New information technologies in the financial sector

10.29073/jer.v4i1.61

Received: January 7, 2026.
Accepted: January 29, 2026.
Published: February 9, 2026.

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Abstract

Information technologies have profoundly reshaped the financial sector, enhancing customer experience, increasing operational efficiency, and creating opportunities for innovation. In order to provide security, transparency, and constant development for both customers and staff, this process has been having a growing influence on financial institutions and will continue to alter the financial system in the years to come.

This study focuses on two technologies: blockchain and artificial intelligence. These two technologies are linked to several meanings, according to different writers from a large number of research and publications. However, there is a broad consensus that machines possess the ability to solve many problems, much like human beings.

Overall, the aim of this study is to analyze the impact that the implementation of these technologies has had on the financial system—whether positive or negative—from the perspective of both consumers and employees. A mixed-method research technique was used for the empirical study, including two interviews and a questionnaire survey, in order to achieve the suggested goals.

The results show that even though these technologies have pros and cons, they have been very important to the digital revolution in the financial industry. Nonetheless, there is still worry that robots may take over human jobs, endangering financial sector workers. With ongoing development, it is expected that humans and machines will be able to work together towards a positive evolution.

Keywords: Artificial Intelligence; Banks; Blockchain; Financial Institutions; Information Technologies.

1. Introduction

Nowadays, technology plays a crucial role in society, being omnipresent and almost impossible to imagine a scenario in which it would disappear. Information technologies (IT) are only one example of the many advancements that have resulted from the constant and unstoppable growth of technology. More and more businesses are using these technologies to reach their goals and interests in a wide range of fields.

Baptista (2024) asserts that organizational elements such as strategy, culture, technology, and people are all impacted by technological advancement. It also shows how the organizational model has developed to accommodate digital trends.

As they develop and are used in the workplace, new technologies are becoming increasingly popular among financial market institutions. With the advent of technologies such as blockchain and AI, which are the focus of academic writing and papers, new more consumer-oriented products have emerged. This has put the spotlight on new technologies in the contemporary financial world and caused pressure on traditional institutions.

As this subject is becoming increasingly relevant to the financial sector, it will be explained how recent IT has been implemented and how it has influenced the financial system. This research, in overall terms, explores the impact that new technologies have had on the financial sector. Likewise, it aims to understand the perspective of employees in Financial Institutions (FIs), considering the implementation of these technologies both in their daily work and regarding the future of the profession in the financial sector.

On the other hand, the study seeks to understand the perspective of consumers considering technological developments and the security of the services provided, as well as the associated benefits and limitations. To respond to the objectives and adopted methodology, the following hypotheses were proposed:

- H1: The integration of disruptive IT (AI and Blockchain) has significantly altered the operational dynamics and service delivery models within the financial system.
- H2: The growth of digital banking acts as a primary driver in shifting consumer behavior from traditional physical interaction to digital-first financial engagement.
- H3: There is a significant perception among stakeholders that automation and AI-driven processes negatively correlate with long-term job security in the financial sector.
- H4: While blockchain provides perceived transparency and security, its influence on the actual adoption of cryptocurrencies is mediated by institutional trust and regulatory frameworks.
- H5: The successful adoption of AI and Blockchain provides measurable efficiency gains and structural benefits that outweigh traditional operational limitations.

To pursue the objectives of this study, a specific research question was defined: How do stakeholders in the Portuguese financial sector perceive the balance between operational benefits and socio-professional risks arising from the implementation of AI and Blockchain? To enhance the information gathered on IT and to produce a clear and credible literature review, bibliographic research will be conducted, primarily through scientific articles. This approach will allow for a better understanding of what has already been presented and developed by various researchers in the field, and to objectively identify the most relevant works on the topic.

While current literature extensively covers the technical architecture of AI and Blockchain, there is a significant gap in understanding the asymmetric perception between these two technologies within the Portuguese financial ecosystem. Specifically, this study addresses the lack of empirical evidence regarding why AI is perceived as an operational tool for efficiency, while Blockchain remains associated with high-risk speculation and 'anxiety' among both staff and consumers. This research fills a specific theoretical gap by examining the socio-technical barrier to the adoption of disruptive technologies in traditional banking. By employing a mixed-methods approach, it moves beyond descriptive analysis to propose a conceptual framework that links technological literacy with trust and perceived job security. The empirical contribution lies in identifying that, in the Portuguese financial sector, AI is viewed as an evolutionary necessity, while Blockchain is still hindered by a lack of institutional transparency and regulatory clarity.

Despite the abundance of studies on the technical benefits of AI and Blockchain (e.g., Anwar et al., 2022; Gujrati & Biradar, 2023), there is a notable research gap regarding the asymmetry of adoption in the Portuguese financial sector. Specifically, it remains unclear why AI is being integrated with relative ease in customer-facing tools (Baptista, 2024), while Blockchain remains relegated to speculative discourse (Guo & Yu, 2022). This study addresses this gap by analyzing the divergent perceptions of trust and job security among two critical stakeholders: frontline employees and end consumers.

To analyze the impact of these technologies, this study is anchored in the Unified Theory of Acceptance and Use of Technology (UTAUT), as proposed by Venkatesh et al. (2003). This framework allows for a structured understanding of how performance expectancy and effort expectancy influence the adoption of AI and Blockchain within the Portuguese financial ecosystem.

Consequently, with the aim of collecting primary data, the empirical study consists of a questionnaire survey (quantitative method) and two interviews (qualitative method) one with a current employee of a financial institution and another with a former employee. This approach seeks to understand the impact that new technologies have on the financial sector, both from the perspective of consumers and of financial institution employees.

With the intention of achieving the objectives proposed for the study and answering the defined questions, the preparation of this study is composed of 6 chapters. Chapter 2 presents the theoretical framework of the study, focusing on a review and synthesis of the literature related to the main areas of the study: Digital Transformation, AI, and Blockchain. This background supports the transition to the empirical study outlined in Chapter 3, which details the methodology, data collection tools, and sample characteristics. Chapters 4 and 5 are dedicated to the presentation and discussion of results, analyzing data obtained from a questionnaire and two interviews—one with a current and one with a former financial institution employee—to assess the impact of new information technologies on the financial sector. Finally, Chapter 6 concludes the study by summarizing the key findings, contributions, and limitations of the research.

2. Literature Review

In order to increase productivity through process automation, quicker workflows, and better decision-making, digital transformation (DT) entails the use of information technology, software, platforms, and procedures to simplify operations (Siregar & Sudarmanto, 2023).

According to Navas et al. (2025), new IT affects all types of organizations, including public and private institutions, hospitals, banks, and even governments. Siregar and Sudarmanto (2023) observe that the adoption of digital technologies by companies enhances operational efficiency, reduces manual errors, monitors internal operations (such as sales, inventory, and losses), allocates resources, accesses new markets, and achieves a competitive advantage in the market.

The shift to digital banking requires user acceptance in addition to technological deployment. Performance expectancy, effort expectancy, social influence, and facilitating conditions are the four main constructs that drive the desire to use a technology, according to the UTAUT model (Venkatesh et al., 2003). These concepts aid in explaining why, in the context of this study, AI tools are more widely accepted because of their apparent effectiveness (performance expectancy), whereas Blockchain encounters opposition because of a lack of enabling circumstances (institutional trust and regulatory clarity). The integration of information technologies in banking is closely linked to the institutional environment. According to Han et al. (2022), financial authorities can create an atmosphere that is favorable to long-term innovation by reducing business uncertainty and maturity mismatches through effective communication. Concurrently, the emergence of Big Data ecosystems offers the technical infrastructure required for AI to improve operational effectiveness and risk management, but it also presents new issues with data security and governance (Hasan et al., 2020).

The concept of “Artificial Intelligence” originates from philosophy and human thought, and there is still no universally accepted definition (Baptista, 2024). As such, the term emerges in an abstract form, encompassing various fields of knowledge through numerous analyses from different scientific studies and authors. There is no consensus regarding its definition. Gbadegeshin et al. (2021) note that some researchers attempt to categorize AI as a specific function, while others try to incorporate it with multiple characteristics. One of the primary difficulties with artificial intelligence, according to Couch (2023) in the essay "Artificial Intelligence: Past, Present, and Future," is coming up with a definition that is agreed upon by everyone. Shaikh (2017) asserts that while innovation is evident across a number of industries, the financial industry is moving more slowly than others because of a number of limitations that make it difficult for it to adapt to structural shifts toward the digital age. According to Puri (2020), because of companies' subsequent investments in innovation, the banking and financial sector today offers novel solutions to traditional banking problems, boosting competition among banks and financial institutions. Thus, AI continues to advance with new AI-based tools in these sectors, and its application

has resulted in improved efficiency and productivity, the creation of customized customer experiences and services, and economic growth in the banking and financial sectors (Gujrati & Biradar, 2023). As mentioned by Vilhena & Navas (2023), the consulting firm Stefanini Group states that the adoption of new innovative tools is developed in favor of better performance, for example, compiling data more quickly and accurately than a human would, thereby optimizing processes and saving time in daily operations. For this reason, it is crucial that companies approach the digital transition as a long-term effort through sustainable growth strategies so that the resulting structural and cultural changes can progress effectively, and ultimately, the implementation of these tools yields the expected benefits rather than causing negative repercussions in the markets (Shaikh, 2017).

To promote cooperation between people and technology, Kokina and Davenport (2017) assert that AI technologies are intended to create more specialized roles like automation, monitoring, and supervision rather than to replace jobs in accounting and auditing tasks in order to cut down on human error, save money, and free up staff for other responsibilities, some processes, such as bank reconciliations, account categorization, and payment processing, can be automated by computers (Vilhena & Navas, 2023), using chatbots that seek to improve the user experience are given special consideration in customer-centered applications, since they are programs built on artificial intelligence (AI) that employ natural language processing (NLP) algorithms to help users with written or spoken transactions or problem-solving and utilize machine learning (ML) approaches to get better over time, which allows them to react fast and correctly (Alt et al., 2021).

According to De Cicco et al. (2020), the platforms and frameworks, the development of artificial intelligence, and the increasing use of messaging apps are the main factors propelling the chatbot industry. However, the market's expansion can be threatened by ignorance regarding the results of using them in different applications. The primary problem, according to De Cicco et al. (2020), is that they sometimes struggle to comprehend user inquiries, which makes it difficult for them to reply to more intricate or thorough questions. Besides this, chatbots utilize data analysis techniques to create ordered outputs, they also automate repetitive jobs, save time, and speed up work processes (Jee, 2023; Navas et al., 2025).

People began to validate and commercialize new transactions with Bitcoin, while others supported and resolved various issues through code. The Ethereum-based decentralized computing platform was created in 2013 by Vitalik Buterin, a programmer and co-founder of Bitcoin Magazine. Anyone can join Ethereum's public blockchains (Guo & Yu, 2022). Later, the Hyperledger Project was created, which is an open-source software initiative that was announced by the Linux Foundation in 2015. Its objective is to develop an enterprise blockchain that will enhance the dependability and performance of existing systems and facilitate international business transactions (Babtista, 2024).

Anwar et al. (2022) describe four stages in the evolution of blockchain technology: i) Blockchain 1.0 sought to improve the present monetary system by eliminating middlemen and enabling cryptocurrency transactions via Bitcoin and other alternative coins; ii) Pradhan (2021) claims that by preventing counterfeiting and double spending, Bitcoin has made transactions safer, more transparent, and more economical than traditional payment systems such as Ethereum was the first to implement smart contracts, which are used in financial services and industries like stocks, options, and financial assets, when it launched with Blockchain 2.0; iii) Blockchain 3.0 aimed to improve the technology's stability and security while expanding its applications into areas such as media, healthcare, financial institutions, art, and justice; iv) Finally, Blockchain 4.0 advances the current industrial revolution by improving user privacy and security. According to Mukherjee and Pradhan (2021), it also functions as a business platform for developing and implementing applications in a variety of industries and businesses, managing one million transactions per second, something earlier generations were unable to do.

