

For blockchain to be able to transition from theory to practice, the trust issue needs to be addressed, which is why we decided to delve deeper in the exact role of trust in the adoption of blockchain.

1.2. Research problem

Our study focuses on the different acceptance models used to evaluate the adoption of blockchain, the acceptance criteria that these models take into account, and the role of trust in these criteria and models. Specifically, we will explore whether trust is a factor in these models and, if so, what role does trust have and what type of trust it is. Through this analysis, we want to provide a deeper understanding of the role of trust in blockchain and how it factors into the adoption process. To conclude, we aim to answer the question:

How does trust impact the adoption of blockchain technology?

The remainder of this master thesis is organized as follows: In section 2, we go through the definition of key terms. The methods employed to develop the review are described in section 3. In section 4, we analyse the sources screened and give results linked to the research questions. Finally, section 5, provides a general interpretation of the results with respect to the review question and objectives, as well as potential implications.

2 – Overview of key terms

In this part, we are going to define keys terms and concepts related to our subject. We will define the basic principles of blockchain technology, explain what is trust and how acceptance models work.

2.1. Blockchain

Blockchain is a decentralized digital ledger that allows the recording and verification of transactions across multiple computers. Each block in the chain-like structure that holds information has a timestamp for the moment it was created, as well as information about the block before it in the chain. This structure makes the data saved on the blockchain more trustworthy and tamper-proof [0].

2.2 Trust

"An individual must make a 'leap of faith' when committing to the new technology. This leap of faith is trust" [4]. Without trust, users are unlikely to engage with a technology or adopt it for their needs [1]. Trust is part of each component in regard to technology adoption, for example, do I trust blockchain as a technology ? Do I trust it to do what I want it to do ?, or again, can I trust the organization developing this technology ?

2.2.1 Types of trust

We can define several types of trust.

Social Trust

Gambetta defines trust as "*a particular level of the subjective probability with which an agent assesses that another agent or group of agents will perform a particular action, both before he can monitor such action (or independently of his capacity ever to be able to monitor it) and in a context in which it affects his own action"* [5].

Meyer defines trust as *"willingness of a party to be vulnerable to the action of another party based on the expectation that the other will perform a particular action important to the trustor, irrespective of the ability to monitor or control that other party"* [6].

Each definition of trust above involves two parties: a trusting party (trustor) and a party to be trusted (trustee). Risk (the hope that someone else's actions will be helpful rather than negative) and vulnerability (the idea that anything valuable is in danger) are often related to trust. In a way, trust can be considered as the calculation of the perceived cost-benefit : there is more trust when the trustor thinks that the trustee will do an action that is beneficial.

Digital Trust

Marcial and Launer (2019) defines digital trust as *"the level of confidence in people, processes, and technology to build a secure digital world*." [7].

Mattila and Seppälä (2016) defines it as *"Digital trust stems from a combination of different factors : security, identifiability, and traceability."* [8].

The trustee will be for example a website, or a system like blockchain, and a trustor is the actor using the system. Having digital trust means that the actor will use the system and *trust it* to do what it is intended to do without breaching the actor's private data and information.

Technology Trust

McKnight defines technology trust as *"the trustor's beliefs in Information Technology (IT)'s trustworthiness to perform a task [..], you can be willing to depend on an IT just as you are willing to depend on the person"* [9].

The trustor will be an actor and the trustee will be the technology in itself.

2.2.2 Trust in Blockchain

The trust gap present in traditional banking systems was the motivating factor behind the development of blockchain technology. Blockchain was intended to serve as a "trustless" replacement for financial institutions like banks. Blockchain works without the need for a trusted third party, in contrast to traditional banking, which depends on human middlemen [10]. However, in the absence of social trust, blockchain introduces a shift toward digital and technological trust [11]. Therefore, successful blockchain adoption will only happen if you succeed in building trust in the new system.

2.3 Acceptance models

A lot of models have been proposed to explain the factors that influence the adoption of new technologies such as blockchain, including acceptance models.

An acceptance model is a set of factors determining the probability that a potential user or customer will adopt a blockchain-based system. Two of the most widely used acceptance models are the Technology Acceptance Model (TAM) and the Unified Theory of Acceptance and Use of Technology (UTAUT).

2.3.1 Technology Acceptance Model (TAM)

The Technological Acceptance Model (TAM) was created by Fred Davis in 1989. This theoretical framework's goals were to explain and predict the adoption and use of new technology. The model is based on the notion that a user's intention to use a technology is influenced by how beneficial, and simple they believe it to be to use. "Perceived usefulness", on the other hand, relates to the user's belief that the technology will enhance their performance, and "Perceived ease of use" refers to the user's idea that the technology would be easy to use [12].

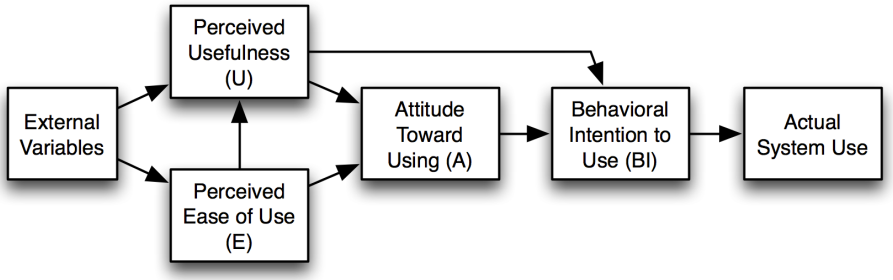

Figure 1 —TAM Model [12].

In Figure 1, "Perceived usefulness" and "Perceived ease of use" are the two primary factors that influence a user's attitude towards a technology. This attitude then affects their behavioural intention to use the technology, which ultimately determines their actual behaviour. The arrow between "Attitude" and "Behavioural intention" represents the relationship between these two factors. Additionally, "Perceived usefulness" and "Perceived ease of use" can be influenced by external factors.

2.3.2 Unified Theory of Acceptance and Use of Technology (UTAUT)

UTAUT was created by Venkatesh in 2003 as a theoretical model to explain and predict users' acceptance and use of technology. UTAUT builds upon the Technology Acceptance Model (TAM) and integrates several key constructs from other technology adoption models, such as the Theory of Reasoned Action (TRA) and the Theory of Planned Behavior (TPB) [13].

In this model, “Performance expectancy”, “Effort expectancy”, “Social influence”, and “Facilitating conditions” are the key factors of technology acceptance. “Performance expectancy” refers to the extent to which a user believes that using a technology will improve their job performance or enhance their productivity. “Effort expectancy “refers to the degree of ease associated with using the technology. “Social influence” refers to the impact of social factors, such as norms and opinions of others, on the user's intention to use the technology. “Facilitating conditions” refer to the external factors that can support the use of the technology, such as training or technical support. The UTAUT model also believes that a number of human characteristics, for example gender, age, and experience, might affect one or more of the keys factors. As shown in the Figure 2, this may then have an impact on the user's intention to utilize the technology and their actual use of it.

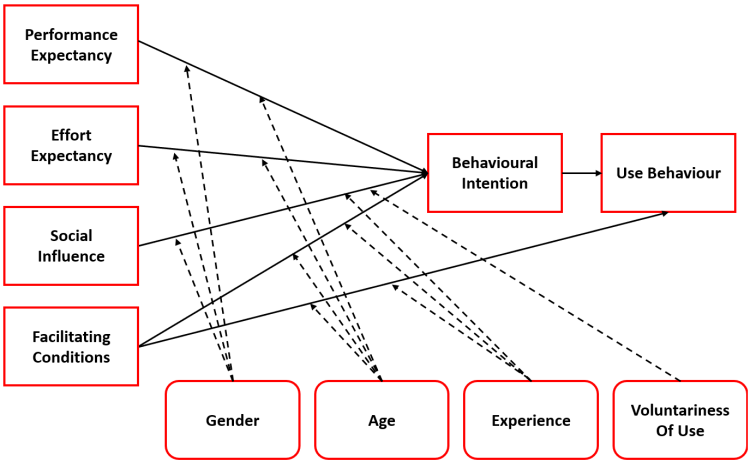

Figure 2 — UTAUT Model [13]

2.4 Related work

In this section, we are going to do an examination of the related studies. We will emphasize on what makes our research distinct in comparison to the current state of knowledge. Table 1, shows the earlier review studies conducted on Blockchain technology and factors of adoption.

Reference	Type	Article	Domain	Goal
38	Systematic review	Key Factor Adoption Blockchain Technology In Smart Supply Management: Literature Review	Supply Chain	Factors that can lead to the adoption of blockchain technology in the supply chain
39	Systematic review	A Systematic Review on Blockchain Adoption	General	Analysis of the adoption of blockchain technology by looking at the technology acceptance models used and the influential factors
40	Systematic review	The Affecting Factors of Blockchain Technology Adoption of Payments Systems in Indonesia Banking Industry	Banking	Find the influence factors of blockchain technology adoption of payments system in Indonesia banking industry.
41	Systematic review	Classifications of Sustainable Factors in Blockchain Adoption: A Literature Review and Bibliometric Analysis	General	Identifies 30 relevant studies from the Web of Science and Scopus, including their industries, countries, methods, and respondent sample size, and the top 18 adoption factors among them

Table 1—List of related works

Studies [38] and [40] focus on examining the factors influencing adoption within specific domains, specifically the banking and supply chain sectors, respectively. However, these studies do not use adoption models to analyse these factors. In contrast, studies [39] and [41] provide a closer alignment with our research objectives as they investigate adoption factors across different domains and through different adoption models.

Despite all these studies acknowledging the presence of trust as a factor, none of them delve deeper into its role and its actual influence on blockchain adoption. In our work, we aim to fill this

research gap by thoroughly investigating the adoption factors once again and specifically focusing on the role of trust and its impact on the adoption of blockchain technology. Additionally, we will conduct a comparative analysis of various surveys conducted in this area to gain further insights. Through our research, we want to contribute to a better understanding of the relationship between trust and the adoption of blockchain technology.

3—Methodology

3.1 Definition of systematic literature review

In this study, we chose to apply a systematic literature review (SLR) approach to review existing research on blockchain adoption. This approach uncovers sources relevant to the research topic and provides a synthesis of the topic under study. A systematic literature review can provide a comprehensive overview of the current state of knowledge in a particular field, and identify areas where more research is needed. As a result, we will be able to pinpoint gaps in the body of knowledge on trust in blockchain adoption and offer suggestions for further study.

This study follows the guiding principles of systematic review established by Kitchenham and Charter [14]. By doing so, we followed the following steps :

Defining the research questions : We have to clearly define the research question by making sure the question is specific and relevant to the topic.

