Exploring the Applicability of the Unified Theory of Acceptance and Use of Technology to Blockchain in the Banking Sector

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Submitted to Horst Treiblmaier

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AFFIDAVIT

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ABSTRACT

The adoption of blockchain technology in the banking industry of Vienna has been thoroughly researched, with the UTAUT model used to investigate various factors impacting adoption. The findings reveal significant insights into the drivers and barriers of blockchain adoption. Financial institutions in Vienna place a strong emphasis on the potential benefits of blockchain, such as increased efficiency and improved service delivery, which positively influence their adoption decisions. However, problems exist in terms of effort expectancy due to the perceived complexity and insufficient technical grasp of blockchain technology.

The study also highlights the importance of innovativeness and perceived compatibility in adoption decisions. Financial institutions that display a higher degree of innovativeness and view blockchain as compatible with their existing systems and strategic goals are more likely to adopt the technology. These factors extend the traditional UTAUT model and provide a deeper understanding of the adoption process.

These findings provide crucial policy and practice recommendations. Financial institutions in Vienna should focus on fostering an organizational culture that encourages innovation and invests in employee training to enhance blockchain understanding. Policymakers are encouraged to establish clear regulatory frameworks that balance innovation with consumer protection and financial stability.

The study sheds light on the key factors influencing blockchain adoption in Vienna's financial sector, emphasizing the importance of performance expectancy, effort expectancy, innovativeness, and perceived compatibility. Understanding these factors can guide financial institutions, policymakers, and stakeholders in effectively integrating and facilitating blockchain technology adoption.

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LIST OF ABBREVIATIONS:

Abbreviations	Definition
ABS	Asset Backed Securities
AML	Anti Money Laundering
API	Application Programming Interface
BOL	Bill of Lading
CBDCs	Central Bank Digital Currencies
CSDs	Central Securities Depositories
DEFI	Decentralized Finance
DLT	Distributed Ledger Technology
DOI	Diffusion of Innovation
ECB	European Central Bank
GAM	Government Adoption Model
GDPR	General Data Protection Regulation
ICOs	Initial Coin Offerings
KYC	Know Your Customer
LSC	Logistics Smart Contract
LOCSC	Letter of Credit Smart Contract
MRs	Mate's Receipts
SPV	Special Purpose Vehicle
TSC	Trading Smart Contract

1 INTRODUCTION

1.1 Background and context of the research problem:

Blockchain technology, first known as the technology behind cryptocurrencies such as Bitcoin, many industries have been increasingly recognizing the potential of that technology and how it could revolutionize several aspects of our life., including the financial sector (Nakamoto, 2008; Treiblmaier, Swan, et al., 2021). This digital ledger system provides many opportunities, an example would be increased security, operational efficiency will improve and costs of transactions would decrease (Tapscott & Tapscott, 2018). Due to that, many financial institutions and banks internationally have been exploring how they could utilize the technology's potential and apply it to making processes easier, enhancing customers' experiences, and reducing costs (Guo & Liang, 2016a; Larue et al., 2020).

Currently, Blockchain sees an increasing interest in its use case potential, with many new projects and prototypes being examined over many diverse services, which include: wealth management, payments, and trading (Ali et al., 2020). Blockchain-focused solutions are already being applied in banks' operations. On the other hand, many others are appraising the technology's pros and cons. Furthermore, the World Economics Forum approximates that by the year 2025, 10% of the global GDP may possibly be kept on blockchain technology, highlighting the technology's capability to affect the financial industry (*WEF_GAC15_Technological_Tipping_Points_report_2015.Pdf*, 2015.).

Nevertheless, there are several drawbacks and obstacles that banks are facing regarding blockchain technology adoption, such as lack of uniformity, privacy concerns, regulatory ambiguity, and the necessity for organizations to shift culturally (Ali et al., 2020). Furthermore, due to the embryonic phase of blockchain technology, there is a lack of well-defined regulations and guidelines administering its use in banks which is the main factor of regulatory ambiguity. Moreover, the lack of uniformity across blockchains presents obstacles in terms of interoperability and generates obstacles to extensive adoption (Pilkington, 2016). Additionally, one of the most valuable features of blockchain technology is its transparency, but due to the financial industry, specifically, banks'

strict prerequisites for data protection, presents a significant obstacle when it comes to privacy concerns (Zohar, 2015). Furthermore, organizations need to shift towards a more decentralized structure and collaborate more in order for them to completely exploit the potential advantages of blockchain technology, that alone is challenging for financial institutions that are traditional (Tapscott & Tapscott, 2018).

The UTAUT model, which combines several theories on the adoption of technology, has been utilized broadly to understand the factors that determine whether a person accepts and uses technology or not. Currently, available studies have mainly concentrated on the possible advantages and disadvantages of the banking industry's adoption of blockchain technology (Guo & Liang, 2016a; Larue et al., 2020), while few have employed technology adoption models like the UTAUT to determine the factors affecting banks desire to apply solutions that are block-chain based. Moreover, prior research has been largely theoretical on this topic, with an absence of empirical studies that examine the perceptions and experiences of professionals from that industry (Ali et al., 2020; AlShamsi et al., 2022).

This gap in this research emphasizes the necessity for a widespread study that investigates the factors affecting the adoption of blockchain technology in banking using the UTAUT model, specifically in Vienna, Austria. Furthermore, by concentrating on this geographically located area, the goal of this thesis is to provide a better understanding of the financial sector's adoption of blockchain technology, taking into consideration the distinctive cultural and regulatory landscape of Austria. Furthermore, to tackle this research disparity, the thesis will rely on a qualitative research design, using semi-structured interviews to collect data from key shareholders in the financial sector, for instance, executives, employees, IT, and blockchain professionals, specifically in banks. Moreover, the qualitative approach is suitable for investigating the perceptions and experiences of these key shareholders, delivering a rich grasp pf the factors that are influencing blockchain technology adoption in the setting of Vienna’s financial sector. Furthermore, the thesis will make use of thematic analysis to systematically identify, analyze and report themes or patterns inside the gathered data (Braun & Clarke, 2006). This approach, in conjunction with the use of NVivo software for data analysis and organization, will enable us to meticulously and expansively analyze the factors affecting blockchain adoption in Vienna’s financial sector

1.2 Research Question and Objectives

The main research question of this thesis is:

What are the factors influencing the adoption of blockchain technology in the financial sector in Vienna, Austria?