A person's transaction is sent to the network, where computer algorithms verify its authenticity (Baptista, 2024). After validation, the transaction is stored as a block in a different data storage unit. Each block is made up of two primary parts: i) the block header, which includes all the information required to verify the block's integrity as

well as that of the blocks that come before and after it; and ii) the block body, which houses all of the transactions that are part of the block (Mukherjee and Pradhan, 2021; Zheng et al., 2018).

The information contained in the block header that enables the validation of each block's identity is called by hash. Together with the timestamp, which captures the date, time, and transaction information, the hash is a special and exclusive digital signature that is applied to every block at creation and serves as a connection between the previous and subsequent blocks (Mukherjee & Pradhan, 2021). Every user has a public key to enter the network after signing transactions with a private key, which are subsequently broadcast throughout the network (Zheng et al., 2018). According to the same author, the block body consists of a transaction counter, with the maximum number of transactions a block can contain depending on both the block size and the size of each transaction.

This type of network conveys trust to users through its transparency and security; however, it is advisable to conceal confidential information so that it is not accessible to everyone (Anwar et al., 2022; El-Rewini et al., 2020; Zheng et al., 2018). Unlike permissionless blockchains, permissioned blockchains limit network access by allowing only authorized users to join (Baptista, 2024). Even if these networks function faster and more effectively, cutting down on transaction times, they are not regarded as decentralized blockchains (Anwar et al., 2022; Zheng et al., 2018).

If users abide by the guidelines and security measures, public blockchain is regarded as secure. It is dependable for users as it guarantees that there are no fraudulent transactions and that all members can see it. However, due to its extensive use, it has issues with agility, speed, and high energy consumption (Anwar et al., 2022; Zheng et al., 2018).

In table 1 a SWOT analysis is presented for Blockchain technology. Its intrinsic advantages relies in decentralization, immutability, transparency, and security which makes it a solid and reliable system for a range of applications These essential characteristics make blockchain a disruptive technology that has the potential to drastically alter the way data is exchanged, managed, and kept (Baptista, 2024). The main drawbacks are high energy and running costs, scalability problems that prevent widespread adoption, and ongoing insecurity problems, especially with relation to private key management and storage.

Table 1: SWOT Analysis of Blockchain Technology in the Financial Sector.

Strengths	Weaknesses
Decentralization	High costs and energy consumption
Immutability	Scalability
Transparency	Cybersecurity
Security	Private key
Opportunities	**Threats**
Automation	Complex
Efficiency	Delay
Cost reduction	Weak regulation

Source: Baptista (2024).

The SWOT analysis presented in Table 1 transcends simple categorization; it highlights a strategic paradox. The 'Efficiency' opportunity provided by automation is directly linked to the 'Threat' of labor displacement. This suggests that for FIs, the challenge is not the technology itself, but the governance of the digital transition (Shaikh, 2017).

Blockchain has enormous potential for automation, productivity gains, and substantial cost savings for companies despite the obstacles already mentioned. Significant economic value can be unlocked by its ability to streamline procedures and the cut of the middlemen. However, because of its intrinsic complexity, possible

implementation delays, and the current state of loose and changing legal frameworks, there are barriers to the successful integration and broad acceptance of this technology. If blockchain reaches its full disruptive potential, these problems must be fixed via transparent standards and intuitive user interfaces (Baptista, 2024).

Blockchain can assist the banking sector in settling past-due payments and safeguarding credit card information, claim Bhagwani and Govindaraj (2020). There have been many incarnations of blockchain technology since the first digital currency, Bitcoin, was introduced. These have resulted in the development of digital currencies with distinct specifications and settings, as well as blockchain applications in financial and economic markets (Anwar et al., 2022). Cryptocurrencies are a successful use of blockchain technology because of their low processing costs and ability to facilitate direct payments between individuals without any restrictions or delays on money transfers (Guo and Yu, 2022). However, Guo and Yu (2022) note that because regulation and control are scarce, users may be exposed to cyberattacks that might wipe out all their assets and that illegal money could move across the blockchain network. As blockchain technology expanded beyond cryptocurrencies, it brought innovations and benefits. Hence, smart contracts and other new applications started to appear in a range of these industries.

To use smart contracts in the banking sector, customers and other participants must provide all personal data, such as name, address, credit card number, and sign a contract accepting the terms of the blockchain network (Baptista, 2024). A blockchain computer executes the code after both parties have designated it, completing the transaction and sending the funds to the client's address (Younus & Abumandil, 2022). These contracts are more affordable, flexible, and secure than traditional ones because they are thought to be immutable, meaning that no one can alter, update, or remove the data without permission (Younus & Abumandil, 2022).

Younus and Abumandil (2022) claim that blockchain has enhanced and been used in the banking and financial sectors in ways other than just smart contracts and cryptocurrencies. Financial service providers control access to the private data that companies keep and share. Even though they frequently don't know who has access to their financial data, customers can use blockchain to safely and securely access and control their personal information in the interim.

Based on the literature review, this study establishes a conceptual framework grounded in the Technology Acceptance Model (TAM) and the Socio-Technical Systems (STS) theory. While the technical capabilities of AI (Gujrati & Biradar, 2023) and Blockchain (Anwar et al., 2022) focus on operational efficiency and security, their actual impact on the financial sector is moderated by human perception.

As shown in Table 1, the strengths of Blockchain (immutability and transparency) collide with threats like 'weak regulation'. This creates a theoretical tension: technology offers trust through code, but users experience anxiety due to a lack of institutional governance. Therefore, our study posits that the transition to Digital Banking is not merely a technical upgrade but a shift in the 'psychological contract' between employees, customers, and financial institutions.

3. Methodology

To provide a more comprehensive response to the research, the empirical study adopted a mixed-methods approach, consisting of a scientific investigation based on the collection and analysis of data through a questionnaire survey (Appendix A) addressed to the general population, and two interviews (Appendix B): one with a current employee of a financial institution and another with a former employee of a financial institution. The aim was to obtain credible data from both the consumer and employee perspectives.

The purpose of the questionnaire was to understand people's perceptions of the impact that new information technologies have had on the financial sector, to provide a realistic and credible analysis.

The interviews focused on more specific and objective topics, aligned with the theoretical framework and the core of the research problem, targeting one former and one current employee of a financial institution. The

interviews were based on a semi-structured set of questions, which could be adapted as the conversation evolved.

The objective of conducting the interviews was to analyze and compare how financial institutions evaluate new information technologies and the impact these technologies have on the financial sector. This scientific technique is considered a qualitative method, as the data analyzed are textual in nature. The full transcripts of the interviews are included in the Appendices section.

The questionnaire was developed based on the literature review, in which the most relevant factors for the study were analyzed, leading to the creation of thematic question blocks. A simple and direct language was used, ensuring that no question contained more than one topic, so that respondents could answer accurately and without assistance.

The questionnaire was created in digital format using the Google Forms platform, which allows for the creation and distribution of online surveys. It was made available to participants via email, social media platforms (LinkedIn, WhatsApp, Instagram), and shared through the university's network with ISCAL's authorization, through a hyperlink to the form. The data collection period took place between March 1, 2024, and May 26, 2024, resulting in a sample of 154 complete and valid responses.

Structurally, the questionnaire includes a brief introduction that informs respondents about the researcher's name and details, as well as the purpose of the study. It clearly states the estimated completion time and assures that the responses are anonymous and used exclusively for research purposes.

The objective focused on the collection of primary data, with a total of twenty-seven questions. The first six questions were sociodemographic, relating to the respondent's age, gender, academic qualifications, field of study, professional status, and area of activity. These were followed by eight questions on AI and the final thirteen questions on blockchain and cryptocurrencies.

The questionnaire included various types of closed-ended questions, including binary questions (yes or no), multiple-choice questions, semantic differential scale questions (1–None; 2–Low; 3–Medium; 4–High; 5–Very high), and Likert scale questions (1–Not important at all; 2–Slightly important; 3–Neutral; 4–Important; 5–Very important; and 1–Strongly disagree; 2–Disagree; 3–Neither agree nor disagree; 4–Agree; 5–Strongly agree). The only conditional question was question 19, which could only be answered if the respondent had answered "No" to question 18. The estimated completion time for the questionnaire was 10 minutes.

The other primary source used in the methodology was the conduction of two semi-structured interviews with open-ended questions directed at two professionals from the financial sector working in different banks. The aim of the interviews was to understand the perspective of banking employees regarding the implementation of technologies in the financial sector. The interviews took place on June 13th, lasting 15 minutes, and on June 23rd, lasting 20 minutes.

The first interview (Appendix C) was conducted with a professional holding a degree in Public Administration and a master's degree in Economics and Public Policy. This individual previously worked at Caixa Geral de Aposentações and BNP Paribas and is currently employed at the Portuguese Tax and Customs Authority.

The second interview (Appendix D) was conducted with a banking professional with extensive experience in customer service, marketing and operations, commercial banking, specialized and investment banking.

For the development of both the questionnaire and the interview, the following research hypotheses were adopted:

- H1: The integration of disruptive IT (AI and Blockchain) has significantly altered the operational dynamics and service delivery models within the financial system.

- H2: The growth of digital banking acts as a primary driver in shifting consumer behavior from traditional physical interaction to digital-first financial engagement.
- H3: There is a significant perception among stakeholders that automation and AI-driven processes negatively correlate with long-term job security in the financial sector.
- H4: While blockchain provides perceived transparency and security, its influence on the actual adoption of cryptocurrencies is mediated by institutional trust and regulatory frameworks.
- H5: The successful adoption of AI and Blockchain provides measurable efficiency gains and structural benefits that outweigh traditional operational limitations.

Tables 2 and 3 present the correlation between the research hypotheses and the questions from the questionnaire and the interviews.

Table 2: Correlation between research questions and research hypotheses.

		Research Hypotheses				
	Questionnaire	**H1**	**H2**	**H3**	**H4**	**H5**
Profile	**Q1**	Characterization of the respondent's profile				
	Q2					
	Q3					
	Q4					
	Q5					
	Q6					
AI	**Q7**	X				
	Q8					
	Q9					
	Q10		X			
	Q11					
	Q12			X		X
	Q13			X		X
	Q14					
***Blockchain* / Cryptocurrencies**	**Q15**	X			X	
	Q16	X			X	
	Q17	X				
	Q18				X	
	Q19				X	
	Q20				X	
	Q21				X	X
	Q22				X	
	Q23				X	
	Q24				X	
	Q25				X	
General Questions	**Q26**	X				
	Q27			X		

Note: Questions not linked to hypotheses are used for descriptive sample profiling and context setting.

Table 3: Correlation between interview questions and research hypotheses.

		Research Hypotheses				
	Interview	**H1**	**H2**	**H3**	**H4**	**H5**
Profile	**Q1**	Characterization of the respondent's profile				
	Q2					
General Questions	**Q3**	X				X
	Q4	X				
	Q5					X
	Q6		X	X		
	Q7		X			
	Q8				X	
	Q9				X	
	Q10	X				

The theoretical landscape explored in the previous chapter reveals a convergence between the technical capabilities of disruptive IT and the human factors that govern their adoption. To bridge the literature with empirical study, we propose an analytical model based on the Socio-Technical Perspective and the Trust-Risk Model.