Identifying relevant studies : We have to use various databases and search engines to find studies that are relevant to your research question.

Data extraction, analysis, and synthesis : We have to extract the data, interpret it and draw conclusions.

Reporting the results : We have to report the results of the SLR.

3.2 Defining the research questions

With this research, we aim to answer the following research questions :

- RQ1 : According to the literature, which acceptance models are mostly used in regard of Blockchain adoption?

Rationale: The goal is to identify the acceptance models that are most frequently used in blockchain adoption research. We will adopt a quantitative approach to determine the prevalence of a specific acceptance models.

- RQ2: What factors of these acceptance models are identified as significant predictors of blockchain adoption?

- RQ2.1 : How do these factors vary across different contexts and user groups?

Rationale: The goal is to identify factors that can influence the adoption of blockchain. The second part of this research question will aim to find, or not, a difference in the factors of adoption depending on specific industries or user characteristics (knowledge on the subject …)

- RQ3: What are the methods used in the studies ?

Rationale: The goal is to compare the methodology of the studies to be able to identify different patterns and understand variation of outcomes.

- RQ4 :How trust influences the adoption of blockchain according to these acceptance models?
  - RQ4.1 : What kind of trust is more associated with Blockchain adoption?

Rationale: The goal is to understand how trust impact the adoption of blockchain and if a specific type of trust is more associated with the adoption of blockchain.

3.3 Identifying relevant studies

3.3.1 Keywords and query

A literature search was conducted using the Scopus database (scopus.com) with an interface MIAGE Scholar created by the university Paris 1.

In order to identify our relevant study, we have to establish the keywords in order to create a search query. The proper association of these terms enables us to acquire our publication base. The following keywords were used to build the query:

Blockchain, Adoption models, Technology acceptance, Trust

Finally, to connect keywords and associate their synonyms, Boolean operators “AND” and “OR” were used. The resulting query is the following :

((TITLE-ABS-KEY(”technology acceptance”) AND TITLE-ABS-KEY(Blockchain)) OR (TITLE-ABS-KEY(blockchain adoption) TITLE-ABS-KEY(blockchain adoption models) TITLE-ABS-KEY(blockchain acceptance) OR TITLE-ABS-KEY(blockchain acceptance models))) AND

(TITLE-ABS-KEY(trust) OR TITLE-ABS-KEY("trustworthiness")) AND PUBYEAR > 2019 AND PUBYEAR < 2023

For our study, we chose articles published between 2019 and 2022 to ensure up-to-date research while avoiding outdated information. We selected 2019 because, as shown in Figure 3, it marks the beginning of increased interest in our subject topic within the scientific community.

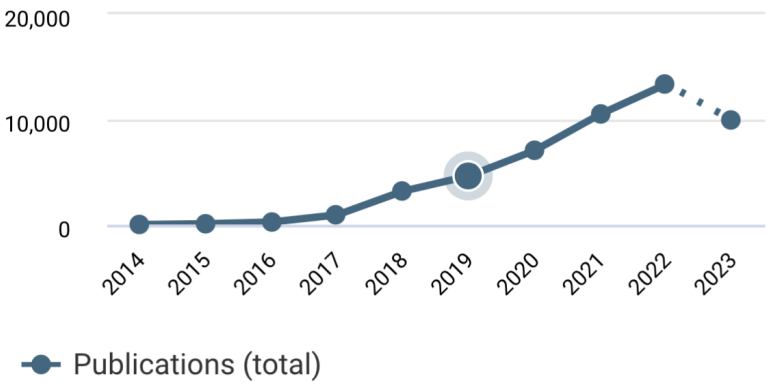

Figure 3—Publications year by year corresponding to our research domain [42]

After the initial search, all results, titles, abstracts and full texts were filtered and checked before inclusion in this study.

3.3.2 Eligibility Criteria

In order to carry out the filtering phase of the SLR method, inclusion and exclusion criteria have been selected. These criteria provide systematic guidelines for including or excluding articles during the filtering phase. Table 2 shows these criteria.

Inclusion Criteria	Exclusion Criteria
Should measure the adoption or acceptance of Blockchain.	Study written in languages other than English or French.
Should apply an acceptance model	Study does not focus on Blockchain adoption
Should conduct a survey	Study full-text is not available

Table 2 – List of inclusion and exclusion criteria.

Additionally, to align with our research, the articles must contain information regarding the adoption or acceptance of blockchain technology and use an acceptance model. We also only used studies conducting a survey to collect their data. We excluded articles not written in French or English to ensure a clear understanding of the research. Furthermore, we have excluded articles that do not focus on blockchain adoption, as our study aims to explore the role of trust in the adoption of this technology.

3.3.3 Selection of Sources

We use the PRISMA framework to guide the selection of articles [15]. To initiate the process of selecting our articles, we first retrieved the list of results from our query (as indicated in section 3.3.1.) and found a total of 79 articles. A total of 78 papers were reviewed.

Filtering based on Abstract/Title reading: Based on the data in the abstract, 31 of these were eliminated. 7 articles were also disqualified because it was impossible to access. In the end, 40 articles were determined to be eligible for the study.

Full-text filtering: From there, we read each of these 40 articles in their entirety to further filter them down. We then proceeded to apply the inclusion and exclusion criteria mentioned in section 3.3.2, this step resulted in the exclusion of 23 articles, leaving us with a total of 17 articles.

3.3.4 Other sources and snowballing

Finally, we employed the "Snowballing" method, which consists in using the reference lists of published articles to lead us to other related studies, offered by the MIAGE Scholar search engine. We were able to add four more articles to our list, which ended up to 21 studies. The analysis and filtering phases that we implemented in order to obtain our database are illustrated in the Figure 4 below.

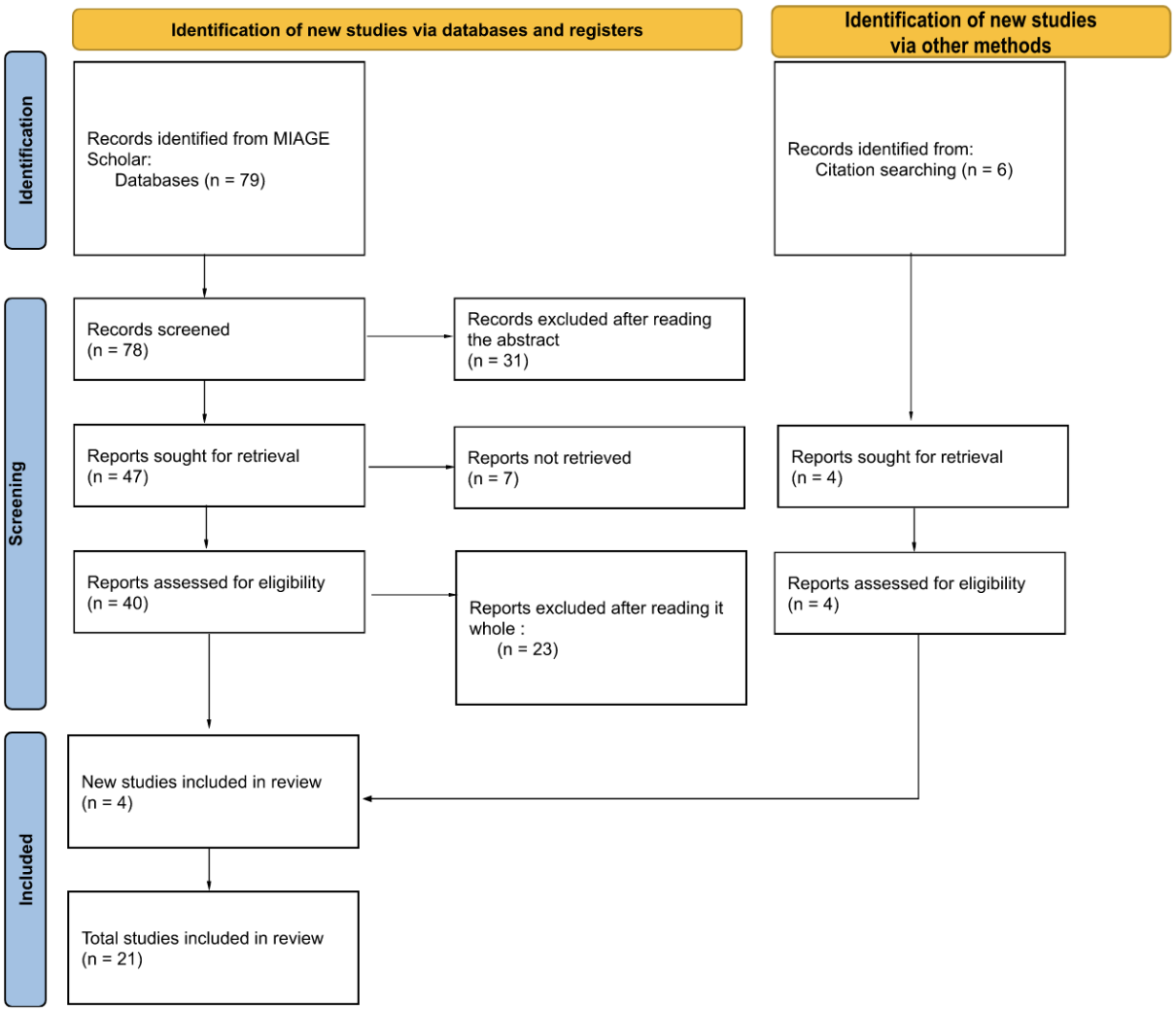

Figure 4—The PRISMA flowchart summarizing the documentary research process

3.4 Data extraction, analysis, and synthesis

Finally, to be able to extract our data systematically, we have created an extraction form. Table 3 summarizes this form.

Data	Information	Related RQ
Research Method	The method used for the research	RQ1
Acceptance model	What acceptance model is used in the study	RQ1

All Factors identified	Which factors are identified in the adoption of Blockchain	RQ2
Factors important	Which factors are identified as having the highest correlation to the adoption of Blockchain	RQ2
Survey sample	Sample of the study if a survey	RQ3
Composition of survey	Composition of the survey	RQ2.1
Survey method	Method used to take the survey	RQ3
Survey target population	To whom the survey was administered	RQ3
Number of questions	Number of questions in the survey	RQ3
Scale of answer	The scale used for the answer of the questions	RQ3
Questions provided	Yes/No	RQ3
Questions about trust	How were the questions relating trust were asked	RQ3, RQ4, RQ4.1
Domain of study	Domain of the study	RQ2.1
Questions	Questions asked in the survey	RQ4
Hypotheses	Hypotheses formulated in the study	RQ4
Is trust a factor ?	Yes/No	RQ2, RQ4
Is trust explicit or implicit	Explicit/Implicit. Is it mentioned explicitly, or as part of something else.	RQ3, RQ4
Trust definition	The definition given of trust in the study and the author	RQ4.1
Trust Role	Direct / Moderating Role / Mediating Role	RQ4
Impact of trust	What is the impact of trust in the study	RQ4
Type of trust	Type of trust identified	RQ4.1

Table 3 —Extraction form

4—Results

After compiling a list of articles for our systematic review of the literature, we can proceed to the analysis in order to be able to present the results. This part is divided into four parts, each part and subpart answer one of our research questions in detail.