To form the primary research question of this thesis, "What are the factors influencing the adoption of blockchain technology in the financial sector in Vienna, Austria?". We followed a process which is described in a more detailed manner below:

Beginning with research on blockchain technology in banking, which provides us the foundational understanding that blockchain technology, since its inception, has evolved from solely supporting cryptocurrencies like Bitcoin to becoming a significant disruptor in various sectors. Some of those sectors are the financial sector and banking industry are particulary affected. The technology has been identified to provide transformative solutions to traditional banking systems, with potential applications in cross-border transactions, supply chain management, data storage, and financial transactions, to name a few. However, the application of blockchain technology is not homogeneously distributed across the globe; its acceptance varies from region to region, largely influenced by several factors such as governmental regulations, economic stability, technological infrastructure, and societal acceptance. Thus, it highlights the necessity of a context-specific exploration to understand the adoption process of blockchain technology. This context-specific exploration forms the base of our primary research question focused on Vienna, Austria.

Research on the UTAUT model contributes to the thesis's research question formulation by introducing a theoretical construct - the Unified Theory of Acceptance and Use of Technology (UTAUT). This theory is a well-recognized model used extensively to explore and understand the acceptance and usage behavior of different technologies across various domains, including banking. Even though it is a comprehensive model for understand technology adoption, the model's application in the framework of blockchain technology is rare, particularly in the banking industry of Austria. Thus, this informs us

of the methodological approach that could be deployed to answer our research question by integrating the UTAUT model to the specific case of blockchain technology adoption in the financial sector in Vienna, Austria.

Finally, Research on banking in Vienna, brings in the specific geographical context of the research question, focusing on the state of blockchain technology in banking in Austria, particularly Vienna. It suggests a steady and promising trend towards blockchain technology acceptance in Vienna, backed by the active engagement of both private and public sectors. Some key players in the Austrian financial sector, including traditional financial institutions like Austrian Control Bank, Erste Group Bank and Raiffeisen Bank, have already made strides in leveraging blockchain technology for various purposes. Despite this advancement, the article highlights a crucial knowledge gap in comprehending the evolution and adoption process of blockchain technology in the Austrian banking sector. This knowledge gap presents a research opportunity for in-depth analysis to uncover the factors influencing the adoption of blockchain technology in this specific context.

Thus, we can confidently articulate the research question as "What are the factors influencing the adoption of blockchain technology in the financial sector in Vienna, Austria?" The goal of this research question is to clarify the complex, influencing dynamics regarding the adoption of blockchain technology in Vienna's banking sector by applying the UTAUT model. This will fill the identified gap in research and contribute to a deeper understanding of blockchain technology adoption in the Austrian banking industry. By conducting this research, we can also provide a roadmap for other regions interested in adopting blockchain technology in their financial sectors, further enhancing the global adoption of this transformative technology.

The individual objectives of the thesis are as follows:

a. To explore the UTAUT model and its applicability in justifying the adoption of blockchain technology in the financial sector in Vienna, Austria. By concentrating on this viewpoint, the thesis aims to fill an important gap in research and weigh in on grasping the factors influencing blockchain adoption in the financial sector.

b. To investigate the function of innovativeness and perceived compatibility in the adoption of blockchain technology. Furthermore, there seems to be a shortage of studies that have taken these two constructs into consideration within the context of the UTAUT model for blockchain adoption, which we were able to determine through the literature review. Thus, this thesis will address this issue by incorporating these two constructs in the UTAUT model and investigating how they affect blockchain adoption.

c. To spot the particular limitations and obstacles that are faced by financial institutions, specifically banks in Vienna. The Literature review has shown that this objective is relatively important because by identifying these limitations we willbe able to provide a better understanding of the main factors that are preventing or slowing down blockchain adoption. Additionally, useful information will be provided to aid financial institutions in addressing these limitations effectively.

d. To offer recommendations for stakeholders, policymakers, and financial institutions on how to integrate and facilitate blockchain technology into their existing operations.

1.3 Significance of the study

The importance of this research rests in its capability to contribute to understanding the practical and academic aspects of blockchain technology adoption in the financial sector, specifically in Vienna. Looking through the lens of the extended UTAUT model will allow us to examine the influencing factors of blockchain adoption and offers us valuable information in regard to the blockers and driving force behind blockchain implementation in the financial industry.

Firstly, the outcomes of this research from an academic perspective will add to the growing compendium on technology adoption and acceptance, specifically in the framework of the financial sector and blockchain technology. Additionally, this research will provide a new perspective on the importance of the extended UTAUT model

and its applicability in this context, possibly leading to the enhancement or advancements of new models that better elaborate the factors affecting blockchain technology adoption.

Secondly, by determining the factors that are affecting blockchain adoption, this thesis would provide stakeholders, policymakers, and financial institutions with the necessary information to aid them in utilizing improved strategies and policies to encourage blockchain adoption.

2 LITERATURE REVIEW

2.1 What Is Blockchain Technology

Blockchain technology is a system that facilitates secure, transparent payment logging through a decentralized digital ledger (Nakamoto, 2008). Furthermore, transactions are confirmed first by users of the network using a consensus mechanism prior to being put on the blockchain in the shape of sequential blocks (Swan, 2015). Moreover, the blockchain is accomplished using a peer to peer network , software that controls the rules of the network, and using a private cryptography key (Nakamoto, 2008). To avoid data corruption and unnecessary data, the blockchain is reproduced on every node in the network (Tapscott & Tapscott, 2018). Moreover, to retain the exclusivity of the network's authorized users and the security of transactions, public key cryptography and a transaction scripting language are used (Antonopoulos, 2014). Blockchain technology can be used in several ways, which include the logging of voting, copyrighted material, and digital products, thus this technology has captured the attention of governments, corporations, financial institutions, and end consumers in general (Crosby, 2016; Treiblmaier & Petrozhitskaya, 2023).

2.2 How Blockchain Technology Works

Satoshi Nakamoto initially included blockchain technology in the Bitcoin protocol. At predestined intervals, blocks in a linear form are inserted into the chain. In every block of the blockchain, specifics about sequences of transactions, a timestamp, and a cryptographic hash of the previous block are included (Swan, 2015). Which designates that the previous block hash is utilized to verify and protect the contents in every block. Furthermore, the reliability and safety of the blockchain increases as more blocks are inserted into the chain (Tapscott & Tapscott, 2018; Treiblmaier, 2019). Whenever new data is introduced for recording, a broadcasting node sends the network a message. The receiving nodes then examine that message and if the message is precise, it is deposited in a block. Using a proof of stake or proof of work method, all receiving nodes in the network verify that block (Antonopoulos, 2014), the block then is added to the chain and confirmed by every node after executing a consensus process. Furthermore, for the

chain to be further extended the latest block is used as the foundation of that extension (Swan, 2015). On this basis, blockchain technology offers a safe, decentralized, and trackable means of accumulating and transmitting data as well as assets (Nakamoto, 2008). Additionally, the Blockchain network preserves the chain by authenticating the transactions and inserting them into new blocks through a procedure recognized as mining. Taking cryptocurrency as an example, a client must designate the desired quantity and the receiver's address when sending an article with a digital counterpart, Private data from the sender's wallet address is then used to verify the transaction which was broadcasted to the network. Additionally, the network nodes checks whether the transaction is authentic or not by retrieving a local copy of the blockchain and computing the balance of the sender and examining the sender's digital signature. Once the transaction is accepted, it is integrated into a new block. The header of the new block contains an overview of the previous block's header and transaction using a mathematical process labeled as a hash. Below is a figure that showcases the transaction process and how they are recorded.