In this framework, Digital Transformation (H1) and Digital Banking (H2) represent the systemic evolution of the sector. However, the success of this evolution is moderated by two critical human factors: Perceived Threat (H3), which explores the tension between automation and labor, and Institutional Trust (H4), where the technical transparency of Blockchain is weighed against regulatory uncertainty. Ultimately, the Successful Adoption (H5) of these technologies is not merely a technical achievement but a balance of efficiency gains versus structural risks. This integrated view, mapping the literature to our research hypotheses, is summarized in the proposed model below (see Table 4).

Table 4: Table of Theoretical Synthesis.

Construct/Topic	Key Authors (Chapter 2)	Linked Hypothesis
Digital Transformation	Siregar & Sudarmanto (2023); Baptista (2024)	H1, H2
AI & Automation	Gujrati & Biradar (2023); Vilhena & Navas (2023)	H3, H5
Blockchain & Trust	Anwar et al. (2022); Guo & Yu (2022)	H4, H5

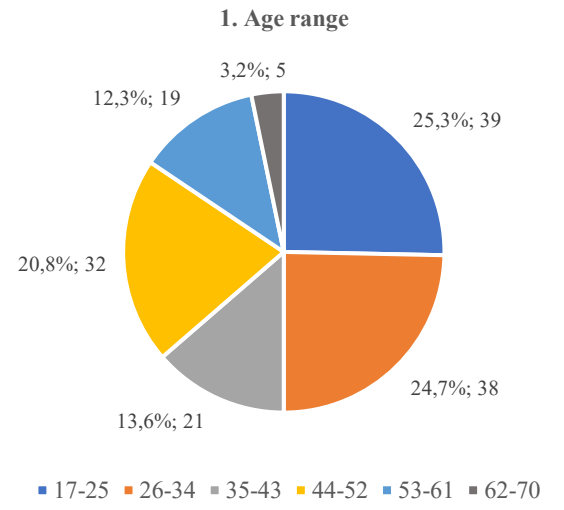
Subsequently, for the analysis of the results obtained from the data collected through the questionnaire survey, a descriptive analysis was carried out. In this way, charts were created based on those generated by Google Forms to facilitate the comparative analysis of the results obtained, along with a correlation with the interviews, which allowed for the extraction of both theoretical and empirical conclusions.

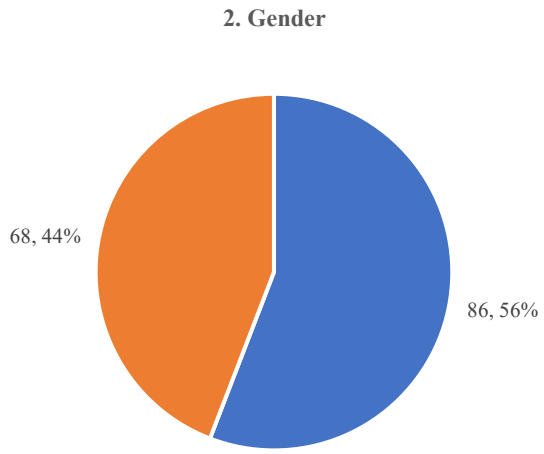
4. Findings and Analysis

4.1. Sample Characterization

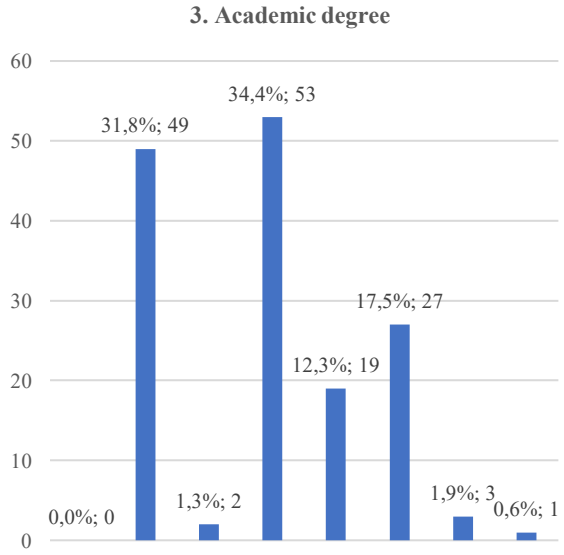
The questionnaire survey includes a sample of 154 respondents. In the first phase, an analysis was conducted to characterize the sample, specifically regarding sociodemographic data: age, gender, educational qualifications, field of study, professional status, and area of activity, with the aim of understanding the sample obtained.

Chart 1: Characterization of the respondent's profile.

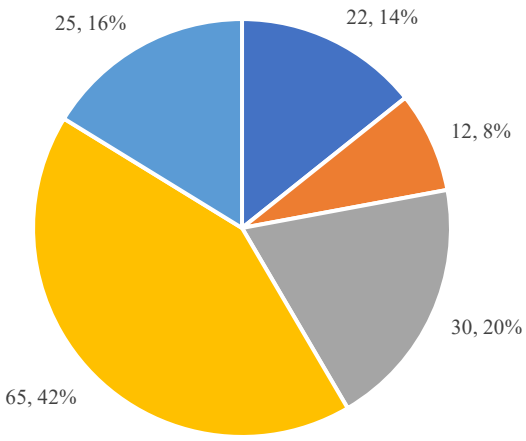




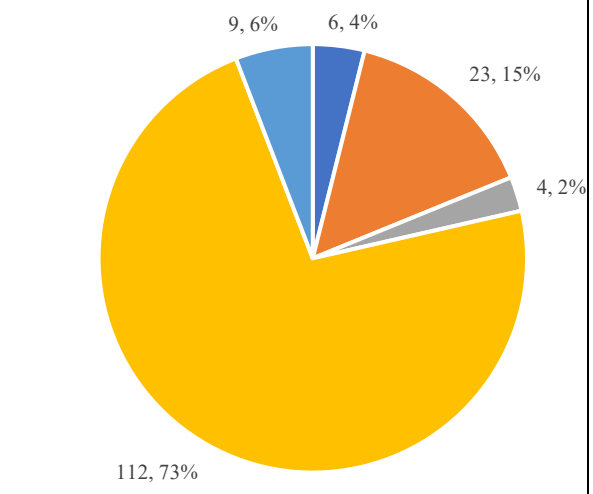
Feminine; masculine



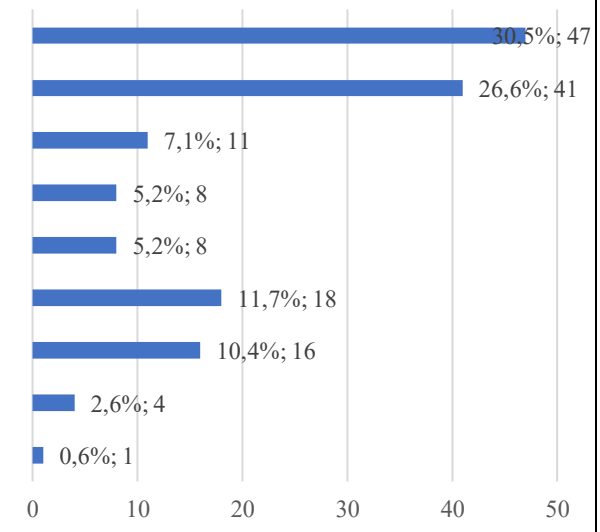
Basic education; high school; bachelor's degree; major degree; postgraduate; master; Ph.D; non specified



Arts and humanities; engineering; social and human sciences; economics and management; non specified



Unemployed; student; non specified; employee; self employed



Non specified; services; health care and social services; engineering; education; sciences, math and IT; social sciences, commerce and law; arts and humanities, agriculture

For question 1 regarding respondents' age, age ranges were created to facilitate data processing. Among the 154 participants, most are between 17–25 (25%), 26–34 (25%), and 44–52 years old (21%), showing a balanced distribution between younger and older adults. Additionally, 14% are aged 35–43, 12% are 53–61, and only 3% are 62–70. Also, 56% of respondents are female (86 individuals), and 44% are male (68 individuals).

Most respondents hold a bachelor's degree (34%) or complete secondary education (32%). Additionally, 18% have a master's degree and 12% a postgraduate diploma. The remaining sample includes 2% with a PhD, 1% with an associate degree, and 1% unspecified. Regarding academic background, the dominant area is Economics and Management (42%), followed by Social Sciences (20%), unspecified fields (16%), Arts and Humanities (14%), and Engineering (8%).

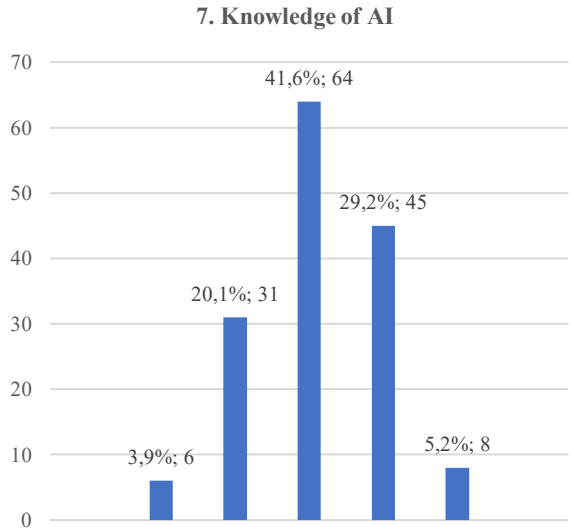
As shown in the chart, most respondents (73%) are employed by others. The rest include 15% students, 6% self-employed, 4% unemployed, and 3% unspecified. Regarding professional fields, 31% did not specify, while 27% work in Services. The remainder are spread across various sectors: 12% in Science, Mathematics, and IT; 10% in Social Sciences, Business, and Law; 7% in Health and Social Protection; 5% in Education; 5% in Engineering and Manufacturing; 3% in Arts and Humanities; and 1% in Agriculture.

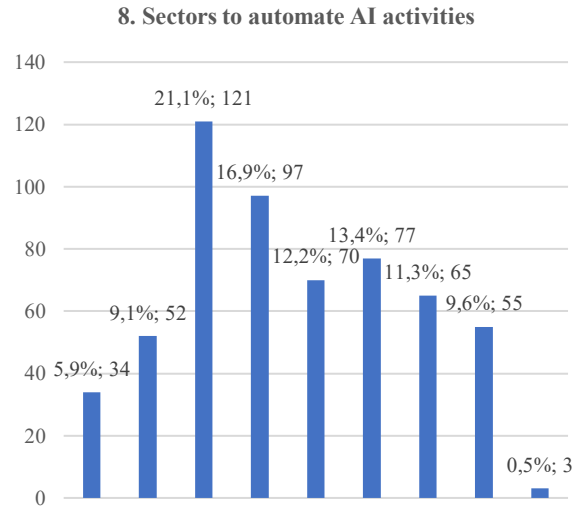
4.2. Analysis of Results

Following the demographic analysis, this chapter focuses on the technical findings gathered through the questionnaire and interviews, specifically regarding AI, blockchain, and cryptocurrencies.