4.1 RQ1 – According to the literature, which acceptance models are mostly used in regard of Blockchain adoption?

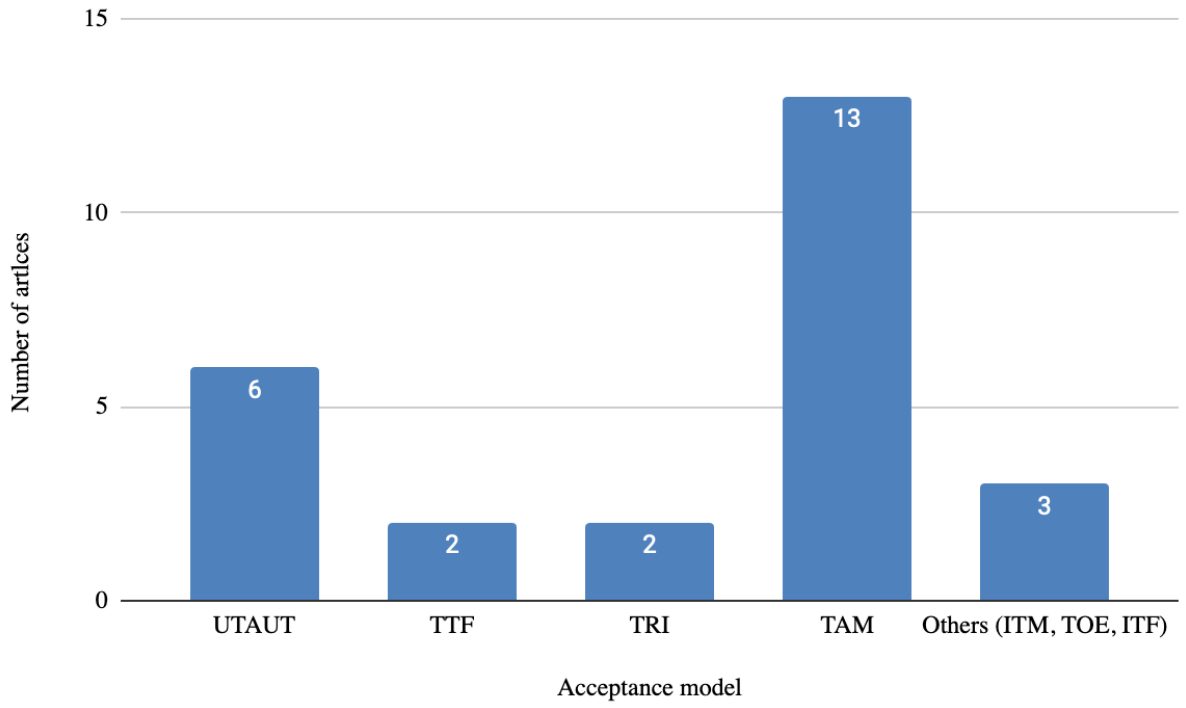

Figure 5—Acceptance models usage

Several acceptance models have been widely used to study the adoption of blockchain technology, according to the literature. 6 articles ([1], [2], [24], [27], [29], [36]) adopted the Unified Theory of Acceptance and Use of Technology (UTAUT) in their research, making it the model that is second most used. 2 publications ([15], [28]) have each used the Technology-to-Performance Fit (TTF) and Trust-Resistance-Intention (TRI) models. Furthermore, Technology Acceptance Model (TAM) is the most popular type of model and has been employed in 13 articles ([19], [20], [21], [22], [23], [25], [26], [28], [31], [32], [33], [34], [35]). 3 publications together have also used other

acceptance models, such as the Innovation Diffusion Theory (ITM) [27], Technology-Organization-Environment (TOE) [18] and Information Technology Framework (ITF) [24]. The Innovation Diffusion Theory (ITM) primarily investigates how innovations, such as blockchain, spread within communities and organizations. The Technology-Organization-Environment (TOE) framework, provides an overview by examining the relation between technological, organizational, and environmental factors in technology adoption decisions.

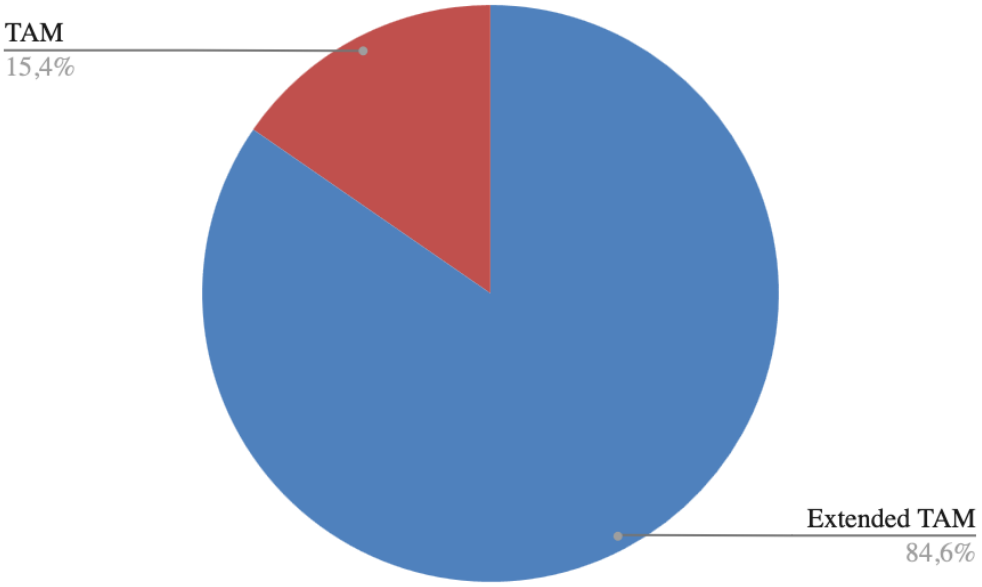

Figure 6 — Type of TAM usage

11 of the included publications employed the Extended TAM ([19], [20], [21], [22], [23], [25], [26], [28], [31], [32], [35]), whereas 2 studies just used the conventional TAM ([33], [34]). Building on the TAM, the Extended TAM integrates other constructs and elements to give a more thorough picture of technology adoption. Study [6] added factors such as “Perceived security”, ”Privacy”, ”Trust“ whereas study [26] added “Perceived innovativeness”, “Knowledge”, “Risk”, “Trust” for example.

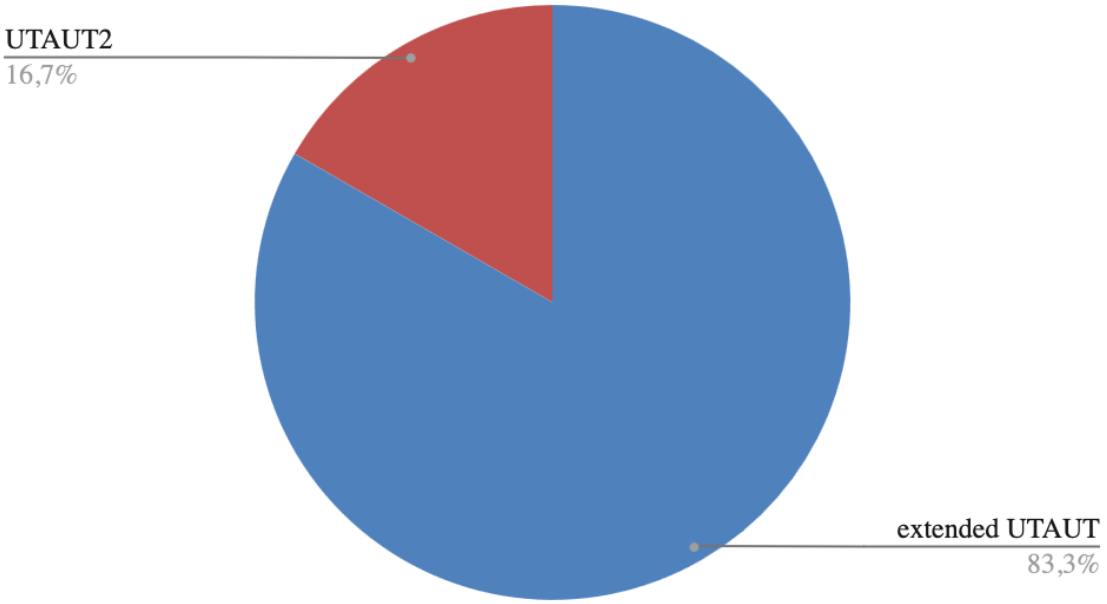

Figure 7 — Type of UTAUT usage

The findings show that 5 of the included articles used the extended UTAUT model ([16], [17], [24], [29], [36]), while the UTAUT2 was used in 1 [27] articles respectively. UTAUT2, an extension of UTAUT, was proposed by Venkatesh in 2012 [37]. Three new variables are introduced : “Habit” (the impact of routine and previous habits on technology use), “Price value” (the perceived value users associate with the cost of using the technology), and “Hedonic motivation” (the pleasure or satisfaction obtained from using the technology). Study [16] for example added constructs such as “Security”, “Trust & Transparency” to the base UTAUT model.