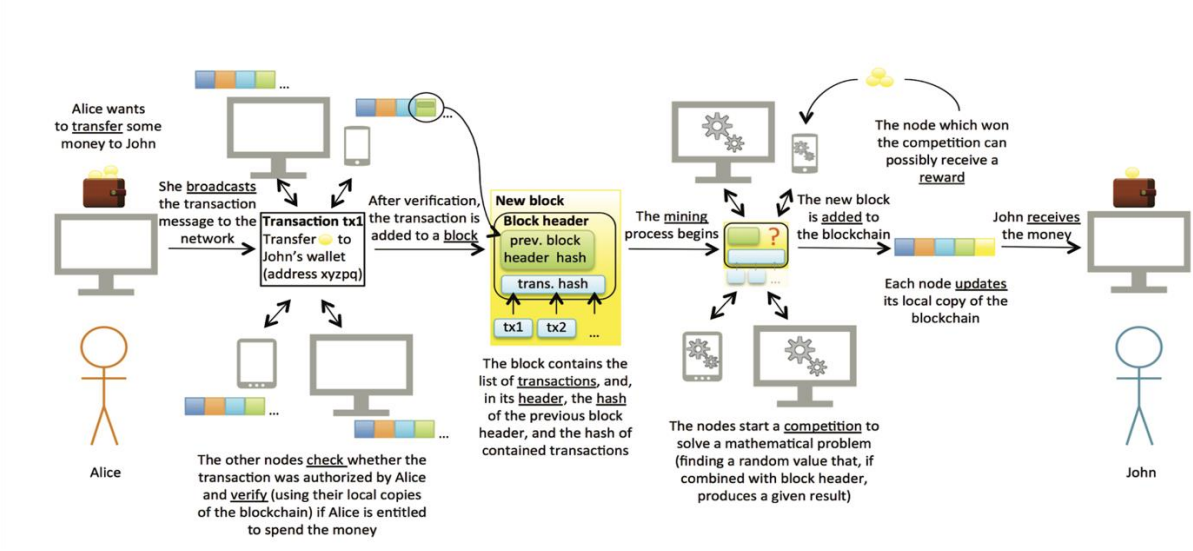

FIGURE 1 HOW BLOCKCHAIN TRANSACTIONS ARE RECORDED (GATTESCHI ET AL., 2018)

2.3 Blockchain Classifications and Composition

There are three categorizations to blockchain technology which are based on their accessibility, governance and construction. Those categorization are public blockchains, consortium blockchains and private blockchains

2.3.1 Public Blockchain

a) Public blockchains epitomize complete decentralization and openness, permitting any individual to scrutinize transactions and contribute to the consensus-building process. In such blockchains, anyone is able to establish an account and commence engagement with the system. Notable instances of public blockchains encompass Bitcoin and Ethereum, which have gained considerable popularity as platforms for cryptocurrencies and decentralized applications.

2.3.2 Consortium Blockchains

b) Consortium blockchains are hybrid systems that are between public and private blockchains. These blockchain infrastructures are managed by a collection of reliable entities who collectively determine rules and access privileges. Offering a more regulated environment than public blockchains, consortium blockchains only permit transaction validation and ledger updates by the participating entities. Noteworthy examples of consortium blockchains are R3 Corda and Hyperledger Fabric, which are frequently employed for cross-organizational collaborations in sectors such as finance and supply chain management.

2.3.3 Private Blockchains

c) Private blockchains are stringently controlled systems that extend access privileges to a restricted set of nodes or users. Predominantly used within a single organization, these blockchains centralize control over the network, data access, and consensus mechanisms. Private blockchains can offer superior security and privacy vis-à-vis public or consortium blockchains by minimizing the potential attack surface. Instances of private blockchain applications are often discovered in corporate settings where confidential information necessitates secure storage and access by only authorized individuals.

Blockchain technology's cornerstone feature is decentralization, meaning it does not depend on central nodes for data acquisition, storage, or modification. Its distinctive attributes include transparency, public accessibility, independence, immutability, and anonymity (Swan, 2015). The dependability of blockchain emanates from its capacity to allow all nodes to view and update the data on the network. As an open-source technol-

ogy, it encourages innovation and transparency by enabling anyone to develop applications and scrutinize public records. Furthermore, blockchain technology's autonomous characteristic is built upon its consensus mechanism, which empowers each node to safely transfer and update data without external interference (Nakamoto, 2008). Once inscribed, blockchain records are permanently conserved, and alterations can only be made if a single entity gains control of more than 51% of the nodes concurrently (Nakamoto, 2008). This distinctive amalgamation of features renders blockchain technology adaptable and applicable across a diverse range of industries and uses, spanning from financial transactions to digital product management and voting systems.

2.4 Overview of Blockchain Technology In Banking

2.4.1 Evolution and Adoption of Blockchain in Banking

The banking industry breakthrough in advancements was always in direct correlation to advanced or new technologies, technologies like blockchain, which have the potential to push banking into new ground. After Bitcoin was introduced in 2009, the financial world has changed dramatically, laying the grandwork for the setting the stage for the rise of digital currencies and decentralized technologies (Mungoli, 2023) Blockchain, the underlying technology for Bitcoin and later cryptocurrencies, has seen considerable growth, adoption and scrutiny over the past decade (Treiblmaier, Leung, et al., 2021), drawing the attention of the global financial industry and stimulating the creation of numerous cryptocurrencies and blockchain-based innovations (Mungoli, 2023).

One crucial aspect of blockchain that makes it such a powerful tool in the banking sector is its fundamental components - distributed ledger, consensus mechanism, encryption mechanism, and smart contracts, which provide numerous advantages like decentralization, persistency, privacy, immutability, and contractability (Chen et al., 2023a; Sillaber et al., 2020). The technology provides a platform where transactional uncertainties and risks could be prevented across organizations and industries, making it an indispensable tool in the banking sector and beyond (Chen et al., 2023a; Hassani et al., 2018). Furthermore, in the finance industry, blockchain technology has positioned itself as a digital innovation and an emerging enabling technology. On the other hand, for financial service providers, a significant concern has been the increased level of regulation and the lack of competitiveness (Chen et al., 2023a; Zhang et al., 2021). Further-

more, with the architectural properties of blockchain, financial organizations have experienced reduced time and labor costs (Chen et al., 2023a; Hassani et al., 2018; Zhou et al., 2018), improved transparency and security (Chen et al., 2023a; Liang et al., 2017; Underwood, 2016), and accelerated transactional speed.