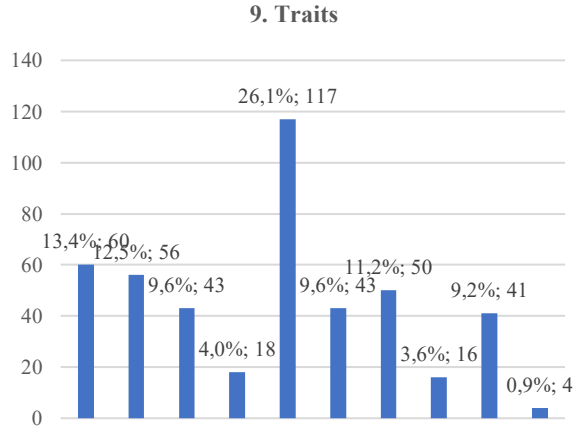
Question 7 used a 5-point semantic differential scale, where 1 meant "No knowledge" and 5 "Very High knowledge" of AI. According to Chart 2, only 4% reported having no knowledge of AI, and 5% indicated very high knowledge. Most responses are in the mid-range: 20% reported low knowledge, 29% high, and the largest group (42%) rated their knowledge as medium. In total, 76% rated their knowledge from medium to very high, compared to only 24% with little or no knowledge.

Chart 2: AI.

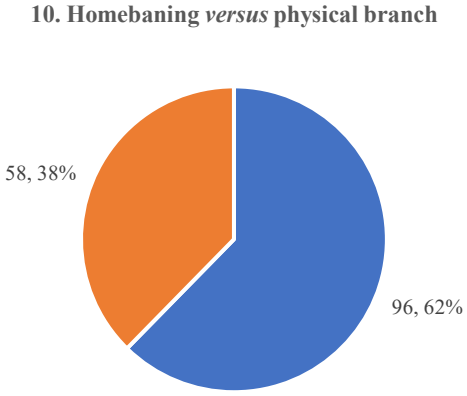




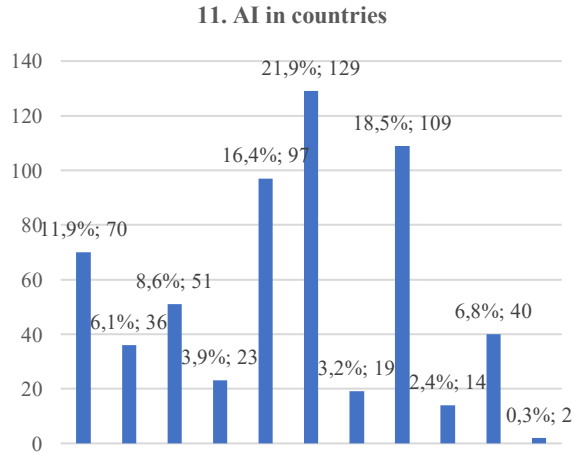
Agriculture; education; data extraction; finance; management; marketing; security; health care; other



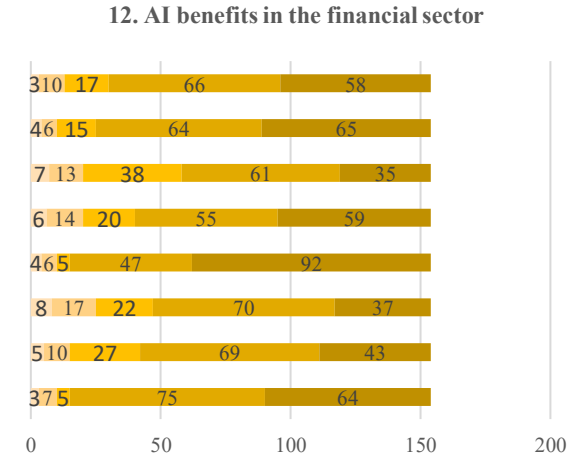
Ambition; comprehension; creativity; education; empathy; honesty; loyalty; resilience; responsibility; velocity



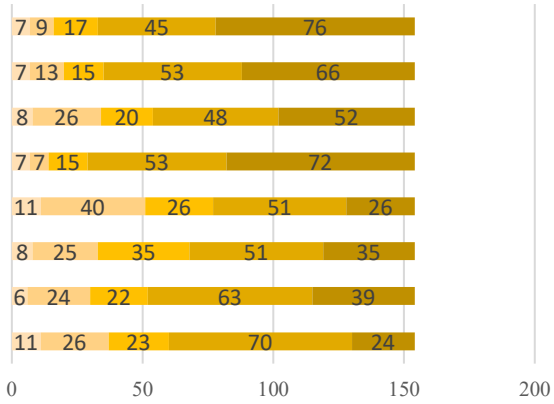
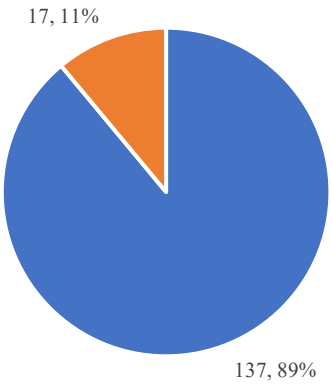
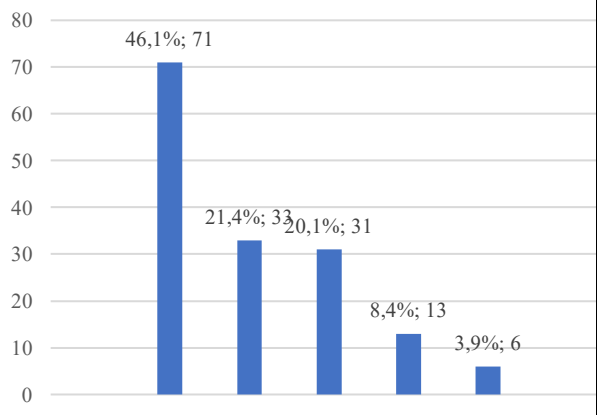
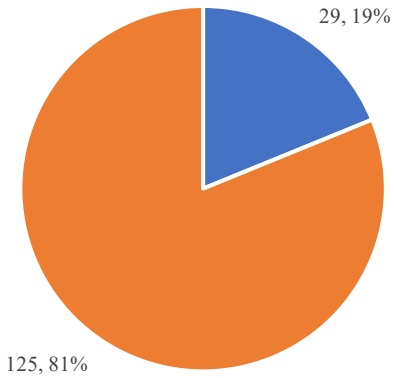
Homebanking (digital); physical branch

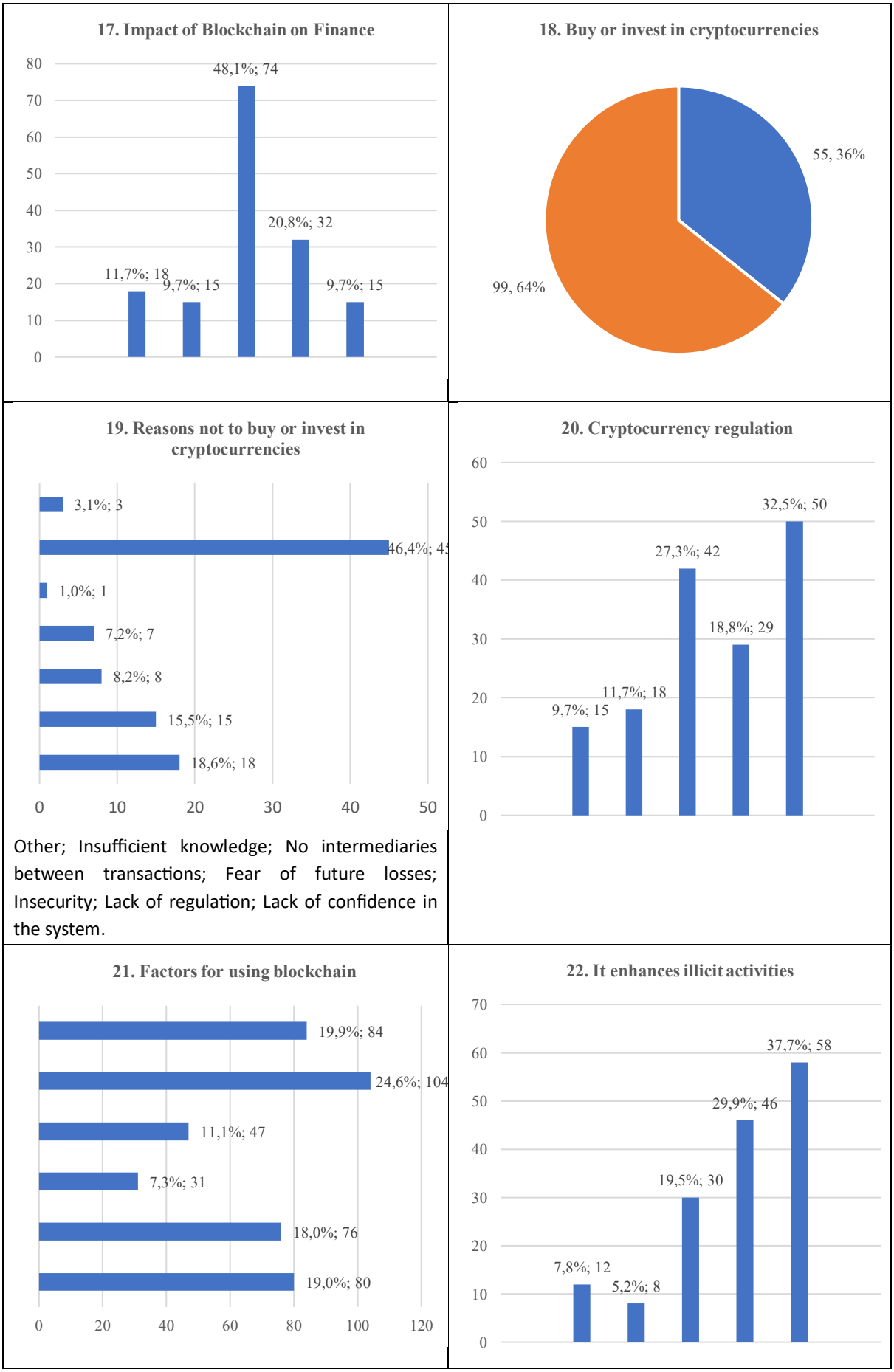


Germany; Canada; Emirates; Australia; China; USA; France; Japan; Portugal; UK: Other



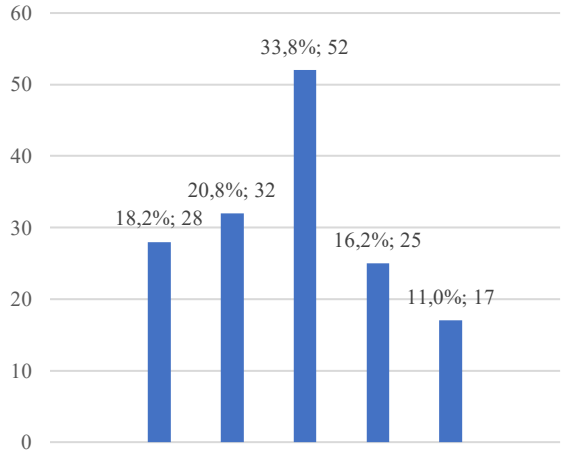
Fast communication; Reduction of operating costs; Greater convenience for employees; Innovation;

	Fraud detention; More efficient service with customers; Increase of efficiency and performance of employees; Process optimization and automation
13. AI limitations in the financial sector  Job displacement; Cybersecurity risks; Loss of control and privacy; Loss of human connection; Lack of transparency; Economic inequality; High implementation and maintenance costs; Job automation	**14. Impact of AI in Portugal** 
15. Degree of knowlege of Blockchain 	**16. Usage of Blockchain** 