4.2 RQ2 – Which factors of these acceptance models are identified as significant predictors of blockchain adoption?

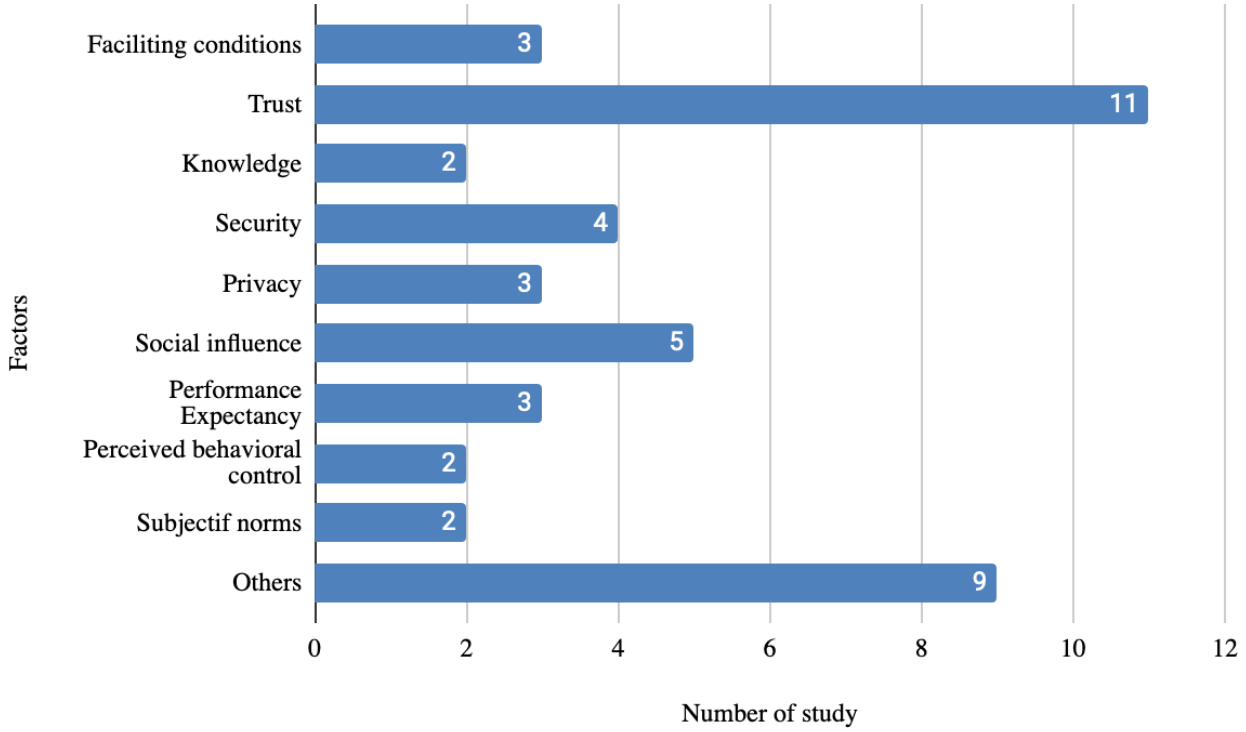

Figure 8 — Top 2 most influential factors

We aimed to find the key factors that strongly predict acceptance in the acceptance models. To simplify our analysis, we focused on factors that had a strong influence in at least two studies. Factors that were found to be influential in only one study were categorized as "Others". Our study identified the top two influential factors from each research study. We found that “Trust” was identified as one of the most influential factors in 11 studies [[16], [17], [20], [22], [25], [26], [28], [30], [31], [32], [35]), highlighting its significant role in acceptance. “Social influence” also emerged as another important factor, with a total of 5 studies.

RQ2.1 – How do these factors vary across different contexts and user groups ?

While trust stands out as the most common influential factor of our studies, it would be interesting to examine its significance in specific domains like finance, supply chain or business. The

prevalence of a factor in a specific sector might indicate a particular concern due to the domain's challenges.

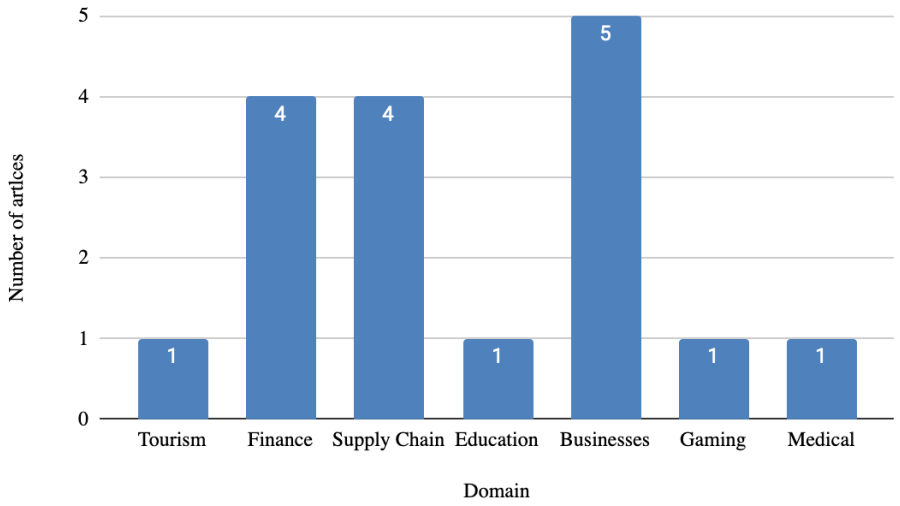

Figure 9 — Domains of studies

The distribution of articles across various domains indicates the focus of research in different fields. Among the analysed articles, tourism, education, gaming, and medical domains each had 1 article dedicated to them, suggesting a relatively limited focus in these areas. On the other hand, finance, supply chain, businesses emerged as the key areas of interest, with 4 or more articles dedicated to each domain. Finally, 4 articles had no specific domain of study.

Study	Factors top 2	Domain
[17]	Faciliting conditions, Trust	
[20]	Social influence, Trust	
[23]	Risk, technology awareness	
[30]	Performance expectancy, Trust	Finance
[21]	Efficiency, Security	
[25]	Trust, Privacy	
[26]	Trust, Knowledge	

[34]	Perceived behavioural control, Subjective norms	
[36]	Social influence, Performance Expectancy	
[18]	Relative advantage, Trust	
[24]	Performance expectancy, User satisfaction	
[29]	Social influence, Faciliting conditions	
[33]	Perceived behavioural control, Subjective norms	Supply Chain

Table 4 — Studies' in Supply Chain, Business, and Finance, top 2 factors

Domains context

In the Business sector, trust was a key topic in two out of the five articles we analysed ([25], [26], [36]). This highlights how essential trust is for companies considering implementing blockchain technology. The other factors, "Efficiency", "Security", "Privacy", "Knowledge", "Perceived behavioural control", "Subjective norms", "Social influence" and "Performance Expectancy" – each appeared once, illustrating the multifaceted considerations businesses must face. In the Supply Chain sector, every factor is cited only once, showing no dominance of a specific factor. In the Finance sector, the factor "Trust" is dominant, being cited in three out of the four articles ([17], [20], [30]). Other factors such as "Facilitating conditions", "Social influence", "Risk", "Technology awareness" and "Performance expectancy" are each mentioned once.

User group of blockchain knowledge

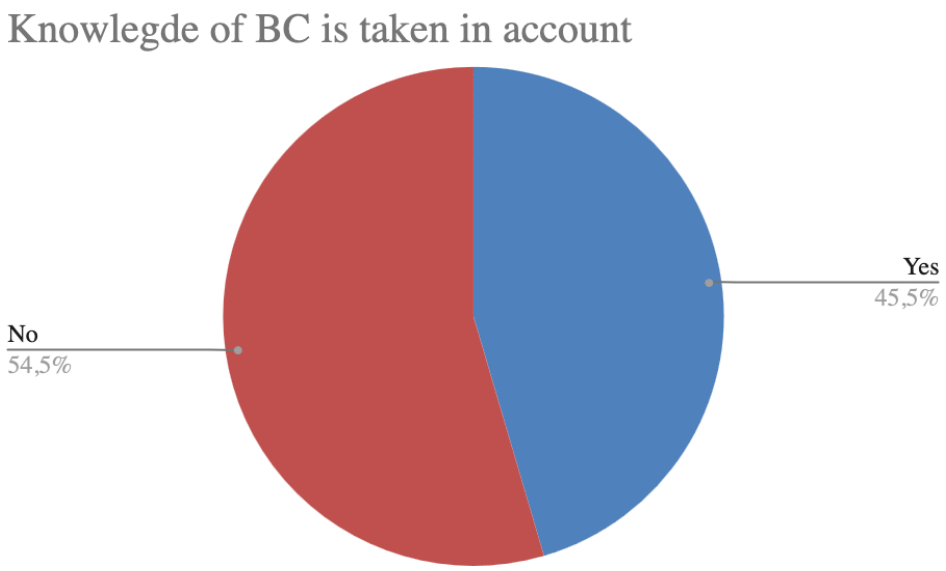

Figure 10 — Knowledge of Blockchain is taken in account

Among the analysed articles, we found 12 articles that explicitly took Blockchain Knowledge into account when evaluating the adoption of blockchain. On the contrary, a small proportion of the articles, 9, did not consider the level of knowledge of their participants in their analysis.

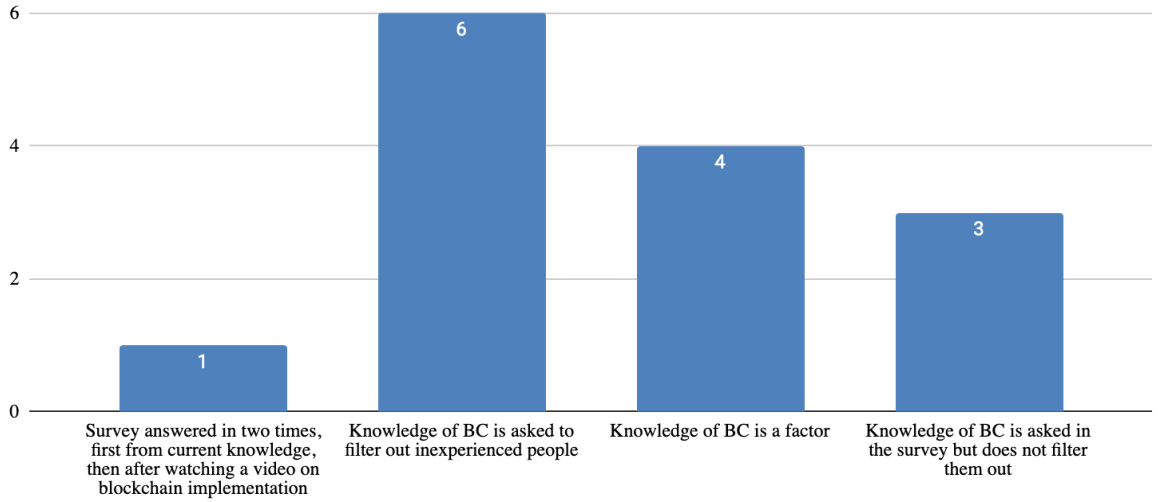

Figure 11 — Classification of how knowledge is taken in account

Out of the studies that explicitly incorporated knowledge of blockchain technology into their analyses, various approaches were observed. Study [16] implemented a unique two-stage survey approach: respondents first answered based on their current understanding, and then, after viewing an informational video about blockchain, provided a subsequent set of responses. Studies [20], [28], [29], [23], and [35] asked questions about respondents' blockchain understanding, using this as a way to filter out individuals with no experience or knowledge of blockchain technologies. On the other hand, studies [27], [32] and [22] included questions regarding blockchain understanding but did not use it to remove participants based on this. Studies [23], [26], [32] and [36] went a step further by using it as a distinct influential factor.