As blockchain technology continues to evolve, its applications are also expanding. The rise of Distributed Ledger Technology (DLT), which stems from blockchain, offers a decentralized, permissionless system that ensures the integrity of data exchanged between parties (Yadav et al., 2023). DLT is a replicated system maintained by each participant in the network, with each maintaining a copy of the ledger. This means that fraudulent transactions cannot bypass the collective consensus of the network, making DLT an ideal solution for e-governance, financial transactions, and corporate functions (Yadav et al., 2023) . It's this decentralization and distributed approach that's set to redefine the operational processes of banking and other governmental functions (Poelstra, 2014; Yadav et al., 2023). Additionaly, the secure nature of blockchain technology is leading the transformation of the banking industry, with many financial institutions spending large sums on the innovation and development of DLT-based applications (Yadav et al., 2023). Due to the increased adoption and an increase in it’s applications, we can deduce that blockchain technology has great potential to improve financial transactions by offering a more secure and efficient platform. Looking ahead, the integration of blockchain into decentralized finance (DeFi) and the rise of Central Bank Digital Currencies (CBDCs) are set to further reshape the traditional financial system (Mungoli, 2023).

By gaining a comprehensive understanding of blockchain's evolution, adoption, and future implications in banking, it's clear that this technology has the potential to drastically change the financial landscape. Additionally, through blockchain's integration in banking, it is possible to gain a more profound understanding of this groundbreaking technology and its potential to revolutionize the financial landscape (Mungoli, 2023).

2.4.2 Blockchain and Banking in Vienna, Austria

Austria has significantly progressed in blockchain acceptance, drawing attention from crucial capital market players and mirroring the global trend of recognizing the transformative capabilities of this technology. Traditional financial institutions such as the Austrian Control Bank (Österreichische Kontrollbank - OeKB) and Erste Group Bank have successfully leveraged blockchain for issuing federal bonds and developing a novel digital issuance platform, respectively (Völkel, 2019). This enthusiasm for blockchain-based solutions is echoed in the public sector, as illustrated by various pilot projects in Vienna, including secure data notarization and a digital meal voucher system for municipal employees (Vienna Business Agency, *Blockchain_Technology-Report_EN.Pdf*, 2020)

Furthermore, Austrian regulators are showing a positive stance towards tokenized securities, marking milestones with the approval of the first EU-wide capital market prospectus for the public offering of tokenised securities(Völkel, 2019). Corporate financing is also experiencing shifts with security token offerings becoming an established instrument in Austria, aided by crowd investment platforms such as CONDA and Black Manta Capital (Völkel, 2019)

Complementing these advancements, the DELPHI research project, initiated by the Oesterreichische Nationalbank (OeNB) in collaboration with OeKB CSD GmbH, the Österreichische Bundesfinanzierungsagentur (OeBFA), Raiffeisen Bank International AG, and Erste Group Bank AG, is exploring digital bond issuance and settlement processes on a blockchain platform (*Oesterreichische Nationalbank (OeNB)*, 2021). It emphasizes the legal feasibility of blockchain implementation within existing EU and national law, whilst also investigating potential market needs (*Oesterreichische Nationalbank (OeNB)*, 2021). Furthermore, on a practical level, Raiffeisenlandesbank Niederösterreich-Wien (RLB NÖ-Wien) has taken a remarkable step by partnering with Bitpanda, a leading crypto firm, to roll out crypto investment services, becoming the first traditional bank in the European Union to integrate digital assets (Deka, 2023). This collaboration aims to simplify financial market processes, making investing accessible to everyone (Deka, 2023).

These initiatives take place within the broader EU regulatory framework for crypto-assets, namely the Market in Cryptoassets (MiCA), which focuses on disclosure and consumer protection (Deka, 2023). Projects like Vienna's "Open Data – Notarisation" and the digital meal voucher system demonstrate how blockchain is enabling citizen participation and innovative solutions at a municipal level (Vienna Business Agency, *Blockchain_Technology-Report_EN.Pdf*, 2020). These initiatives illustrate blockchain's potential in various sectors, including energy, with the planned trial of blockchain-enabled power sharing in Vienna's Viertel Zwei development (Vienna Business Agency, *Blockchain_Technology-Report_EN.Pdf*, 2020).

As digitalization continues to impact money and finance, the European Central Bank explores the idea of a digital euro, and research into stablecoins and decentralized finance increases. In general, Austria's versatile adoption of innovative digital finance solutions, such as blockchain technology, demonstrates that there is an evolving landscape that is shaping the future of the financial system.

2.4.3 Blockchain Applications in Banking

The exploration of blockchain applications in the banking sector uncovers an array of opportunities, improvements, and potential challenges. Trust in payment systems has been shown to be a major driving force of their adoption, starting from methodical and hierarchical trust rooted in objective proof of payment mechanisms, security and mining processes (Malherbe et al., 2019; Patel et al., 2022; Treiblmaier et al., 2004).

Another fundamental aspect of blockchain applications is tokens and tokenisation (Treiblmaier, 2023). These units of value are built on pre-existing blockchains and can peg their value to a variety of assets such as cryptocurrencies, real estate, commodities, or fiat money (Nadler & Guo, 2020; Patel et al., 2022). While promising price stability, transaction efficiency, and pseudonymity, tokens simultaneously raise regulatory challenges and market uncertainties. Initial Coin Offerings (ICOs) represent a novel method of capital acquisition, especially beneficial for early-stage ventures. The success of ICOs frequently hinges on high-quality whitepapers, bonus schemes, and expansive social media coverage (Fisch et al., 2022; Levasseur et al., 2022.; Patel et al., 2022).

Blockchain technology, extending its applicability across banking services, enhances their usability and efficiency. Invoice financing, a growing component of the financing market, can gain significantly from blockchain technology through guaranteed data confidentiality and diminished risk of fraud (Guerar et al., 2020; Patel et al., 2022) Similarly, blockchain can be leveraged by peer-to-peer lending platforms to boost prediction of non-performing loans and bad loan recoveryar. Clearing and settlement services, presently hampered by operational shortcomings, stand to be revolutionized by the implementation of blockchain technology (Mills et al., 2016; Patel et al., 2022). Blockchain's ability to offer decentralized, fully replicable, and secure data storage can lead to substantial enhancements in these services.

Moreover, blockchain technology can enhance payment processes notably by allowing banks to speed up the transaction speed and decrease fee costs through channels that are decentralized. This would allow banks to be more competitive with innovative fintech companies by offering better security, safety and reduction of payment processing costs. In parallel, blockchain can revolutionize clearance systems by facilitating instant settlement of bank transactions, presenting a superior alternative to existing protocols such as SWIFT .