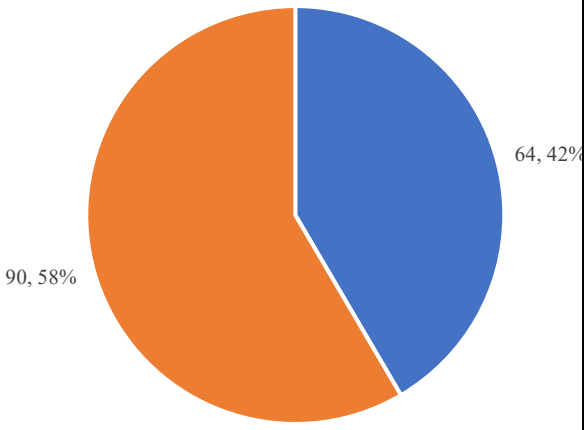

17. Impact of Blockchain on Finance
80
70
60
50
40
30
20
10
0
48,1%; 74
20,8%; 32
11,7%; 18
9,7%; 15
9,7%; 15
18. Buy or invest in cryptocurrencies
55, 36%
99, 64%
19. Reasons not to buy or invest in cryptocurrencies
3,1%; 3
46,4%; 45
1,0%; 1
7,2%; 7
8,2%; 8
15,5%; 15
18,6%; 18
0
10
20
30
40
50
Other; Insufficient knowledge; No intermediaries between transactions; Fear of future losses; Insecurity; Lack of regulation; Lack of confidence in the system.
20. Cryptocurrency regulation
60
50
40
30
20
10
0
32,5%; 50
27,3%; 42
18,8%; 29
11,7%; 18
9,7%; 15
21. Factors for using blockchain
19,9%; 84
24,6%; 104
11,1%; 47
7,3%; 31
18,0%; 76
19,0%; 80
0
20
40
60
80
100
120
22. It enhances illicit activities
70
60
50
40
30
20
10
0
37,7%; 58
29,9%; 46
19,5%; 30
7,8%; 12
5,2%; 8

Security and storage stability; User protection; Price stability; Increase in the number of banks adopting; Increase in information; State approval and regulation	

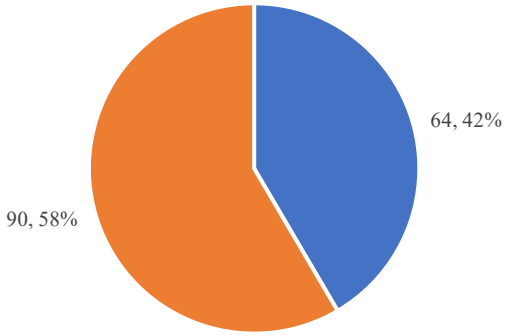
23. Cryptocurrencies as a future currency



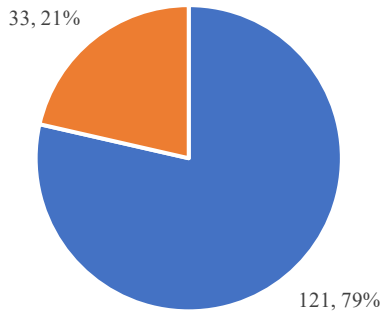
24. Use cryptocurrencies or virtual currency



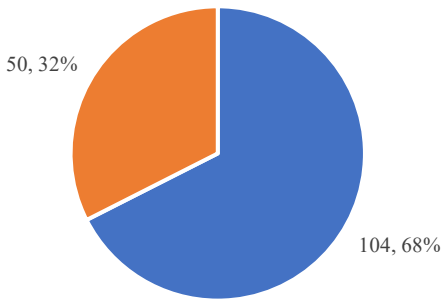
25. Cryptocurrency as official currency



26. AI and Blockchain in Digital Transformation in the Financial Sector



27. "New technologies are a possible threat to the future of professionals in the financial sector"



Notes: Q7, Q15, Q17, Q20, Q22, Q23 = Lickert scale (1-5); Q14, Q16, Q18, Q24, Q25, Q26, Q27 = Yes, No.

Question 8, shown in Chart 2, allowed respondents to select one or more sectors where they believed AI has the greatest potential for automation. The most selected sectors were data extraction and finance, each chosen by around 38% of the sample. Intermediate selections included management, marketing, security, healthcare, and education (10–17%). Agriculture was seen as having low automation potential, with only 6% selecting it. Respondents also suggested three additional sectors: engineering, public administration, and public services.

In question 9, respondents could choose one or more personality traits they believed machines would struggle to replicate. Empathy was the most selected trait, with 26% identifying it as the hardest for machines to emulate. Other traits—such as ambition, understanding, loyalty, creativity, honesty, and responsibility—were moderately chosen (around 11–13%). Traits like politeness, resilience, and speed were considered easier for machines to replicate.

Question 10 asked respondents whether they preferred handling banking matters at a physical branch or through digital channels The majority—around 96 respondents (62%)—preferred digital banking. However, a notable portion—about 58 respondents (38%)—still favored in-person service at a physical branch. Interestingly, while 62% prefer digital banking (Q10), this preference is more pronounced in the 17-34 age brackets (50% of the sample), suggesting a generational shift in financial interaction (Supporting H2).

Question 11 asked respondents to select one or more countries they considered most capable of integrating AI into daily work. The most advanced countries identified were the United States, Japan, China, and Germany. In contrast, Australia, France, and especially Portugal—selected by only 2.4%—were seen as less capable. One respondent also added Denmark as an additional country.

It was asked about the potential benefits of AI in the financial sector. A Likert scale was used in Question 12 to assess the perceived importance of each benefit. Except for fraud detection—rated “Very Important” by about 60%—and employee convenience, which had a balance between “Indifferent” and “Very Important,” most other benefits were rated as “Important” or “Very Important” by most respondents.

In contrast to Question 12, Question 13 presents some limitations that AI may bring to the financial sector, using the same Likert scale to assess respondents' level of agreement. Over 75% of respondents agreed or strongly agreed that job displacement, cybersecurity risks, and loss of human connection are major limitations. Most also agreed that job automation and high implementation/maintenance costs are significant concerns. Opinions were more divided on economic inequality and privacy loss. Regarding lack of transparency, responses were balanced, though 26% disagreed that AI would harm data transparency.

Question 14 aims to assess respondents’ views on the future impact of AI in Portugal over the next 10 years. The expectation is nearly unanimous: about 137 respondents (89%) believe AI will impact various sectors in Portugal. Conversely, 17 respondents (11%) disagree with this prediction.

Like question 7, question 15 used a 5-point semantic differential scale, where 1 indicates “No” knowledge and 5 indicates “Very High” knowledge of the blockchain concept. Chart 2 shows that nearly half of respondents (about 46%) reported having no or low knowledge, while only 4% claimed very high knowledge. Overall, 67% of the sample had little to no understanding of blockchain, while 33% reported medium to high levels of knowledge. Even with 34% of respondents holding a bachelor's degree and 18% a master's, the knowledge of Blockchain (Q15) remains surprisingly low (67% low/none), indicating that higher education does not necessarily translate into literacy regarding decentralized ledger technologies.

Question 16 aimed to determine whether respondents had ever used blockchain technology. The vast majority—around 81%—have never used it, while only 19% reported having used it in some aspect of their daily lives.

Based on the answers to Question 17, the aim was to assess respondents’ views on whether blockchain has an organizational impact on the financial sector. Nearly half—around 48%—neither agreed nor disagreed. Meanwhile, 22% disagreed to some extent, and 31% agreed that blockchain has had an impact on the sector.

Since most respondents had little knowledge of blockchain and had never used it, Question 18 aimed to understand whether they were willing to buy or invest in cryptocurrencies. Around 64% said they were not willing to invest, while 36% expressed willingness.

Question 19 was the only conditional question, answered only by those who responded "No" to Question 18. It aimed to identify the reasons behind respondents' unwillingness to buy or invest in cryptocurrencies. The main concern, selected by 46% of respondents, was the lack of knowledge and information. Other key concerns included lack of trust in the system (19%) and lack of regulation (16%). Less frequently cited reasons were insecurity (8%), fear of losses (7%), and absence of intermediaries (1%). Some also mentioned tax evasion and funding of criminal or terrorist organizations.

Question 20 addressed whether respondents believe cryptocurrencies should be regulated by banks, the state, and governmental institutions, similar to traditional currencies. About 33% of respondents fully agreed with the need for regulation, while only 10% totally disagreed. Around 27% were neutral, 19% agreed, and 12% partially disagreed. Overall, data shows that over half of the respondents support crypto regulation.

In Question 21, respondents could select one or more factors they considered important for using blockchain technology. The most selected was user protection, chosen by 104 respondents (25%). Other key factors included secure and stable data storage (20%), state approval and regulation (19%), and increased information (18%). Less important were price stability (11%) and broader adoption by banks (7%).

Question 22 addresses respondents' level of agreement on whether cryptocurrencies may increase illicit activities. According to the chart, 38% totally agree and 30% agree, while only 8% totally disagree and 5% partially disagree. Meanwhile, 20% neither agree nor disagree. Overall, about 68% of the sample believes that, without regulation, cryptocurrencies could promote illicit activity.

Question 23 represents respondents' agreement on whether cryptocurrency could become the currency of the future. Around 34% neither agree nor disagree, while 21% disagree and 18% totally disagree. Conversely, 16% agree and 11% totally agree. Excluding the neutral responses, the results are balanced, suggesting uncertainty and lack of knowledge about cryptocurrencies.

Question 24 aimed to assess whether respondents would be willing to use cryptocurrencies or digital currencies. Around 58% stated they would not be willing to use digital currencies in the future, while 42% indicated they would be open to using them.

Question 25 asked whether, in 20 years, 25 % of the world's countries will adopt cryptocurrency as their official currency. Most respondents, 90 people (58 %)—disagreed, whereas those willing to use, buy, or invest in cryptocurrencies tended to agree.

AI and blockchain have emerged in several sectors, including finance. Question 26 asked whether these technologies have played a significant role in digital transformation within the financial sector. 121 respondents (79%) agreed they have played a key role, while 33 (21%) disagreed.

The final question, number 27, presented the statement: "New technologies are a possible threat to the future of professionals in the financial sector," to which respondents could answer "yes" or "no." 104 respondents (68%) agreed that new technologies may pose a threat to jobs in finance, while 50 (32%) did not see them as a threat.

The findings reveal a perceptual paradox: while AI is recognized for its high operational utility in fraud detection and process optimization (Q12), it simultaneously triggers a high level of professional anxiety, with 68% of the sample perceiving it as a direct threat to job security (Q27). This supports the Socio-Technical tension proposed in our conceptual framework.

The internal consistency of the research instrument was assessed using Cronbach's Alpha coefficient. The reliability analysis yielded a Cronbach's Alpha of 0.7501 for the AI section, indicating good internal consistency.

Regarding the Blockchain section (α = 0.4114), the lower coefficient is attributed to the multidimensional nature of the items, which combined binary (Yes/No) usage data with attitudinal Likert scales. Furthermore, the high percentage of respondents reporting 'no knowledge' of blockchain (68%) contributed to a higher variance in responses. As such, these items were analyzed as independent indicators of digital literacy rather than a single unified scale.

To examine the predictors of AI acceptance, a Multiple Linear Regression was conducted, as shown in Table 5. The dependent variable was the aggregate score of AI perceptions (validated by Cronbach's Alpha = 0.75), while sociodemographic factors and self-reported knowledge were treated as independent variables. This inferential approach allows for a robust assessment of how individual characteristics influence the digital transition in the financial sector.

Table 5: Results of Multiple Linear Regression for AI Acceptance.