Across the studies examined, “Trust” was consistently identified as one of the top influencing factors in eight out of the twelve studies ([16], [20], [22], [26], [28], [30], [32], [35]).

4.3 RQ3 – What are the methods used in the studies ?

Survey Overview

Study	Survey Sample	Administration method	Target population	Number of questions	Questions provided in the survey	Scale
16	537	Online Survey	Residents of Jeju islands (Korean Islands) and other provinces	28	Yes	5-point likert
17	381	Online Survey	Employees of banking institutions and fintech	32	No	5-point likert
18	287	Online Survey	Professionals working in supply chain departments	47	Yes	7-point likert
19	208	Online Survey	Any university students and professionals	24	Yes	7-point likert
20	103	Online Survey	People who know about blockchain developments	35	Yes	10-point Likert
21	108	Online Survey	Italian innovative companies employees	25	No	7-point likert

22	210	Online Survey	University students	27	No	5-point likert
23	333	Online survey & Paper Survey	University students	33	No	5-point likert
24	449	Online Survey	Professionals of data acquisition firms	49	No	5-point likert
25	248	Online Survey	Professionals of establishments and businesses that allow Bitcoin transactions	29	Yes	5-point likert
26	287	Online Survey	Supply chain managers/professionals using BCT	21	Yes	5-point likert
27	72	Online Survey	University students	33	No	Not provided
28	254	Online Survey	University students and members	24	Yes	7-point likert
29	184	Online Survey	Professionals in supply chain	23	Yes	7-point likert
30	327	Online Survey	Anyone that had previous notions about what cryptocurrencies	26	Yes	7-point likert
31	251	Online Survey	Anyone who uses money transaction technologies	34	Yes	7-point likert
32	94	Online Survey	Users of Save-Ideas.com, who uploaded at least one idea on this platform.	21	Yes	7-point likert
33	181	Online Survey	Supply chain professionals	33	Yes	5-point likert
34	211	Online Survey	Professionals working in the manufacturing, logistic, finance, and Information Technology department of Pakistan.	36	Yes	5-point likert
35	63	Online Survey	Anyone with knowledge about the internet	Not provided	No	7-point likert

36	246	Online survey & Paper Survey	Professionals of supply chain	31	No	7-point likert

Table 5—Survey overview

As seen in Table 5, we can make different observations. Firstly, the most population administration method is an online survey. This suggests that researchers are using the internet to gather data from a wider audience, with the use of social media such as LinkedIn ([21], [29]). Study [23] and [36] also distributed paper surveys, indicating efforts to reach populations that may not have been easily accessible online. Secondly, almost every study uses a likert scale for the responses but with different granularity, for example, 1 -strongly agree to 7-strongly disagree for a 7-point. The different scales can affect the answers, a 10-point scale, in study [20], might offer more nuanced feedback compared to a 5-point scale. Thirdly, while some studies prefer to target professionals of the research sector (supply chains, banking…) or experienced people from a concept; whereas some aim to a wider audience from no specific background and knowledge, such as university students and members. This diversity of population allow for better and more diverse insights for blockchain acceptance. Finally, the sample size of the studies differ from 63 to 537.

How "Trust" was addressed by the survey ?

As trust is our main point of interest, we will examine and compare the way the trust related questions are asked in studies providing the questions.

Study	Trust Questions
16	Trust & Transparency : • Blockchain technology is trustworthy. • Blockchain technology services are trustworthy. • Data in blockchain technology would have no errors. • Data in blockchain technology would be saved securely. • Data in blockchain technology would be handled transparently.
18	• I feel certain putting away my firm's information using blockchain technology. • Putting away our firm's information under outsider control is one of our Interests. • My firm's data in the cloud might be utilized by an outsider without our assent.
19	• It is trustworthy • It gives an impression of promise and commitment; • It keeps my interest in consideration • This system can be used in long run

20	• The service that My-T Wallet provides is trustworthy. • The service provided by My-T Wallet is very committed. • The services provided by My-T Wallet keep my best interests in mind.
25	• I feel safe using Bitcoin • The decentralization of Bitcoin makes it a safe currency • Forgery and duplication are impossible thanks to a sophisticated cryptographic system • Transactions are irreversible
26	• BCT is trustworthy. • I trust in the benefits of BCT. • I trust BCT.
28	Calculation-based trust : • Blockchain makes the cost of fraud very high. • Blockchain prevents opportunists from making profits. Knowledge-based trust : • Based on my past experience, I think this system is honest. • Based on my past experience, I think this system is trustworthy. • I am familiar with the whole system's technology. • Based on my past experience, I think there is no speculation involved in this system. • Based on my past experience, I think this system is transparent and visible.
29	• I believe that blockchain is trustworthy. • I trust blockchain. • I have no doubt on blockchain's reliability. • I feel assured that legal and technological structures • adequately protect me from blockchain-related problems. • Blockchain has the ability to fulfil its task.
30	• I believe that cryptocurrencies are trustworthy. • I have confidence in cryptocurrencies. • I do not doubt the veracity of cryptocurrencies, their systems, and related services. • I am confident that the legal and technological structures protect me from problems with cryptocurrencies. • Even if they were not regulated, I would still trust cryptocurrencies. • Cryptocurrencies are capable of doing their job.
31	• This service is trustworthy. • The service providers (both cryptocurrency and blockchain) give the impression that they keep promises and commitments. • I believe the service providers (both cryptocurrency and blockchain) keep my best interests in mind.
32	• This website (Save-Ideas) has the skills and expertise to perform transactions in an expected manner • This website (Save-Ideas) has access to the information needed to handle transactions appropriately • This website (Save-Ideas) is fair in its conduct of customer transactions • This website (Save-Ideas) is fair in its customer service policies following a transaction • This website (Save-Ideas) is open and receptive to customer needs • This website (Save-Ideas) makes good-faith efforts to address most customer concerns • Overall, this website (Save-Ideas) is trustworthy
33	No questions about trust explicitly
34	No questions about trust explicitly

Table 6 - Explicit Trust questions in the survey

A common theme across the surveys is the direct questioning of the trustworthiness and reliability of blockchain or the specific service/tool in question. This is seen in [16], [18], [19], [25], [26], [28], [29], [30], [31] and [32]. Some studies, such as [19] and [20], focus on the service's promise and commitment. This question aims to see if users believe that the technology has their best interests in mind. Studies [29] and [30] include questions on trust in the legal structures surrounding blockchain and cryptocurrencies, questions like, "I am confident that the legal and technological structures protect me from problems with cryptocurrencies" from [30] underscore the importance of this trust. Studies [28] and [33] emphasize trust built upon experiences, these questions suggest that familiarity and previous interactions with the system or service play a crucial role in forming trust. Trust and security are linked in several studies, [25], [26], [16], [18] and [32]. For instance, the question “I feel safe using Bitcoin” from [25] isn't just about trust; it taps into the sentiment of security that Bitcoin offers against potential threats. Similarly, the statement from [16] about "Data in blockchain technology would have no errors" sheds light on the trust in the reliableness of blockchain's security. Finally, a broader view on blockchain's features is presented in various questions, such as “Data in blockchain technology would be handled transparently” or “The decentralization of Bitcoin makes it a safe currency”. These questions are not only about trust; they also explore the fundamental values that blockchain and cryptocurrencies promise, like transparency and decentralization.

While the studies explicitly address trust in their questions, it's also crucial to acknowledge the implicit dimensions of trust present in many of them. Table 7 summarizes our findings in implicit trust.

Study	Factor	Questions	Explanation
25	Security	• IT Devices using blockchain technology would be safe from external threats, such as hacking. • IT Devices using blockchain technology would be safe from risks such as information leakage. • IT Devices using blockchain technology would be safe against possible misuse of information. • IT Devices using blockchain technology would be safe from the risk of data forgery and alteration. • IT Devices using blockchain technology would secure personal information.	Asking about trust in BC security capabilities

28	Security	• I feel that blockchain technology isn't adequately secure to store our firm's information. • I feel that traditional technologies are safer than blockchain technology	Asking about trust in BC security capabilities
30	Security and privacy	• Use of the blockchain-based system is technically secure; • I have confidence in the system; • I believe the system for the confidentiality of data	Asking about trust in BC security capabilities
33	Security	• I feel that My-T Wallet (blockchain) is very safe. • I feel that My-T Wallet (blockchain) is so secure that no one can change anything without notice.	Asking about the trust in BC security capabilities
34	Privacy, Security	• Transactions take place directly from person to person, and I think it is good that there are no intermediaries • It is not necessary to reveal your identity when doing business and you preserve your privacy • Decentralization and the fact that no country controls it guarantee that my investment is private • Money is safe in transactions with the Bitcoin cryptogram The digital format capacity is sufficient for high volume transfers	Asking about trust in the anonymity and security of transactions
25	Information quality	• With blockchain, the information in the system is accurate. • With blockchain, the information updates in the system are timely. • With blockchain, the information in the system is adequate. • With blockchain, the information in the system is complete. • With blockchain, the information in the system is reliable.	Asking about trust in BC reliability
28	Risk	• I think that the use of cryptocurrencies puts my privacy at risk. • I think hackers can control my transaction history if I use cryptocurrencies.	Asking about trust in the anonymity and security of transactions
30	Disconfort, Insecurity	• Technology always seems to fail at the worst possible time I • I worry that other people will see the information you send over the BT • Whenever something gets automated, you need to check carefully that the machine or system is not making mistakes	Asking about BC reliability, anonymity and security of transactions
33	Disconfort, Insecurity	• Technology seems mostly to fail at the worst • You are worried, blockchain technology adoption will disturb your firm security in the future • You do not feel confident and reliable on adopting blockchain technology	Asking about BC reliability, anonymity and security of transactions

Table 7 - Implicit Trust questions in the survey

Security-related questions often serve as a way to ask for trust. Trust in the capabilities, reliability, and robustness of Blockchain is not just explicit; it's implied in the concerns and considerations regarding its safety and protection mechanisms in the way it handles transactions and data. This link between trust and security is present in study [16], [17], [19], [20], [33], and [34].