Blockchain technology also optimizes identity verification procedures, a vital component for online business transactions. Furthermore, The auditing sector, historically slow to digitize, can be thoroughly transformed by blockchain technology. The strict regulatory requirements concerning data validity and integrity form an ideal environment for the immutable and transparent nature of blockchain to deliver unparalleled value. It is very visible that there is a wide range of application in banking, and yet we still have to utilize its full potential

A prime example of blockchain's transformative capability is the concept of smart contracts. Representing programmable protocols that autonomously execute, update, and verify operations, these contracts offer a robust alternative to traditional contract systems. Ethereum-based smart contracts, leveraging immutable verification procedures, reduce the likelihood of fraudulent activities and disputes due to falsified documents

(Levasseur et al., 2022.; Patel et al., 2022). These smart contracts play integral roles in simplifying traditionally complex trade processes.

Further, examples of potential smart contracts that banks can utilize include Trading Smart Contract (TSC), Letter of Credit Smart Contract (LoCSC), and Logistics Smart Contract (LSC)(Alsalim & Ucan, 2023). These innovative contracts harness the power of blockchain technology to streamline, secure and automate crucial banking functions, thus signaling a new era of efficient and transparent trade processes.

- Trading Smart Contract (TSC) is a dynamic tool that retains all relevant information with timestamps and predetermined conditions under which they are triggered (Alsalim & Ucan, 2023; Zamani & Giaglis, 2018). TSCs serve as the modern equivalent of traditional paper contracts used to verify sales in trade, providing a more secure, efficient and transparent platform for traders. Moreover, they can assist in negotiations in the event of disputes by providing a standardized record of trade transactions (Alsalim & Ucan, 2023; Zheng et al., 2018). TSCs also have the potential to transfer data for Letter of Credit and Logistics Smart Contracts (LoCSC and LSC), allowing recipients to stay abreast with the current status or even gain complete control of initial Bill of Lading (BoL). This signifies that traders can request payments without presenting paper BoLs and claim their shipment without traditional BoLs (Alsalim & Ucan, 2023; Eberhardt & Tai, 2017).

- Letter of Credit Smart Contract (LoCSC) comes as a significant innovation in the domain of trade agreements. With the introduction of LoCSC, the functions of conventional paper Letter of Credits have been rejuvenated (Alsalim & Ucan, 2023; Zamani & Giaglis, 2018). Similar to TSC, LoCSCs too have the responsibility of transmitting information to TSC and LSC while also updating the progress status (Alsalim & Ucan, 2023; Zheng et al., 2018). Furthermore, LoCSCs can empower negotiating and issuing banks to keep track of all transaction procedures, take responsibility for shipping BoLs, and reduce the expense and risk associated with transferring LoCs and BoLs (Alsalim & Ucan, 2023; Eberhardt & Tai, 2017). This way, the issuing bank issues a letter of credit as soon as an

importer submits a letter of credit request and completes all required inspection procedures.

- Logistics Smart Contract (LSC) represents another powerful application of blockchain technology in trade processes. The main aim of LSC is to replace the original purpose of logistical documents such as Mate's Receipt (MRs), BoLs, and packing lists (Alsalim & Ucan, 2023; Zamani & Giaglis, 2018). By using the shipping database, LSC can communicate information, current status, and cargo tracking besides trading conditions set in TSC (Alsalim & Ucan, 2023; Zheng et al., 2018). The application of LSC allows shipping companies to have a more beneficial method of tracking their shipment, simplifying the document processing procedures (Eberhardt & Tai, 2017).

Blockchain applications in banking reveal vast opportunities for improvements, operational efficiencies, and transformative changes. As trust and familiarity with the technology increase, we can anticipate more diverse and innovative applications of blockchain within the banking sector. Furthermore, inspect the table below to have an overview insight on blockchain technology possible applications.

TABLE 1: SUMMARY OF POSSIBLE APPLICATIONS (VINOD RAMCHANDRA ET AL., 2022)

Banking Function	**Role of Blockchain Technology**	**Benefited Participant**
Value accounting	Reports are dramatically improved	Regulators, audit, and accounting
Risk management	Minimize the occurrence of risk	Management of risk, insurance, wholesale banking, regulators, brokerage, and clearinghouses
Investment and Funding	Provide new models for investment and funding	Stock exchange, regulators, audit, legal, investment banking, capital venture, and man-

Banking Function	**Role of Blockchain Technology**	**Benefited Participant**
		agement of property
Exchange of value	Dramatically improving the speed	Business, banking, corporate, and other industries
Value for lending (debit card, credit card, securities for asset, municipal bonds, and other forms of lending or credit)	Blockchain issued debt with settled and traded forms, efficiency increases, systematic risk are managed, and many other important roles	Retail banking, commercial banking, and wholesale banking, Microlending, credit rating agencies, software companies, etc.
Authentication for value and identity	Identities are recorded after robust verification, assure value through cryptography	Analyst of customer data, rating agencies, network regulators for payment cards, etc.
Value for storing (commodities of currencies, financial assets, the deposit of money, saving accounts, etc.)	Reducing the operational cost of financial services, reliable and safe payment services, obsolete shaking for ban accounts	Asset management, retail banking, telecommunication, regulators, investment banking, etc.

2.5 Case Studies of Blockchain In Banking

2.5.1 Case Study Review: Facilitating interorganizational trust in strategic alliances by leveraging blockchain-based systems: Case studies of two eastern banks

- **Overview of the Case Study**

This case study focuses on the challenges of facilitating trust in interorganizational relationships, a critical aspect of strategic alliances. Strategic alliances, as defined by (Chen et al., 2023b; Mowery et al., 1996), are agreements between two or more parties to undertake a mutually beneficial project or set of objectives, with each party maintaining its independence. These kind of arrangements necessitate mutual collaboration and dependence (Chen et al., 2023b; McEvily & Marcus, 2005), necessitating the management of environmental uncertainty and behavioral uncertainty from the partners involved. Trust, which (Krishnan et al., 2006) defines as the expectation held by one firm that another will not exploit its vulnerabilities, plays a crucial role in smoothing the function of strategic alliances. Furthermore, blockchain, system's security mechanisms, based on public ledger and distributed consensus, make it superior to centralized systems in preventing fraudulent activities (Chen et al., 2023b; Sarker et al., 2021; Wang et al., 2016).