Independent Variables	Coefficients (β)	Standard Error	t-statistic	p-value
(Intercept)	46.012	2.915	15.783	< 0.001***
Age	0.032	0.049	0.648	0.517
Gender (Male)	3.405	1.304	2.610	0.009***
Academic Qualifications	0.029	0.437	0.067	0.946
Level of Knowledge (IA)	0.446	0.704	0.634	0.526

Notes: *** - statistical significance at 1%.

The inferential analysis for the AI sector reveals a gender-based digital divide. A multiple linear regression model ($F = 2.12$, $p < 0.10$) identified Gender as the primary significant predictor of positive AI perception ($B = 3.40$, $p < 0.01$). These results suggest that, within the Portuguese financial context, men demonstrate a significantly higher propensity for AI engagement and perceived utility than women, while age and academic qualifications showed no significant impact in this specific model.

In addition to the AI analysis, a Multiple Linear Regression was performed to examine the predictors of blockchain adoption (Table 6). Due to the insufficient internal consistency observed in the overall blockchain scale (Cronbach's Alpha < 0.70), Question 24 ('Willingness to adopt blockchain/digital currencies in the future') was selected as the primary dependent variable. Sociodemographic characteristics were treated as independent variables to assess their specific influence on the intention to adopt decentralized ledger technologies.

Table 6: Results of Multiple Linear Regression for Blockchain Adoption.

Independent Variables	Coefficients (β)	Standard Error	t-statistic	p-value
(Intercept)	0.437	0.129	3.389	0.001***
Age	-0.001	0.003	-0.524	0.600
Gender (Male)	0.226	0.079	2.860	0.005***
Academic Qualifications	-0.021	0.027	-0.798	0.426

Notes: *** - statistical significance at 1%.

The multiple linear regression model ($F = 3.31$, $p < 0.05$) identified Gender as the primary significant predictor of positive AI perception ($B = 0.2258$, $p < 0.01$). In both AI and Blockchain, men show a greater intention to adopt and a more positive perception. This suggests that digital literacy strategies in financial institutions should focus on reducing this gender disparity. Interestingly, the Blockchain model (Q24) proved to be more significant globally ($p < 0.05$) than the AI model ($p < 0.10$). This proves that, although general knowledge of Blockchain is lower, the decision to "want to use it in the future" is more clearly defined by specific demographic profiles. The fact that academic qualifications are not significant in either model is an important finding. It indicates that "digital zeal" does not depend on the degree level (bachelor's vs. master's), but on other sociocultural factors.

5. Discussion of Results

Following the analysis of the questionnaire data, this chapter focuses on interpreting the 154 responses collected through the survey regarding new information technologies in the financial sector, along with the insights from the two interviews. The aim is to correlate these findings with the previously formulated research hypotheses.

For interpreting the results, both the historical approach and the inductive approach were utilized. The historical approach encompasses various techniques, methods, and procedures to examine the phenomena and processes examined in the study, whereas the inductive approach is based on observing specific data to formulate general conclusions - progressing from particular instances to overarching insights. These approaches facilitate extensive considerations instead of definitive conclusions.

The initial questions played a crucial role in outlining the sample's profile to identify its characteristics. Regarding the questionnaire, there was a balanced representation between female and male respondents, although most responses came from women. Age was a key factor, with most responses coming from individuals aged between 17–25, 26–34, and 44–52. This provides insights from both younger and older perspectives regarding the impact of new information technologies in the financial sector. In terms of education level, most respondents had either a bachelor's degree or a secondary education.

The inferential analysis conducted provides a new layer of understanding regarding the determinants of technology adoption in the Portuguese financial sector. The results of the multiple linear regressions for AI (Table 5) and Blockchain (Table 6) reveal a remarkable convergence: in both digital ecosystems, Gender emerges as the most robust and significant statistical predictor ($p < 0.01$ for AI and $p < 0.01$ for Blockchain). These data suggest the existence of a persistent gender digital divide. Male respondents demonstrate not only a more favorable perception of the usefulness of AI, but also a significantly higher predisposition for the future adoption of cryptocurrencies and distributed ledger technologies. This finding aligns with the literature on the UTAUT model (Venkatesh et al., 2003), which identifies gender as a critical moderator in the acceptance of new technologies, frequently associating the male profile with a greater orientation towards performance and perceived ease of use in FinTech environments. On the other hand, the absence of statistical significance for Academic Qualifications and Self-Reported Knowledge Level in both models is revealing. This indicates that the desire to integrate these technologies into daily financial life is not strictly dictated by the level of education, but by deeper sociodemographic factors. Regarding Blockchain, although the aggregate scale showed reduced internal consistency ($\alpha = 0.41$), reflecting the fragmentation and novelty of the topic for the general public, the individual analysis of future usage intention (Q24) validated the global model ($p < 0.05$). This result suggests that, despite blockchain literacy still being incipient (68% unaware), future adoption decisions are already being shaped by specific demographic profiles, reinforcing the need for more inclusive and targeted financial communication strategies to mitigate the observed disparities.

As for the interviews, both were conducted with male participants. One holds a master's degree and has worked in two financial institutions, while the other is currently employed in a financial institution. Since both have or had contractual ties to financial institutions, their input is valuable for analyzing the perspective from within the industry.

The following section presents the analysis of each research hypothesis formulated in the study:

Hypothesis 1: The integration of disruptive IT (AI and Blockchain) has significantly altered the operational dynamics and service delivery models within the financial system.

Regarding the level of knowledge about the technologies presented, most respondents (76%) reported having medium to high knowledge about AI, suggesting that this technology is relatively familiar to the public. In contrast, blockchain showed the opposite trend, with 68% of respondents having little or no knowledge, and only a small portion (12%) claiming to have high or very high knowledge. This indicates that blockchain is still relatively unfamiliar and not widely adopted among the target audience, as 81% have never used the technology.

Regarding the organizational impact of blockchain in the financial sector, nearly half of the respondents (48%) neither agreed nor disagreed with the statement, reflecting the lack of knowledge and understanding previously demonstrated in earlier questions. However, 31% agreed or strongly agreed that technology has an organizational impact, indicating a growing recognition of blockchain in the financial industry.

According to the data, 79% of participants think blockchain and AI are going to have a major impact on the financial industry's digital transformation. The experts surveyed concur, pointing out that both technologies are boosting productivity, simplifying procedures, strengthening security, and stimulating innovation in the financial industry. However, one interviewee noted that putting these technologies into practice presents several difficulties, such as the need for new regulatory measures because of the increased risk of fraud, investments in technology infrastructure, employee training, and guaranteeing the security, privacy, and protection of data for financial institutions and their clients. The other interviewee pointed out that the financial sector has begun to adapt to these technologies; for example, the level of blockchain implementation varies between investment banks and fund management in relation to transactions - and stressed that digitalization in Portugal is advancing at a faster pace compared to other nations.

Consequently, the findings reinforce the research hypothesis that emerging information technologies have brought about a new dynamic within the financial system, which leads us to accept Hypothesis 1.

Hypothesis 2: The growth of digital banking acts as a primary driver in shifting consumer behavior from traditional physical interaction to digital-first financial engagement.

Data on how banking operations have changed and the effects they have on customers and employees were gathered using a questionnaire and interviews with banking professionals.

Question 10 of the questionnaire supports Hypothesis 2. Most customers (62%) prefer using online banking services over going to a physical branch. Results show that digital services provide better accessibility and faster response times. It is also demonstrated how technology is increasingly the influence how people engage with the financial system. It also implies that there is still potential for improvement when it comes to managing more complicated problems that might call for face-to-face help at a physical location. The 62% preference is not just about "convenience," but a shift in the consumer's mental model.

From the perspective of the interviewed banking professionals (questions 6 and 7), digitalization and technological advancement have led to the closure of physical branches. However, they emphasize that this should not be viewed as a threat but rather as an opportunity to enhance the financial sector. The growth of digital services opens the door to new jobs. These jobs need professional retraining and the development of new roles, such as data analysis and the design of tech solutions. One interviewee pointed out that the pandemic sped up the use of online banking services. This shows how outside events can push change among consumers and affect the way financial institutions operate. The other interviewee pointed out that self-service has become a dominant trend in banking and other industries.

Based on these results, it is possible to conclude that technological evolution has significantly influenced banking operations through the rise of digital banking, changing the way people perceive and engage with the financial system. Therefore, this hypothesis is accepted.

Hypothesis 3: There is a significant perception among stakeholders that automation and AI-driven processes negatively correlate with long-term job security in the financial sector.

The survey results reveal that consumers view most benefits of implementing AI in the financial sector as important or very important. Notably, 90% highlight the automation and optimization of processes, which shows that people recognize AI’s ability to improve efficiency and reduce human error. Other significant advantages include faster communication at 81%, lower operational costs at 84%, and increased convenience for employees at 62%. These findings indicate that AI can simplify routine financial operations.

However, implementation also raises concerns. Most respondents agree or strongly agree that AI can automate tasks (61%) and replace jobs (79%). This highlights serious worries about its impact on employment. Additionally, the loss of human connection (81%) is viewed as a major drawback, potentially harming the relationship between financial institutions and their clients.

From the consumers' standpoint, this concern is further confirmed by the fact that 68% believe new technologies pose a threat to financial professionals. This perception is shared by the interviewees, who acknowledge the risk of job displacement and the erosion of human contact. Still, they also point out that using technology can create new opportunities through adjustment and job retraining, which leads to the development of new roles and functions that help clients, employees, and financial institutions. In conclusion, while new technologies are shaping the future of finance with clear benefits, both consumers and professionals see their evolution as a possible threat to jobs; therefore, this hypothesis is accepted.

Hypothesis 4: While blockchain provides perceived transparency and security, its influence on the actual adoption of cryptocurrencies is mediated by institutional trust and regulatory frameworks.

As previously noted in Hypothesis 1, respondents show limited or no knowledge of blockchain (68%), while the remaining minority report medium, high, or very high levels of knowledge - with only 19% having ever used the technology.

The data suggests that most consumers (64%) are unwilling to purchase or invest in cryptocurrencies, with 46% of them citing lack of knowledge as the primary cause. Other major obstacles include a lack of regulation (15%) and a lack of trust in the system (19%). These results show that regulatory oversight and a lack of trustworthy information are major barriers to respondents' adoption of cryptocurrencies.

When participants were asked if they would use a tool from their bank to monitor cryptocurrencies for investment or purchase, most focused on user protection (25%). This was followed by secure and stable data storage (20%), state approval and regulation (19%), and more information (18%). While limited information is a relevant barrier, data protection appears to be a stronger motivator for possible crypto adoption.

From a professional point of view, one banking expert sees cryptocurrency trading as a financial chance for institutions, as long as it is closely watched and regulated to safeguard both investors and financial markets. The second professional is more critical. They view cryptocurrencies as highly speculative and with a limited supply. They contend that the pricing is excessive and are concerned that banks may make the same mistakes they made during the 2008 financial crisis.

In conclusion, experts and consumers alike concur that the most crucial elements for the possible uptake of cryptocurrencies are security and regulation. Banks, governments, and regulatory agencies should regulate cryptocurrencies, according to a sizable portion of the sample (51%) who agree or strongly agree. Furthermore, 68% believe cryptocurrencies could increase illicit activities if left unregulated.

However, only 42% of respondents would consider using cryptocurrencies in the future, 27% believe they could become the currency of the future, and 58% do not believe that 25% of the world's countries will adopt them as official currency within the next 20 years.

One interviewee argues that cryptocurrency adoption within the EU is unlikely without unanimous agreement among member states. The other believes that if central banks were the issuers, adoption would be more likely.