Moreover, the themes of privacy and risk, which further emphasize the relationship between trust and other variables, are pronounced in studies such as [25] and [30]. While trust might not always be explicitly stated, it remains a core concern in different factors.

4.4 RQ4 – How trust influences the adoption of blockchain according to these acceptance models?

Trust has been found in different ways across the studies, it can be categorized as:

Direct Impact of Trust on Adoption

In 5 studies [18, 26, 29, 36, 27], trust was found to directly influence the adoption of blockchain.

Trust as a Mediating Factor

In several studies, trust acts as a mediating factor between other variables and the adoption of blockchain. A mediating factor, is a variable that explains the process through which an independent variable affects a dependent variable.

Study	Independent Variable(s)	Mediator	Dependent Variable(s)	Findings
16	Trust & Transparency	Performance Expectancy, Effort Expectancy, Social Influence, Facilitating Conditions	Behavioral Intention	Trust Transparency has a direct impact on Performance Expectancy, Effort Expectancy, Social Influence, and Facilitating Conditions, which further influence Behavioral Intention.
17	Performance Expectancy, Facilitating Conditions	Trust	Adoption of Blockchain	Trust mediates the influence of facilitating conditions and performance expectancy on blockchain adoption.
19	Perceived Security, Privacy	Trust	Attitude towards Blockchain, Perceived usefulness	Trust shaped by security and privacy shapes user attitudes towards blockchain. Perceived risk is increased when trust is decreased
20	Social Influence, Government Regulations, Security	Trust	Intention to Use Blockchain	Security and governement regulations do not have a significant relationship with Trust. However, social influence does. Trust influences the intention to use the service, but does no changes the perceived ease of Use

22	Perceived Security, Privacy, Perceived Ease of use	Trust	Intention to Use Blockchain	Privacy does not have a positive effect on trust, but Perceived security and Perceived ease of use does. Trust has a positive effect on behaviour intention to use blockchain-based games
25	Risk	Trust	Privacy, Perceived Usefulness, Perceived Ease of use	Trust influences privacy and perceived ease of use in the Bitcoin adoption process but does not influence Perceived usefulness. Risk influences trust.
28	Calculative Based trust, Perceived Ease of use	Trust	Perceived Usefulness, Intention to Use	Trust positively affects the perceived usefulness of blockchain and the intention to use blockchain. Perceived ease of use and calculation-based trust positively affects trust in blockchain.
30	e-Wom, Quality of Website, Perceived Risk	Trust	Behavioral Intention	There is a positive relationship between web quality and trust. Electronic word of mouth has a very strong positive relationship with trust. There's a negative relationship between perceived risk and trust, meaning as perceived risk increases, trust decreases. Trust has a strong positive effect on behavioral intention.
32	Subjective knowledge about BC	Trust	Perceived Usefulness & Intention to use	Positive relation, if an user has knowledge about blockchain, they will have greater trust in these websites and will perceive these websites as more useful
35	Privacy	Trust	Attitude	Trust has a mediation effect between privacy and attitude towards BC

Table 8—Studies where trust is in a mediating relationship

Trust as a Moderator

A moderating variable is a variable that affects the strength of the relationship between an independent variable and a dependent variable.

Study	Independent Variable(s)	Moderator	Dependent Variable(s)	Findings
24	Performance Expectations	Trust	Intention to Adopt Blockchain	Trust strengthens the relationship.
	Effort Expectation	Trust	Intention to Adopt Blockchain	Trust strengthens the relationship.
	Social Influence	Trust	Intention to Adopt Blockchain	No significant moderating effect.
	Facilitating Conditions	Trust	Intention to Adopt Blockchain	Trust strengthens the relationship.

30	e-Wom	Trust	Behavioural Intention	The effect of e-Wom on use behavior is stronger when trust is high.
	Web Quality	Trust	Behavioural Intention	The effect of web quality on use behavior is stronger when trust is high.
	Perceived Risk	Trust	Behavioural Intention	The negative effect of perceived risk on use behavior is weaker when trust is high. This means high trust can mitigate the impact of perceived risk.

Table 9 - Studies where trust is in a mediator relationship

Lack of Trust Examination

- Studies [21, 23, 33, 34] didn't consider trust in their research.

RQ4.1 – What kind of trust is more associated with Blockchain adoption?

None of the studies explicitly categorize trust into a specific type of trust. To understand the type of trust cited, we turned our focus to the very definitions of trust given in each study where trust was an explicit factor. As seen in Figure 12, more than half of the studies examining trust as a factor did not give a proper definition to it. Studies [16], [19], [20], [22], [25], [27], [28], [33], [32], [34], [35], and [36] fall into the category of study where there was no definition to trust, suggesting either an assumption that their audience understands trust in the blockchain context or a potential oversight. Studies where a trust definition was included are summarized in Table 10.

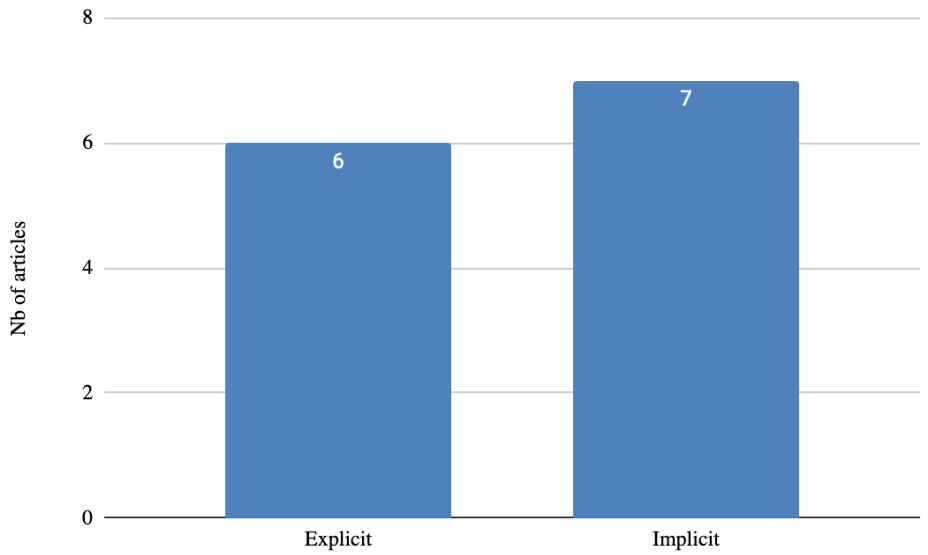

Figure 12 - Definition of trust provided by the studies

Study	Trust definition
17	“Willingness of a person to take risks to fulfill a need without prior experience or credible, meaningful information”. - Kim and Prabhakar
18	Own : “Trust is defined as the cost-benefit trade-off concerning the risks related to technological adoption”
26	“existing when one party has confidence in the exchange partner’s reliability and integrity” - R. M. Morgan and S. D. Hunt
29	“the willingness of a party to be vulnerable to the actions of another party based on the expectation that the other will perform a particular action important to the trustor, irrespective of the ability to monitor or control that other party.” - Mayer, Davis, and Schoorman [7]
30	“the belief and willingness of an individual to act on the words, actions, and decisions of another” - Lewicki and Wiethoff
31	Own : “Trust refers to the level of comfort, confidence, and security that consumers have when using technologies”

Table 10 - Trust definition given in the studies

While the provided definitions of trust from various studies offer insights into how trust is conceptualized in the context of blockchain, it is not enough to answer to our question. A study might define trust in terms of reliability and integrity, but might frame its questions in a way that primarily examines users' confidence in the technological capabilities of blockchain. In such cases, despite the definition suggesting a tilt towards social trust, the implied notion of trust could lean more towards digital trust. Table 11 summarizes our classification of the type of trust found in examining the survey question. Based on our definitions given in Section 2.2, we've categorized the

concept of trust in the following way: "technology trust" covers direct trust associated with Blockchain as a system ; "digital trust" covers trust notions linked to Blockchain's functionalities; and "social trust" the mentions to the trust dynamics between individuals and entities. The questions are a mix of the explicit questions related to trust (marked with a •) and the implicit questions linked to trust (marked with a +) from Section 4.3.

Study	Type of trust	Explanation
16	<u>Technology trust</u> • Blockchain technology is trustworthy. • Blockchain technology services are trustworthy. <u>Digital trust</u> • Data in blockchain technology would have no errors. • Data in blockchain technology would be saved securely. • Data in blockchain technology would be handled transparently. + IT Devices using blockchain technology would be safe from external threats, such as hacking. + IT Devices using blockchain technology would be safe from risks such as information leakage. + IT Devices using blockchain technology would be safe against possible misuse of information. + IT Devices using blockchain technology would be safe from the risk of data forgery and alteration. + IT Devices using blockchain technology would secure personal information.	<u>Technology trust</u> Focus on the reliability of Blockchain itself <u>Digital trust</u> Focus on Security, Immutability of Data and Transparency
18	<u>Technology Trust</u> + I feel that traditional technologies are safer than blockchain technology. <u>Digital trust</u> • I feel certain putting away my firm's information using blockchain technology. • Putting away our firm's information under outsider control is one of our Interests. • My firm's data in the cloud might be utilized by an outsider without our assent. + I feel that blockchain technology isn't adequately secure to store our firm's information.	<u>Digital trust</u> Trust in the digital Ledger and security offered by Blockchain
19	<u>Technology Trust</u> • It is trustworthy • This system can be used in long run + I have confidence in the system; <u>Digital trust</u> + Use of the blockchain-based system is technically secure; + I believe the system for the confidentiality of data	<u>Technology trust</u> Focus on the reliability of Blockchain itself