Despite blockchain's potential as a 'trust machine' (The Economist,2015), questions remain about how it facilitates interorganizational trust, a gap that hampers organizations' ability to derive benefits from blockchain implementations. Most existing research on blockchain predominantly adopts a technology-determinism perspective(Chen et al., 2023b), ignoring the business impacts. To address this gap, the current case study utilizes affordance theory (Bentley University, USA et al., 2008; Chen et al., 2023b). and explores two cases involving Oriental Bank and Northern Bank, which have successfully implemented blockchain technology in asset-backed securities (ABS) business in the finance sector. By investigating the technical features of blockchain and how they afford trust within strategic alliances, this study seeks to make theoretical and empirical contributions to the discourse on blockchain's role in facilitating interorganizational trust.

- **Methodology Used in the Case Study**

In this paper, the goal was to investigate the impact of a blockchain-based system on interorganizational trust and alliance performance within a strategic financial alliance. Due to the exploratory nature of the investigation, a case study approach was chosen, given its proven usefulness in such contexts. The research method was designed in alignment with principles of interpretative case studies, taking advantage of the rich context provided by case research for understanding and validating the novel phenomenon under investigation(Chen et al., 2023b). Furthermore, the study focused on two cases, both state-owned banks located in different Chinese cities that had developed and implemented a blockchain-based system for managing asset-backed securities (ABS) business. A multisite field research methodology was used to scrutinize the nature and impact of blockchain technology on interorganizational trust. Both banks had designed their systems based on Fabric 1.0 from Hyperledger, a widely adopted platform among Chinese fintech companies.(Chen et al., 2023b)

The data collection strategy involved a combination of primary and secondary sources, engaging a variety of stakeholders from both banks and their partners. In total, 26 semi-structured interviews were conducted, and additional data were also collected and examined. The data analysis followed a method resembling grounded theory to derive concepts closely related to the context of each site. The analysis examined the technical features of blockchain technology, its affordance, interorganizational trust, and their linkages. The study also developed a comprehensive framework adapting the process model, illustrating the relationship between the technical features of blockchain technology, data and process affordance, and the emerging interorganizational trust (Chen et al., 2023b).

- **Findings of the Case Study**

The findings of the case study provide detailed insights into the technical properties and affordances of blockchain technology in the context of an Asset-Backed Securities (ABS) system. In the analysis of the ABS systems implemented by Oriental Bank and Northern Bank, the high-level architecture of the blockchain-based systems is described, consisting of four layers: blockchain infrastructure, node deployment, web ap-

plications, and peripheral system (Chen et al., 2023b). The blockchain infrastructure serves as the fundamental layer, implemented using Hyperledger Fabric 1.0, a permissioned blockchain that leverages cryptography, distributed ledger, consensus, and smart contracts. The implementation of consortium blockchain with cryptographic algorithms ensures data privacy and security while allowing data sharing among authenticated nodes in the chain (Chen et al., 2023b). The distributed ledger, a crucial structural property of blockchain-based systems, enables the chronological and tamper-proof recording of transactional data across a network of nodes (Chen et al., 2023b). Ledger-based on accounts is chosen to conveniently record and search information relevant to each account, enhancing user authorization and data management (Chen et al., 2023b). The consensus mechanism ensures data consistency and synchronization across nodes, achieved through voting and peer-to-peer communication before transactions are added as new blocks to the chain (Chen et al., 2023b). Smart contracts, autonomous computer programs executed on the blockchain, play a significant role in verifying and executing contract terms, automating tasks, and improving efficiency (Chen et al., 2023b) .

The affordances of blockchain technology are identified at both the data and process levels. At the data level, blockchain affords data encryption, ensuring privacy and security through cryptography, and data consistency by providing a distributed ledger that is shared among nodes. The authenticity of data is guaranteed through immutability and the tracking of data chains over time. These affordances enhance data protection, availability, and trustworthiness, making blockchain technology suitable for ABS systems that require secure and transparent data sharing (Chen et al., 2023b).

At the process level, the use of blockchain technology improves process transparency, tracking, and automation. The transparency and availability of data across the ABS process enable parties to have a clear view of activities and processes that were previously invisible, improving managerial abilities and decision-making. The traceability of transactions and information on the blockchain facilitates audit trails, reduces information distortion, and strengthens control over the entire process. Automation of tasks, enabled by smart contracts and the elimination of manual verification, accelerates the ABS process, reduces reliance on paper-based records, and enhances efficiency (Chen et al., 2023b).

The findings from the case study emphasize how blockchain technology plays a big part in building interorganizational trust. Competence-based trust is established through the technical properties of blockchain, such as data immutability, transparency, and traceability, which enhance the reliability and competence of partners in carrying out transactions and fulfilling obligations . Integrity-based trust is fostered by the provision of tamper-proof data and adherence to agreed principles, as blockchain technology ensures the authenticity and integrity of information. The implementation of blockchain is seen as a signal of trustworthiness and adherence to values and principles, further strengthening interorganizational trust (Chen et al., 2023b).

- **Implications of the Case Study for Blockchain in Banking**

Blockchain's technical properties, including cryptography, distributed ledger, consensus, and smart contracts, play a pivotal role in facilitating collaboration and trust among organizations in strategic alliances (Chen et al., 2023b; Hughes et al., 2019; X. Pan et al., 2020). In the banking context, the integration of blockchain can bring about numerous benefits.

First and foremost, blockchain ensures enhanced data security, transparency, and traceability, which are crucial aspects for banking operations (Chen et al., 2023b; Warkentin & Orgeron, 2020). By leveraging blockchain's data and process affordance, banks can fortify data protection through encryption and authentication mechanisms, safeguarding the confidentiality and integrity of sensitive information (Chen et al., 2023b; Schlatt et al., 2023). Moreover, the adoption of blockchain's distributed ledger feature ensures data consistency, eliminating the need for intermediaries in transaction verification and thereby streamlining banking processes and reducing costs (Chen et al., 2023b; Wong et al., 2020).

Another noteworthy advantage of blockchain in banking is its ability to automate processes through smart contracts. These self-executing contracts enable the automatic enforcement of predefined rules, eliminating the need for manual paperwork and reducing the risk of errors (Chen et al., 2023b; Tönnissen & Teuteberg, 2020). By embracing blockchain, banks can enhance process visibility, traceability, and automation, resulting in streamlined operations, reduced fraud, and improved customer experiences. Further-

more, blockchain technology fosters the development of interorganizational trust based on technical mechanisms and consensus among participants. The integrity and validity of data underpin blockchain transactions, eliminating the need for traditional trust-building methods in financial relationships. By adopting blockchain, banks can strengthen competence-based and integrity-based trust, leading to more secure and reliable transactions (Chen et al., 2023b).

- **Relation to the Present Research**

Examining the relationship of the present research to the identified case studies, we find a profound interconnectedness, solidified by shared objectives, mutual themes, and similar investigative trajectories. Both the present research and the case studies plunge into the intricate world of groundbreaking technological adoption, focusing their lens on the variables that engender successful collaborations and transformations within the financial sector, a bustling arena of constant change and evolution.