In conclusion, blockchain technology does offer security and transparency, and financial experts see its potential for institutional gains. However, these factors alone are not enough to get people to use cryptocurrencies. Consequently, this hypothesis is dismissed. The rejection of H4 is a significant finding. It suggests a decoupling between the technical merits of Blockchain (security/transparency) and the psychological/regulatory readiness for Cryptocurrency. This indicates that transparency is a 'hygiene factor' (necessary but not sufficient) and that without Institutional Trust and State Regulation, the technological advantage remains inert. The rejection of H4 also stems from the lack of a unified technological perception among respondents (as evidenced by the low Cronbach's Alpha of 0.41 for this section), which reinforces our finding that institutional trust and literacy are still in an embryonic stage.

The findings regarding the lack of knowledge in Blockchain (68% of respondents) align with the UTAUT framework (Venkatesh et al., 2003), specifically the 'Facilitating Conditions' construct. The results suggest that without adequate information and regulatory support, the perceived effort to use these technologies outweighs the intention to adopt them, leading to the rejection of H4.

Hypothesis 5: The successful adoption of AI and Blockchain provides measurable efficiency gains and structural benefits that outweigh traditional operational limitations.

Most consumers see that using AI offers substantial benefits to the financial sector, especially in fraud detection (90%), process automation (90%), lowering operational costs (84%), and driving sector innovation (74%). These findings align with insights from the interviews, where professionals also believe that both AI and blockchain can significantly improve efficiency, increase security, provide new customer services, cut costs, and foster innovation within the financial system.

Despite these benefits, consumers share concerns. They identify loss of human connection (81%), cybersecurity risks (77%), and job displacement (79%) as their main worries. However, these challenges do not outweigh the advantages. Instead, they highlight the need to address these issues effectively.

Furthermore, consumers emphasize that user protection (25%) and secure data storage (20%) are crucial for adopting cryptocurrencies. This again stresses the vital role of security and trust in embracing new technologies. The benefits "outweigh" the limitations not by opinion, but because respondents identify gains of 90% in critical areas such as fraud.

Data indicates that both consumers and professionals generally have a positive view of technological implementation, especially regarding efficiency, cost savings, and innovation, despite ongoing concerns about security, human interaction, and employment. These results highlight the need for a safe, well-managed adoption process to achieve successful and sustainable integration of these technologies in financial institutions. One interviewee mentioned that adopting such technologies in financial institutions usually takes over five years.

Additionally, the acceptance of cryptocurrencies relies heavily on user protection and security. Therefore, we can conclude that the successful use of AI, blockchain, and cryptocurrencies in financial institutions benefits the financial sector, and this hypothesis is valid.

In summary, Table 7 presents the accepted or rejected results of each research hypothesis.

Table 7: Hypothesis analysis results.

Research Hypothesis	Hypothesis Description	Status
Hypothesis 1	The integration of disruptive IT (AI and Blockchain) has significantly altered the operational dynamics and service delivery models within the financial system.	Supported
Hypothesis 2	The growth of digital banking acts as a primary driver in shifting consumer behavior from traditional physical interaction to digital-first financial engagement.	Supported
Hypothesis 3	There is a significant perception among stakeholders that automation and AI-driven processes negatively correlate with long-term job security in the financial sector.	Supported
Hypothesis 4	While blockchain provides perceived transparency and security, its influence on the actual adoption of cryptocurrencies is mediated by institutional trust and regulatory frameworks.	Not Supported
Hypothesis 5	The successful adoption of AI and Blockchain provides measurable efficiency gains and structural benefits that outweigh traditional operational limitations.	Supported

5.1. Discussion: Mechanisms of Digital Transition

The rejection of H4 and the low internal consistency of the blockchain scale (α = 0.41) are not merely statistical artifacts; they reveal a deep-seated mechanism of Institutional Trust. As noted in the literature, blockchain provides technical transparency, but our results show that 46% of non-investors cite "lack of knowledge" as the primary barrier. his suggest that in the Portuguese context, technical security is insufficient if not accompanied by regulatory frameworks. The "knowledge paradox" identifies that even with a recognized potential for innovation, the absence of a stable legal environment prevents the transition from "interest" to "actual use".

Our Multiple Linear Regression identified Gender as the only significant predictor for both AI and Blockchain adoption ($p < 0.01$). This aligns with the UTAUT model (Venkatesh et al., 2003), which posits that gender acts as a moderator where performance expectancy (the belief that technology helps tasks) is often more salient for men in competitive environments. This suggests that the digital transition in the Portuguese financial sector is currently asymmetric, requiring targeted policies to promote gender-neutral digital literacy.

While 90% of respondents recognize AI's efficiency in fraud detection, 68% view it as a threat to their profession. This reflects a tension in Task-Technology Fit (TTF). Technology is perceived as "fitting" the task of data processing, but "unfitting" the task of human relationship management. As corroborated by the interviewees, the closure of physical branches is an operational efficiency but creates a "void" in the psychological contract between the bank and the client.

6. Conclusion

This study's main goal was to assess how new IT has affected the financial industry from both a consumer and a professional standpoint. This exploratory study sought to map the current digital transformation landscape and its implications for the future of financial professions by examining the levels of knowledge, perceived benefits, and limitations of blockchain and AI.

A discrepancy in technological literacy is revealed by the data gathered. While the majority of this sample demonstrates a medium to high level of AI knowledge, suggesting a degree of familiarity with this technology, blockchain remains poorly understood, with most respondents reporting little to no awareness. This lack of understanding appears to correlate with a sense of anxiety regarding decentralized systems. Consequently, for the participants in this study, increasing information sharing and public awareness emerges as a potential requirement to dispel technical doubts.

From the questionnaire and interviews, it is observed that both consumers and professionals tend to hold favorable views on IT's role in introducing new dynamics to financial operations. The preference for digital banking over traditional channels in this sample reflects how technological advancement can improve banking operations. However, these respondents had a more negative opinion of cryptocurrencies; while security and transparency are acknowledged as technological benefits, they do not appear to be enough to promote widespread adoption. This is supported by the qualitative findings from the interviews, which indicate that adoption might be more dependent on investor protection and regulatory monitoring than on technological features alone.

The perception of new technology as a possible danger to existing financial industry jobs is a noteworthy finding that is consistent across both quantitative and qualitative data. The majority of respondents voice concerns about job security notwithstanding the possibility of professional requalification and the introduction of new roles. This tension highlights one of the study's primary interpretative contributions: while IT facilitates lower operating costs and greater efficiency through digital banking, it simultaneously introduces obstacles such as the loss of human connection and the risk of structural unemployment.

This research contributes to the scientific community by illustrating how IT is transforming conventional financial systems. By applying inferential techniques - such as the Multiple Linear Regression which identified gender as a significant predictor for adoption ($p < 0.01$) - the study moves beyond descriptive findings to suggest that

technological engagement is moderated by sociodemographic factors, as posited by the UTAUT framework. Unlike general studies, our findings reveal a knowledge paradox in the Portuguese context: high familiarity with AI does not translate into job security, whereas low knowledge of Blockchain correlates directly with financial skepticism.

Strategically, the results indicate that the amount of data handled by FIs is putting increasing pressure on them to reconsider their business strategies. By emphasizing that a successful digital transformation necessitates a balance between technology advantages and the mitigation of socio-technical hazards, such as professional anxiety and digital exclusion, the research helps to the strategic growth of financial institutions.

These findings should be interpreted cautiously and not as generalizations for the Portuguese population as a whole, given the exploratory approach and convenience sample (N=154). The results highlight the need for continuous structural changes in order to modernize the industry and show trends within a particular group. Regular assessment and updated research are crucial to ensuring that the shift to the digital era remains inclusive and balanced as the complexity of blockchain and AI continues to develop.

The representatives of the sample obtained through the questionnaire survey constitutes the primary limitation of this research. Due to the use of convenience sampling - a non-probability technique selected to facilitate data collection - the participants were primarily reached through personal networks and academic referrals. Consequently, this sampling nature precludes a generalized analysis of the results for the entire Portuguese population and should be interpreted as an exploratory snapshot of a specific demographic.

Furthermore, the scale of the study, while providing a good response rate and a diverse age range, remains constrained by the total number of participants (N=154). This restriction aligns with the qualitative component, as a higher number of interviews with financial industry professionals would have potentially allowed for greater thematic saturation and a more representative assessment of the internal reality within FIs.

Regarding future research, it would be valuable to overcome these constraints by implementing probability sampling with larger cohorts of both experts and consumers to achieve broader applicability. We suggest expanding the scope in two specific directions. First, the institutional focus, by conducting research solely within FIs operating in Portuguese territory to collect granular data on the specific benefits and risks of technology implementation in each organizational culture. Secondly, a comparative analysis, by correlating Portuguese data with findings from FIs in other nations to identify regional patterns in digital transition.

Lastly, future research should monitor the development of cryptocurrency laws in Portugal, considering the intricacy of blockchain and AI. It is nevertheless vital to keep an eye on whether more regulations result in better rates of acceptance as a payment method across various businesses. Regular updates to this research body are necessary to guarantee the findings' continued relevance in the digital age, given the continuous and quick growth of these technologies.

Acknowledgments

The opinions expressed in this article are those of the authors and do not necessarily represent the views of the institutions with which they are affiliated. The authors acknowledge the financial, research, and administrative support from FCT (NECE-UBI: UIDB/04630/2020) and by Instituto Politécnico de Lisboa as part of the IPL/IDI&CA2024/CRYPTORISK_ISCAL projects.

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Appendices

Appendix A—Questionnaire Survey (Translated into English)

New Information Technologies in the Financial Sector

My name is (…) and, within the scope of my master's dissertation in Management of Financial Institutions at the Instituto Superior de Contabilidade e Administração de Lisboa, the following questionnaire aims to understand the impact that new information technologies currently have on the financial sector.

The data obtained is strictly confidential and will be treated anonymously, used solely and exclusively for scientific research purposes (no response will be identified or treated individually).

Your participation consists of completing a short questionnaire, which is expected to take no more than 10 minutes of your time.

I would like to thank you in advance for your participation in this research, which is essential for the continuation of my dissertation.

* Indicates a mandatory question

Respondent Profile Characterization

1. Age *

2. Gender *

Select only one option.

◯ Male

◯ Female

◯ Unspecified

3. Academic Qualifications *

Select only one option.

◯ Basic Education

◯ Secondary Education

◯ Associate Degree

◯ Bachelor's Degree

◯ Postgraduate Studies

◯ Master's Degree

◯ Doctorate

◯ Unspecified

4. Field of Study *

Select only one option.

- ◯ Arts and Humanities
- ◯ Engineering
- ◯ Social and Human Sciences
- ◯ Economics and Management
- ◯ Unspecified

5. What is your employment status? *

Select only one option.

- ◯ Unemployed
- ◯ Student
- ◯ Employee (working for someone else)
- ◯ Self-employed
- ◯ Unspecified

6. Area of activity *

Select only one option.

- ◯ Agriculture
- ◯ Arts and Humanities
- ◯ Social Sciences, Business and Law
- ◯ Sciences, Mathematics and IT
- ◯ Education
- ◯ Engineering, Manufacturing and Construction
- ◯ Health and Social Protection
- ◯ Services
- ◯ Unspecified

Artificial Intelligence

7. What is your level of knowledge regarding the concept of Artificial Intelligence (AI)? *

Select only one option.

	1	2	3	4	5	
None	◯	◯	◯	◯	◯	Very High

8. Which sectors do you consider to have the most potential for AI to automate their activities? (You may select more than one answer) *

Mark all that apply.