20	Technology Trust • The service that My-T Wallet provides is trustworthy. Digital Trust • The service provided by My-T Wallet is very committed. +I feel that My-T Wallet (blockchain) is very safe. +I feel that My-T Wallet (blockchain) is so secure that no one can change anything without notice. Social Trust • The services provided by My-T Wallet keep my best interests in mind.	Technology trust Ask about the trustworthiness of the system Digital trust Ask about the reliability of the functions of a blockchain system Social trust Ask about the service or the people behind it take into account the user's interests
25	Technology Trust • I feel safe using Bitcoin Digital trust • The decentralization of Bitcoin makes it a safe currency • Forgery and duplication are impossible thanks to a sophisticated cryptographic system • Transactions are irreversible + Transactions take place directly from person to person, and I think it is good that there are no intermediaries + It is not necessary to reveal your identity when doing business and you preserve your privacy + Decentralization and the fact that no country controls it guarantee that my investment is private + Money is safe in transactions with the Bitcoin cryptogram + The digital format capacity is sufficient for high volume transfers	Technology Trust Trust in the system Digital Trust Trust in the functionality of BC (decentralization, Security, Data immutability)
26	Technology trust • BCT is trustworthy. • I trust BCT. Digital Trust • I trust in the benefits of BCT. • With blockchain, the information in the system is accurate. • With blockchain, the information updates in the system are timely. • With blockchain, the information in the system is adequate. • With blockchain, the information in the system is complete. • With blockchain, the information in the system is reliable.	Technology Trust Trust in the system Digital trust Trust in the functionalities of BC and how they can be beneficial
28	Technology Trust • Based on my past experience, I think this system is honest. Based on my past experience, I think this system is trustworthy. • I am familiar with the whole system's technology. Digital trust • Blockchain makes the cost of fraud very high. • Blockchain prevents opportunists from making profits. • Based on my past experience, I think there is no speculation involved in this system. • Based on my past experience, I think this system is transparent and visible. + I think that the use of cryptocurrencies puts my privacy at risk. + I think hackers can control my transaction history if I use cryptocurrencies.	Technology trust Ask about a person's experience with the system's overall reliability Digital Trust Trust in the functionalities of BC (Security, Data immutability, Transparency, Consensus Algorithm)

29	Technology Trust • I believe that blockchain is trustworthy. • I trust blockchain. Digital trust • I have no doubt on blockchain's reliability. • Blockchain has the ability to fulfil its task. Social trust • I feel assured that legal and technological structures adequately protect me from blockchain-related problems.	Technology trust Trust in the system Digital Trust Trust in the functionalities of BC, that they do what we intend them to do effectively Social trust Trust in laws to protect individual
30	Technology Trust • I believe that cryptocurrencies are trustworthy. • I have confidence in cryptocurrencies. Digital trust • I do not doubt the veracity of cryptocurrencies, their systems, and related services. • Cryptocurrencies are capable of doing their job. + I think that the use of cryptocurrencies puts my privacy at risk. +I think hackers can control my transaction history if I use cryptocurrencies. Social Trust • I am confident that the legal and technological structures protect me from problems with cryptocurrencies.	Technology trust General trust in cryptocurrencies Digital trust Authenticity and true representation of data in cryptocurrencies transactions. Social trust Trust in laws to protect individual
31	Technology Trust • This service is trustworthy. Digital trust • The service providers (both cryptocurrency and blockchain) give the impression that they keep promises and commitments. • I believe the service providers (both cryptocurrency and blockchain) keep my best interests in mind.	Technology trust Trust in the system Digital trust Trust in the reliability and functionalities of the blockchain and cryptocurrency services and implying that they operate in a way that aligns with the user's best interests
32	Technology Trust • Overall, this website (Save-Ideas) is trustworthy Digital Trust • This website (Save-Ideas) has the skills and expertise to perform transactions in an expected manner • This website (Save-Ideas) has access to the information needed to handle transactions appropriately Social Trust • This website (Save-Ideas) is fair in its conduct of customer transactions • This website (Save-Ideas) is fair in its customer service policies following a transaction • This website (Save-Ideas) is open and receptive to customer needs • This website (Save-Ideas) makes good-faith efforts to address most customer concerns	Technology trust Trust in the system Digital trust Trust in the website's capability to access and manage data for transactions and efficiency of the website to perform its primary tasks (Transparent and Verifiable) Social trust Trust in the way the organization (Save-Ideas) handles the customer's needs and concerns
33	Technology Trust +Technology always seems to fail at the worst possible time +Whenever something gets automated, you need to check carefully that the machine or system is not making mistakes Digital trust + I worry that other people will see the information you send over the BT	Technology trust Trust in technologies overall, not necessarily BC Digital trust Trust in the security of a BC system

34	Technology Trust + Technology seems mostly to fail at the worst +You do not feel confident and reliable on adopting blockchain technology Digital trust +You are worried, blockchain technology adoption will disturb your firm security in the future	Technology trust Trust in technologies overall, not necessarily BC Digital trust Trust in the security of a BC system

Table 11 - Type of trust classification

Throughout our classification of 78 questions, we ended up with 49 questions classified under "Digital Trust". When we go a bit further, we can see that 28 are questions explicitly related to trust, while the remaining 21 were from the implicit questions. In contrast, "Technology Trust" accounted for a total of 22 questions, 16 of which were explicit trust questions, and 6 implicit. "Social Trust" had the fewest representations, with 7 questions, all of which explicitly coming from explicit trust questions (Figure 13, Figure 14). When we look at Figure 15, we can note that when studying the implicit questions, the big majority of the questions can be categorized under "Digital Trust". The dominance of "Digital Trust", both in explicit and implicit terms, shows that it is the most common type of trust in the subject of blockchain, followed by "Technology Trust". "Social Trust" is not often linked to blockchain adoption.

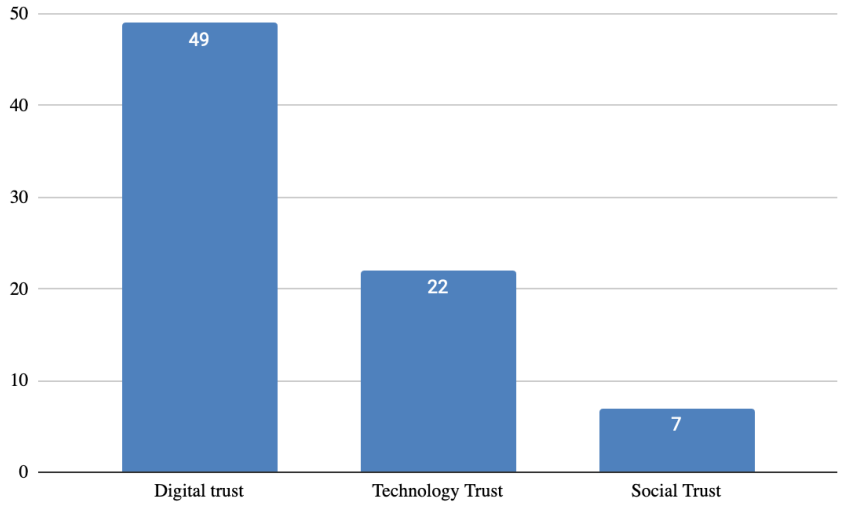

Figure 13—Classification of type of trust, totalities of the questions

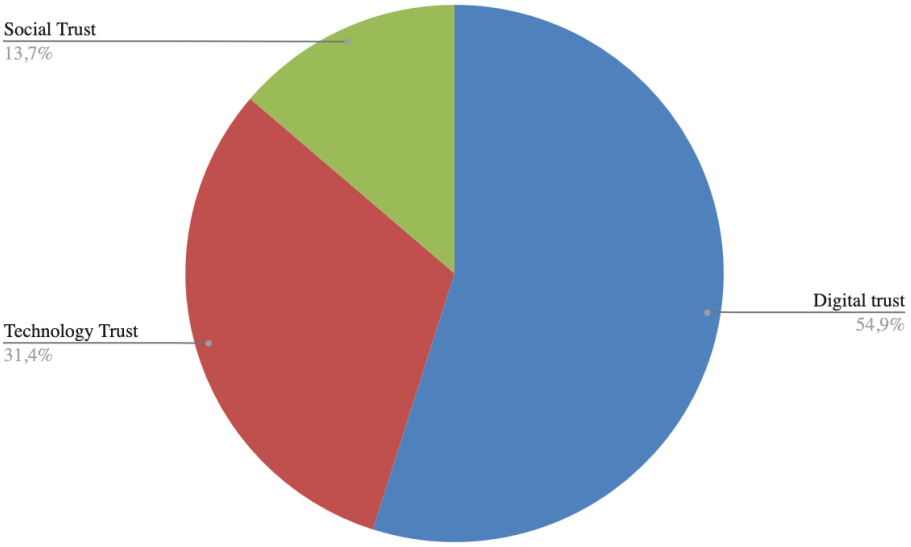

Figure 14—Classification of type of trust, explicit notion of trust

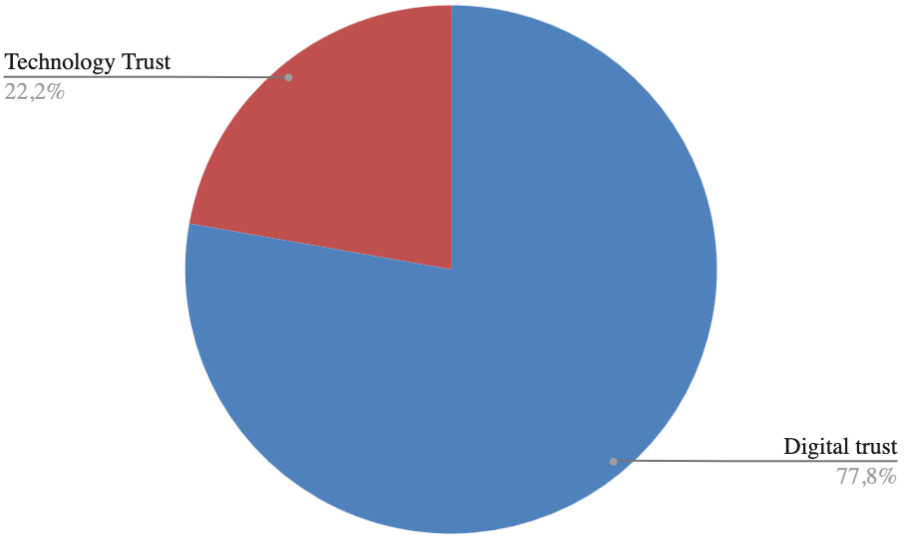

Figure 15—Classification of type of trust, implicit notion of trust

5—Discussion

5.1 RQ1 – According to the literature, which acceptance models are mostly used in regard of Blockchain adoption?

The analysis of the literature indicates that the Technology Acceptance Model (TAM) is the most commonly used acceptance model, as it was employed in 13 out of the 22 articles reviewed. This finding is consistent with the results of study [39], which reported TAM being used in 14 out of 30 articles, and study [41], which found TAM to be used in 13 out of 30 articles. The prevalence of TAM suggests its widespread recognition and applicability in understanding the factors influencing blockchain adoption. However, we can see that our second most used acceptance model is UTAUT whereas in study [39], TOE was the second most frequently employed model and study [41] has TOE and UTAUT tied for second place. The more widespread use of UTAUT in our study can be linked to its accuracy and applicability in comprehending the difficulties of blockchain adoption, as UTAUT includes a wider variety of elements.