In the case study, a significant emphasis is placed on the pivotal role of trust, security, and regulatory compliance in the process of adopting innovative technologies. This vital focus resonates with the underlying principles guiding the present research, which seeks to unravel the limitations and roadblocks encountered by financial institutions in their journey to integrate blockchain technology into their operations. As the case study navigates through the complexity of this novel technology, it uncovers the challenges tethered to data privacy and the growing demand for standardized protocols in the landscape of blockchain adoption. These findings strike a chord with the central objective of the present research: to dissect the multifaceted factors affecting blockchain adoption and to untangle the knots of privacy concerns surrounding this revolutionary technology.

Furthermore, the case study illuminates the often convoluted world of asset-backed securities processes, revealing the labyrinthine journey these transactions undertake. The study illustrates how the implementation of blockchain-based systems can simplify and automate these otherwise complex processes, fostering increased transparency and nurturing a climate of trust among stakeholders. This perspective finds its echo in the corri-

dors of the present research, which ventures into the realm of applying the Unified Theory of Acceptance and Use of Technology (UTAUT) model to better understand the adoption of blockchain technology within Vienna's financial sector. Both the case study and the present research converge in their pursuit to deepen our understanding of how innovative technologies are adopted and embraced within the financial sector, with particular emphasis on blockchain.

The case study's insights align harmoniously with the findings of the present research, further enhancing our comprehension of the factors influencing the adoption of blockchain technology in the financial sector. The case study emphasizes the importance of trust-building procedures as critical enablers of technology adoption. It pinpoints trust as an indispensable factor, mitigating potential risks and bolstering confidence among stakeholders when contemplating the integration of cutting-edge technologies like blockchain. The case study emphasizes the importance of collaborative decision-making and the establishment of strong governance mechanisms inside businesses..

These insights resonate with the themes emerging from the present research, which underlines the importance of organizational readiness and the cultivation of in-house expertise in fields like IT and security. The findings draw attention to the essential role these elements play in ensuring a smooth and successful integration of blockchain technology. Furthermore, the case study offers a broader perspective concerning the collaborative decision-making processes utilized in the asset-backed securities industry. It underlines the importance of coordination and cooperation among various stakeholders and recognizes blockchain as a technological catalyst that enhances transparency, data security, and trust among these parties.

In terms of the application of findings, the case study's discoveries offer a wealth of valuable insights that add texture to the objectives of this thesis and enrich its content. The case study, which explores the implementation of blockchain-based systems within the asset-backed securities (ABS) industry, provides a detailed examination of the factors influencing blockchain adoption within the Chinese banking sector(Chen et al., 2023b). As the present research probes the variables impacting the adoption of blockchain technology in Vienna's banking industry using the Unified Theory of Acceptance

and Use of Technology (UTAUT) model, the case study's findings fortify this investigation by shedding light on the elements propelling blockchain adoption.

The case study further elucidates the potential advantages and challenges inherent in the process of integrating blockchain into existing banking processes. This knowledge can inform the Vienna financial industry and help them anticipate potential hurdles and enablers of blockchain adoption. By considering the factors influencing blockchain adoption in the Chinese

banking sector, the research underscores the importance of understanding these drivers in diverse contexts. This viewpoint aligns with the core objective of the present research, which highlights the significance of examining how current adoption models, such as the UTAUT model, might apply in the unique context of adopting blockchain technology.

By amalgamating insights from the case study with the research from this thesis, we can augment our understanding of how the UTAUT model might be adapted to investigate factors impacting blockchain adoption. This is particularly relevant within the financial industry, a sector on the brink of technology-driven disruption.

Lastly, this research provides valuable recommendations to make the adoption of blockchain technology in the financial sextor easier and These recommendations may be informed and enhanced by the case study's results, which explore the variables impacting blockchain adoption in the Chinese banking industry and provide insightful information for stakeholders. This information may be used by organizations in Vienna's financial sector to develop a favorable regulatory environment. Additionally, they can create regulatory frameworks that strike a balance between stimulating innovation, safeguarding consumers, and preserving financial stability by comprehending the regulatory difficulties China faces.. Thus, the relation of the present research to the case study is one of shared objectives, complementary findings, and practical applications, which collectively enrich our understanding of blockchain adoption in the financial sector.

2.5.2 Case Study Review: The impact of blockchain in banking processes: the Interbank Spunta case study

- **Overview of the Case Study**

This paper presents a comprehensive case study centered on the application of blockchain technology in the Italian banking sector, specifically within interbank processes. The study explores a project spearheaded by the Italian Banking Association's research and innovation center, ABI Lab. The Interbank Spunta project uses blockchain technology to improve information visibility and transparency, speed up executions, and enable direct checks and transfer of funds within the application itself. This unique use-case presents valuable insights into the challenges faced by bankers when applying blockchain technology, and provides a foundation for future research and practical applications (Cucari et al., 2022)

Blockchain is a major technological revolution that has been creating a buzz in the Information Technology (IT) industry, with its implications being particularly profound in the fintech and banking industries (Cucari et al., 2022; Zhao et al., 2016). However, there is still a lack of complete knowledge of its strategic and organizational implications, particularly from the standpoint of bank-to-bank relationships.(Cocco et al., 2017; Cucari et al., 2022; Peters & Panayi, 2016). This case study tries to fill that need by demonstrating the potential of blockchain technology in altering traditional banking procedures and encouraging improved operational efficiency, security, as well as information networking.. It also underscores potential challenges, such as increased susceptibility to money laundering and other criminal activities (Cucari et al., 2022).

The Interbank Spunta project's practical implementation offers a unique opportunity to examine the practical challenges and opportunities associated with blockchain technology. By focusing on interbank reconciliation processes, the study explores how blockchain can streamline these operations, reducing complexities, and costs associated with daily banking operations (Cucari et al., 2022). This exploration concludes with five propositions to guide further investigation and stimulate debate within the banking research community.

The paper further investigates the disruptive role of blockchain technology and its potential to transform banking institutions' business models (Cucari et al., 2022; Guo & Liang, 2016b; Zheng et al., 2018). It outlines three major areas in banking where blockchain may be used: improving process efficiency, increasing security, and improving information networking (Cucari et al., 2022; Hassani et al., 2018). The authors also note the potential drawbacks, such as criminal threats like money laundering, and the need for stringent Anti Money Laundering policies.