- [ ] Agriculture
- [ ] Education
- [ ] Data Mining
- [ ] Financial
- [ ] Management
- [ ] Marketing
- [ ] Security
- [ ] Health
- [ ] Other:

9. Which attributes (personality traits) do you think are most difficult to replicate in machines? (You may select more than one answer) *

Mark all that apply.

- [ ] Ambition
- [ ] Understanding
- [ ] Creativity
- [ ] Education
- [ ] Empathy
- [ ] Honesty
- [ ] Loyalty
- [ ] Resilience
- [ ] Responsibility
- [ ] Speed

10. Technological growth in the financial system has resulted in the closure of hundreds of physical branches, leading to the emergence of digital banking. Given this, in your daily life, do you prefer to go to a physical branch and continue to have human contact to resolve your issues, or do you prefer to resolve your issues through digital means? *

Select only one option.

- ◯ Digital Banking
- ◯ Physical Banking

11. In your opinion, which are the most developed countries capable of including AI in daily work? (You may select more than one answer) *

Mark all that apply.

- [ ] Germany
- [ ] Canada
- [ ] United Arab Emirates
- [ ] Australia
- [ ] China
- [ ] United States of America
- [ ] France
- [ ] Japan
- [ ] Portugal
- [ ] United Kingdom
- [ ] Other:

12. AI is increasingly present in financial markets. Evaluate from 1 (Not Important at all) to 5 (Very Important) the benefits that its implementation brings to the financial sector: *

Select only one option.

	Not Important at all	Slightly Important	Indifferent	Important	Very Important
Automation and optimization of processes					
Increased efficiency and employee performance					
More efficient customer service					
Fraud detection					
Innovation					
Greater convenience for employees					
Reduction of operational costs					
Speed in communication					

13. In your opinion, evaluate from 1 (Strongly Disagree) to 5 (Strongly Agree) the limitations that AI encounters in the financial sector: *

Select only one option.

	Not Important at all	Slightly Important	Indifferent	Important	Very Important
Job automation					
High implementation and maintenance costs					
Economic inequality					
Lack of transparency					
Loss of human connection					
Loss of control and privacy					
Cybersecurity risks					
Job displacement					

14. In 10 years, do you consider that AI will have an impact on several sectors in Portugal? *

Select only one option.

◯ Yes

◯ No

Blockchain and cryptocurrencies

15. What is your degree of knowledge regarding the concept of blockchain? *

Select only one option.

	1	2	3	4	5	
None	◯	◯	◯	◯	◯	Very High

16. Have you used blockchain technology? *

Select only one option.

◯ Yes

◯ No

17. Do you agree that in organizational terms in the financial area is there an impact of blockchain? *

Select only one option.

	1	2	3	4	5	
Totally disagree	◯	◯	◯	◯	◯	Totally agree

18. Blockchain records and provides security for cryptocurrency transactions; however, these are not regulated by the state. Based on your knowledge of cryptocurrencies, would you be willing to buy or invest? *

Select only one option.

- ◯ Yes
- ◯ No

19. If you selected "no", why? *

Select only one option.

- ◯ Lack of confidence in the system
- ◯ Lack of regulation
- ◯ Insecurity
- ◯ Fear of future losses
- ◯ No intermediaries between transactions
- ◯ Insufficient knowledge
- ◯ Other:

20. Do you agree that cryptocurrencies should be regulated by banks, state and government? *

Select only one option.

	1	2	3	4	5	
Totally disagree	◯	◯	◯	◯	◯	Totally agree

21. If your bank had automated software that monitored cryptocurrency activities, which of the following factors would be a requirement for your usage: (You may select more than one answer) *

Mark all that apply.

- ☐ State approval and regulation
- ☐ Increase in information
- ☐ Increase in the number of banks that join
- ☐ Price stability
- ☐ User protection
- ☐ Security and stability in storage

22. Do you consider that the use of these currencies increases illicit activities? *

Select only one option.

	1	2	3	4	5	
Totally disagree	◯	◯	◯	◯	◯	Totally agree

23. To what extent do you agree that cryptocurrencies are the currencies of the future? *

Select only one option.

	1	2	3	4	5	
Totally disagree	◯	◯	◯	◯	◯	Totally agree

24. In the future, do you plan on using cryptocurrencies or virtual currency? *

Select only one option.

◯ Yes

◯ No

25. In your opinion, do you think that in 20 years, around 25% of the world's countries could adopt cryptocurrencies as their official currency? *

Select only one option.

◯ Yes

◯ No

26. In your opinion, have AI and blockchain played a significant role in the digital transformation of the financial sector? *

Select only one option.

◯ Yes

◯ No

27. Do you agree with the following statement: "New technologies are a potential threat to the future of finance professionals."? *

Select only one option.

◯ Yes

◯ No

Appendix B—Interview Script (Translated into English)

Profile / Interviewee Experience:

1. Tell me a little about your background and your work experience.
2. What technologies do you work with or have you worked with in your day-to-day?

Technical Questions (Artificial Intelligence, Blockchain, and Cryptocurrencies):

1. How do you perceive the emergence of new technologies such as Artificial Intelligence and Blockchain in the financial sector?
2. What are the challenges that these two technologies have brought to the financial system?
3. What is the role of Artificial Intelligence in the future of the financial institutions' business?
4. Do you believe that the impact of technological evolution on the financial system has led to the closure of physical branches and the growth of digital banking? Could this be a threat to the future of professionals in the financial area?
5. As an employee/former employee of a Financial Institution, are people increasingly using digital options instead of physically going to a bank?
6. Regarding cryptocurrencies, these assets are not prohibited in Portugal and have been declared as income since 2023; however, their use is not guaranteed by any national authority. In view of this, do you believe that Financial Institutions could monitor cryptocurrency activity with the objective of commercializing them?
7. Do you agree that if cryptocurrencies were regulated by States, they could be the currencies of the future?
8. Do you believe that new technologies play a significant role in digital transformation in the financial sector?

Appendix C—Transcript of the 1st Interview (Translated into English)

1. Tell me a little about your background and your work experience.

I have a degree in Public Administration and a Master's in Economics and Public Policies. In banking, I have worked at Caixa Geral de Aposentações and BNP Paribas, and currently I work as a senior technician at the Tax and Customs Authority (Autoridade Tributária e Aduaneira).

2. What technologies do you work with or have you worked with in your day-to-day?

I essentially use Excel and SAP.

3. How do you perceive the emergence of new technologies such as Artificial Intelligence and Blockchain in the financial sector?

I see it as something positive that should be encouraged by organizations connected to the financial sector. These two technologies in question have the potential to increase efficiency, improve security levels, and offer new services to customers. Furthermore, they promote innovation in the financial sector and can reduce operational costs.

4. What are the challenges that these two technologies have brought to the financial system?

It implies a new effort from regulatory bodies, as the emergence of new technologies also brings opportunities for fraud and crime. There is also the need to invest in technological infrastructure and in training for employees, and to ensure customer data privacy and protection.

5. What is the role of Artificial Intelligence in the future of the financial institutions' business?

The automation of processes, the elimination of jobs, and a greater capacity for cyclical market prediction, I believe that will also be possible.

6. Do you believe that the impact of technological evolution on the financial system has led to the closure of physical branches and the growth of digital banking? Could this be a threat to the future of professionals in the financial area?

Yes, but I don't think it's a reason to stop the process of technological evolution. Digitalization has led to the closure of physical branches, but it also creates opportunities, such as data analysis, the development of technological solutions, and the adaptation and reskilling of professionals.

7. As an employee/former employee of a Financial Institution, are people increasingly using digital options instead of physically going to a bank?

Yes. The speed of response of digital options has led more and more people to choose these services, and the pandemic accelerated the adoption of online banking services with the aim of reducing the need for people to go to physical branches.

8. Regarding cryptocurrencies, these assets are not prohibited in Portugal and have been declared as income since 2023; however, their use is not guaranteed by any national authority. In view of this, do you believe that Financial Institutions could monitor cryptocurrency activity with the objective of commercializing them?

Yes. Everything that could eventually bring financial gains inevitably attracts the attention of Financial Institutions. However, it is crucial that these activities are regulated and monitored to ensure the safety of investors and the integrity of financial markets.

9. Do you agree that if cryptocurrencies were regulated by States, they could be the currencies of the future?

It would be difficult in the context of the European Union since it would only be possible if there was unanimity among the member states. Regulation could bring more legitimacy and stability to cryptocurrencies, but it would always depend on international agreements.

10. Do you believe that new technologies play a significant role in digital transformation in the financial sector?

Yes, technologies redefine processes, improve operational efficiency, and create new business opportunities, not only in the financial sector but also in other sectors.

Appendix D—Transcript of the 2nd Interview (Translated into English)

1. Tell me a little about your background and your work experience.

I have banking experience in various areas, such as customer service, marketing, and operations, and across different banking segments, such as commercial, specialized, and investment banking.

2. What technologies do you work with or have you worked with in your day-to-day?

Excel, Primavera, SAP, Power Query, and programs built by the company Fidelity National Information Services (FIS).

3. How do you perceive the emergence of new technologies such as Artificial Intelligence and Blockchain in the financial sector?

AI will have a cross-industry impact, optimizing and automating processes. Blockchain will have a different level of implementation, starting perhaps more with investment banks/funds, due to the fact that many batches of securities are traded between them, and tokenization could have some value.

4. What are the challenges that these two technologies have brought to the financial system?

Like any industry, the financial one wants to be at the forefront. Therefore, it has already adapted, giving an example that a major European investment bank managed to issue tokenized bonds in limited numbers.

5. What is the role of Artificial Intelligence in the future of the financial institutions' business?

AI should play a role in optimizing and improving business processes in any industry. There are already some investment funds that use an investment "robot," as is the case with BlackRock. Still, the large-scale implementation of AI in the industry will take no less than 5 years.

6. Do you believe that the impact of technological evolution on the financial system has led to the closure of physical branches and the growth of digital banking? Could this be a threat to the future of professionals in the financial area?

The future is full of unknowns, but moving forward is not one of them. The financial sector, like others, will have to shift routine professions toward coding and technology professions.

7. As an employee/former employee of a Financial Institution, are people increasingly using digital options instead of physically going to a bank?

Yes, although there is still much work to be done in making digital services available, this has been a trend. Self-service has been the dominant trend in banking and also in all other industries. With a population that is better educated in digital tools and some basic banking concepts, they no longer want to "stroll" to bank branches.

8. Regarding cryptocurrencies, these assets are not prohibited in Portugal and have been declared as income since 2023; however, their use is not guaranteed by any national authority. In view of this, do you believe that Financial Institutions could monitor cryptocurrency activity with the objective of commercializing them?

Cryptocurrencies are a highly speculative asset with no underlying rationale (Bitcoin has limited mining and therefore there is a clash with the availability of supply, which generates some rationale, but not enough to justify the price). I hope that banks do not venture into cryptocurrencies as they ventured into subprime mortgages that collapsed the system in 2007.

9. Do you agree that if cryptocurrencies were regulated by States, they could be the currencies of the future?

If central banks were to issue cryptocurrency, perhaps.

10. Do you believe that new technologies play a significant role in digital transformation in the financial sector?

New technologies and innovation play a fundamental role in any industry. In Portugal, banking has always gone hand-in-hand with telecommunications companies, and that is why we have a relatively advanced banking system, with payment systems like MBWay. The digitalization of banking has been slow, but fast compared to other countries.

Ethical Statement

Conflict of Interest: Nothing to declare. **Funding:** FCT (NECE-UBI: UIDB/04630/2020) and by Instituto Politécnico de Lisboa as part of the IPL/IDI&CA2024/CRYPTORISK_ISCAL project. **Peer Review:** Double-blind.