The popularity of the Extended TAM in the literature implies that there is an increasing awareness of the necessity to investigate the various issues and nuances surrounding blockchain adoption. Our results suggest that when analysing the adoption of blockchain technology, researchers are progressively taking into account a broader set of variables beyond the fundamental categories of perceived usefulness and perceived ease of use.

5.2 RQ2 - What factors of these acceptance models are identified as significant predictors of blockchain adoption?

Based on the findings of this study, several conclusions can be drawn regarding the influential factors in acceptance models. “Trust” consistently emerged as the most influential factor. This highlights the critical role of trust in shaping individuals' acceptance of Blockchain. “Social influence” also showed a significant effect. This underscores the impact of others' opinions and behaviours on individuals' acceptance decisions. Factors such as “Facilitating conditions”, “knowledge”, “security”, “privacy”, “performance expectancy” and “subjective norms” were found to be influential in a smaller number of studies. Although not as consistently significant as “Trust” and “Social influence”, these factors still hold relevance and contribute to the understanding of

acceptance dynamics. Our findings are consistent with the related studied. Study [39] found that “Trust” is the most influential factor in 17 out of 30 studies, even the second most common factor being “Social influence” is coherent with our findings.

5.3 - RQ2.1 – How do these factors vary across different contexts and user groups ?

Business context

The dominance of “Trust” indicates a concern when integrating new technologies and show the importance of ensuring security and reliability in business transactions. On the other hand, “Performance Expectancy” may be linked to a company's objectives, as they want to be sure the adoption of blockchain would lead to improvements in their operations or give them a competitive advantage. Meanwhile, “Social Influence” possibly indicates that businesses pay attention to industry trends when considering blockchain.

Supply Chain context

In the Supply Chain sector, we saw no major difference between the factors. The presence of factors such as “Relative advantage”, “Performance expectancy”, “User satisfaction”, and “Facilitating conditions” as top factors suggest that supply chain stakeholders are highly interested in the direct benefits they can derive from integrating blockchain into their processes. This is consistent with the nature of supply chains, where efficiency, accuracy, and speed are crucial. Adopters would likely want to be assured that the technology would enhance their operations rather than introduce complexities. “Social influence”, “Perceived behavioural control” and “Subjective norms” shows the sector's sensitivity to external influences, for example from consumer expectations. Finally, the presence of “Trust” suggests that stakeholders are considering the integrity and security implications of the blockchain.

In the related study [38], the top two factors influencing the adoption of blockchain in the Supply Chain sector were identified as “Transparency”, followed by “Safety”, “Traceability”, and “Decentralization”, that were tied. This contrasts slightly with our findings. While both analyses highlight the multifaceted considerations in the Supply Chain sector, the emphasis on “Transparency” in the related work emphasizes the sector's priority for clear visibility across processes. However, the significance of “Safety” and “Traceability” in the related work aligns with the mention of “Trust” in

our findings, underscoring the importance of secure, reliable, and traceable transactions in supply chains.

Finance context

In the Finance sector, the factor “Trust” is dominant. This underlines the importance of trustworthiness, reliability, and credibility when deliberating the integration of blockchain into financial systems and processes. In an industry where transactions, investments, and assets are important, ensuring the integrity and security of new technology becomes a concern. Other factors such as “Facilitating conditions”, “Social influence”, “Risk”, “Technology awareness”, and “Performance expectancy” are each mentioned one, showing the multifaceted nature of considerations in the finance domain.

In the related study [40], the most dominant factor is “Easy to use”. This underscores the banking industry's priority to ensure user-friendliness in their blockchain-based systems, given that customers often prioritize convenience. “Risk perception”, in second place, aligns with our findings, having “Trust” and “Risk” in our dominant factors. It underscores the sector's consistent focus on security and reliability of blockchain systems, which is pivotal in an industry that deals with sensitive financial data and transactions.

User group of blockchain knowledge

The knowledge of blockchain has been proved to be an interesting point of view in the difference of significant predictor of blockchain adoption. The two-stage approach adopted by study [16] highlights the effect of information on participants' perceptions of the technology. Furthermore, the choice by studies [20], [23], and [35] to filter out participants with no blockchain knowledge demonstrates a focused approach towards understanding the perspectives of those already familiar with the technology. In contrast, the inclusive approach by studies [27], [28], [29], and [32] offers a broader perspective, considering the views of both experienced and inexperienced individuals. This comprehensive approach might provide a more rounded picture of the general population's attitude towards blockchain technology.

Interestingly, even when knowledge of blockchain was explicitly considered, “Trust” emerged dominantly as a key factor influencing its adoption. This shows the importance of trust when confronted to a new technology. The relationship between trust and knowledge of blockchain can be explained by the fact that the more an individual gains an understanding of blockchain, the more

trust there can be in its capabilities and features. On the opposite, those with limited knowledge might be hesitant to fully trust the technology due to a lack of understanding. As seen in study [16], after seeing a video explaining blockchain, the participants' response to recognizing blockchain as a trust computing technology went from 8.93% to 27.9%.

5.4 RQ3 – What are the methods used in the studies ?

Predominantly, online surveys are the favoured methodology, which is not surprising for a subject such as blockchain since online surveys are the best way to share to a wider audience. The broad spectrum of target populations, from professionals of different domains to university students, offers a multitude of trust perceptions. A distinction comes up in the granularity of the Likert scales used, which may influence the nuance in responses.

As most studies specifically asked questions about trust in blockchain, we saw a difference in the way it was asked. While some asked directly about the trustworthiness the respondents had, we also could note more specific questions around service commitment, legal structures, experiential trust or security implications. We could also see a more implicit trust in other variables‘ questions. Often, trust is linked with concepts like security, privacy, and risk. When participants are asked about their perceptions of security, reliability, or even transparency in a system, they are indirectly asking about their trust in that system. For instance, when a respondent agrees with a question asserting the security of a blockchain-based service, they are also expressing a level of trust in that service's ability to protect them from threats or errors.

5.5 RQ4 – How trust influences the adoption of blockchain according to these acceptance models?

From our data analysis, we can conclude that trust plays an important role in the acceptance and adoption of blockchain. We have pinpointed three roles of trust throughout the studies.

Firstly, as a direct influencer of blockchain adoption, studies [18, 26, 27, 29, 36] have all found trust to be a decisive element in determining the direct adoption of blockchain technology. This showcases that individuals or organizations are likely to engage with blockchain if they inherently trust the system. Study [29] concludes that managers should monitor supply chains management *“in order to identify behaviours that can affect trusting BCT quickly”*.

Secondly, trust emerges as a mediating factor in many studies. Trust is often found in a relationship between factors like perceived security, transparency, performance expectancy, and adoption of the blockchain. For example, as shown in the Study [16], while trust and transparency both directly affect multiple acceptance variables including Performance Expectancy and Effort Expectancy, it is their influence on trust that further drives Behavioural Intention toward blockchain adoption. Likewise in Study [19], which emphasizes the influence, perceived security and privacy immediately form the user's trust, which then shapes their opinion toward blockchain. In Study [30], trust acts as a mediator between website quality, electronic word of mouth, and perceived risk onto behavioural intention. These mediation effects highlight the fact that, despite the fact that a number of factors may not directly influence blockchain adoption, they do so indirectly through influencing users' levels of system trust. The mediating effect suggests a layered influence process: certain factors shape trust, which in turn shapes behavioural intentions related to blockchain adoption.

Thirdly, trust is also identified as a moderator. Trust amplifies the relationship between certain variables and adoption of blockchain. In Study [24], “Trust” straightens the relationship between factors such as “Performance Expectancy”, “Effort Expectation” and “Facilitating Conditions”, meaning that when people believe in the efficiency and ease of use of the blockchain system, they are more likely to adopt it when they trust the system. However, the lack of moderating effect with “Social Influence” suggests that even if individuals trust the blockchain or not, social opinions have a consistent impact on their adoption intentions. Similarly, study [30] shows that when users hear positive recommendations about blockchain technology and find that website interface is good, and have a high level of trust in the system, they are more likely to be inclined in using it. Interestingly, trust can even counteract the negative effect of perceived risk : when trust in the system is high, user are more likely to adopt Blockchain even if they think there are some risks.

Trust is not only a passive factor, it can actively modify the relationship of other factors and the adoption of blockchain by strengthening or diminishing their influence.

5.6 RQ4.1 – What kind of trust is more associated with Blockchain adoption?

Based on an analysis of various studies, our classification led to a dominance of “Digital trust” being the most common type of trust associated with blockchain adoption. This points that the key features of blockchain, like security, immutability, and transparency, are the prime focus when considering the adoption of a blockchain system. The second most type of trust is “Technology

Trust". This type of trust seems to act as a foundational trust element. The results suggest that for users to even consider adopting blockchain, they must first trust the technology itself. However, once this basic trust is established, the accent seems to shift towards the digital functionalities and attributes of blockchain (Digital Trust). Finally, the least common type of trust we found is "Social Trust". This could be attributed to blockchain's design, which minimizes the need for human middle men and emphasizes trust in the system over trust in individuals or entities. However, its presence in some studies does suggest that there's a part of users who are concerned about the human elements, such as the intentions of blockchain service providers or regulatory protections.

6—Conclusion

In this study, we have examined the research question "**How does trust impact the adoption of blockchain technology?**". To be able to answer to this question, we examined different research questions that helped us to go a little further each time in order to delve deeper in the subject.

We saw through a meta-analysis that trust is a significant factor in the acceptance and adoption of blockchain technology. The roles of trust, as a mediator or moderator, offers a deeper insight in the way it influences adoption. As a mediator, trust can shape the way other factors affect adoption. As a moderator, trust can amplify or diminish the effects of other factors. Furthermore, the implicit consideration of trust underscores its important in blockchain adoption. Even when not explicitly mentioned, trust can be found in different subjects, especially when it is about security.

It is essential to also highlight that while many studies has indicated the importance of digital trust, social trust has received far less attention. A lack of research in understanding the nuances of social trust could limit blockchain's broader acceptance and application, given that technologies don't operate alone, but within social communities.

Even though trust was a factor in many studies, there wasn't always a consensus definition of the concept. This shows that further study may be required to focus on developing a common concept and classification of trust in the context of blockchain.

Finally, we would like to address the limitations of this master thesis. To select scientific papers, we only used the Scopus database. Therefore, it would be interesting for future studies to use a larger database or use other databases to broaden the scope of research.

List of figures

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