As the study concludes, the authors emphasize that blockchain technology holds considerable promise for improving several financial activities, from trade finance to payments, securities settlement, and regulatory compliance (Cocco et al., 2017; Cucari et al., 2022; Ikeda & Hamid, 2018). They propose the standardization of blockchain technology implementation as a crucial prerequisite for achieving an interconnected system, thereby reducing discrepancies and mistakes in daily operations and enabling cost and time savings. The study effectively illuminates the potential impact of blockchain technology on traditional banking processes, offering useful insights for both researchers and banking operators (Cocco et al., 2017; Cucari et al., 2022; T. Wu & Liang, 2017).

- **Methodology Used in the Case Study**

The research methodology for the case study on the application of blockchain in the Italian banking sector follows an abductive theory-building approach, which combines deductive and inductive logics to develop a fresh understanding of the phenomenon. Abductive reasoning is suitable for formulating propositions and often used in case studies. The approach lends itself to an exploratory case study design, which has been chosen to provide a rich and contextualized understanding of the situation (Cucari et al., 2022).

Purposive sampling was used to gather data for the study from both primary and secondary sources. Primary data were gathered through semi-structured interviews with the Research Manager of ABI Lab, a consortium consisting of ABI, 150 banks, and 70 technological partners, renowned for conducting research on the application of technology in banking (Cucari et al., 2022). These interviews took place between March and May 2019, focusing on key aspects of the Interbank Spunta project, an exemplary case

of blockchain application in banking. In addition, secondary data were collected from well-documented sources such as ABI's official website, research reports, and press releases. Ultimately, the gathered data were used to formulate five propositions to guide future research and inspire practitioners in the field of blockchain application in banking (Cucari et al., 2022).

- **Findings of the Case Study**

The case study primarily focuses on the Interbank Spunta project, which was initiated by the ABI Lab, the research and innovation center of the Italian banking sector. This project involves the application of a private and permissioned distributed ledger technology (DLT) to the interbank reconciliation process known as 'Spunta.' This process traditionally involves the entire Italian banking sector, in collaboration with technology firms R3, SIA, and NTT Data, with each firm playing a crucial role in the project's development and implementation. The DLT Corda platform, developed by the consortium R3, records, manages, and executes the financial agreements of institutions in sync with their peers, leading to improved efficiency and reliability (Cucari et al., 2022).

The traditional interbank reconciliation process, or 'Spunta,' was complex and cumbersome, thus forming the main problem the Interbank Spunta project aimed to address. Traditionally, this process involved bilateral recording of all payment transactions between two banks, which owned the account simultaneously but could only manage the transactions during their respective ownership periods. This led to several issues including communication problems, a lack of transaction transparency, and a lack of harmonization with international banking processes. The implementation of DLT was expected to address these pressing problems, perhaps improving the cost, process, and risk management for this particular back-office procedure (Cucari et al., 2022).

The implementation of the DLT Interbank Spunta project occurred in four distinct phases, starting in May 2017. The initial phase involved setting up one-on-one meetings with the participating banks to gain a comprehensive understanding of the existing process's intricacies and pain points. This insight was essential to develop the new framework for the Interbank Spunta project. The second phase involved the application of DLT Corda to bilateral bank relations, carried out through rigorous tests and strong

monitoring to ensure the benefits, stability, and security of the project. The third phase then intended to evaluate the project's effectiveness and create a new interbank agreement. This involved simulating an increasing number of transactions, and successfully demonstrating the network's sustainability and the data transmission's security on a nationwide scale (Cucari et al., 2022).

By March 2020, the final phase of migration to the DLT Interbank Spunta had started, and by September of the same year, 100 banks had transitioned from traditional communication channels to a distributed ledger for mutual accounts reporting. This shift led to a substantial increase in the number of transactions processed, with 55 banks involved in the first two timeslots processing 204 million transactions. The maximum capacity of the distributed ledger was estimated to be around 8.4 billion transactions (Cucari et al., 2022).

The transition to DLT led to significant improvements in the interbank Spunta process. Notable benefits included faster execution of transactions and direct access to account information through a shared database. The DLT platform also enabled banks to conduct checks and exchanges from within the application, and the use of smart contracts autonomously cleared the majority of interbank transactions, considerably streamlining and accelerating up the reconciliation process. The introduction of smart contracts further enabled real-time transaction tracking with immediate feedback, leading to a decrease in operating risk and improved accessibility to a user-friendly platform. In addition, even though banks still alternated ownership of accounts, DLT provided simultaneous transaction visibility, simplifying the auditing process within bank operations and reducing the associated operational risk. The application of DLT was also estimated to reduce costs by between 10% and 30% due to a decrease in the reliance on Full Time Equivalent employees, leading to savings in resources used in the checking process, back-office resources involved in the investigation phase, and supporting IT (Cucari et al., 2022).

The findings from the Interbank Spunta project cast a positive light on the potential applications of blockchain technology in the financial sector. While blockchain was initially associated with cryptocurrencies and perceived as a threat to the financial sector's intermediation, the case study of the Interbank Spunta project demonstrates that such

technology can instead offer substantial benefits to banking processes. It showcases how the introduction of DLT can reduce operational risks, increase efficiency, and deliver significant cost savings, serving as an influential example of successful blockchain application in the banking industry (Cucari et al., 2022). This underscores the potential for DLT to be an effective tool for future initiatives in the banking sector.

- **Implications of the Case Study for Blockchain in Banking**

The Interbank Spunta project, pioneered by ABI Lab, is a prime example of successful blockchain implementation in the banking industry, a fact that was recognized when it won the Technology Joint Venture category at the Digital Banking Awards by The Banker (Financial Times). Blockchain has proven to be ideal for these processes due to its ability to securely store data and distribute large databases across connected nodes, which allows banks to manage a shared ledger that's continually updated in accordance with mutual rules, thereby overcoming disharmonised rules and operational inefficiencies that plagued the traditional process (Cucari et al., 2022; Hughes et al., 2019; Mendling et al., 2018).

Nevertheless, adopting blockchain technology is not without challenges. It requires significant investment in new hardware and software for information networking, the development of new roles and expertise, and often leads to transformative changes in organizational structures. These changes can meet resistance due to a lack of understanding, uncertainty about potential benefits, the scarcity of skilled personnel, and skepticism regarding the maturity of the technology (Beck & Müller-Bloch, 2017; Cucari et al., 2022). ABI Lab, serving as a 'catalyst of ecosystem development,' is aiding consortium members by accelerating their knowledge on blockchain application through shared work, learning, and research paths (Cucari et al., 2022; Schwartz & Bar-El, 2015).

This leads to the first research proposition (P1), suggesting that the adoption of blockchain technology, facilitated by catalysts like ABI Lab, can induce significant changes in organizational culture.

A phenomenon gaining traction in the context of blockchain implementation is 'coopetition'—cooperation amongst competitors when there's mutual interest in specific activities (Cucari et al., 2022). Coopetition can lead to cost reductions, risk sharing, increased market share, and heightened organizational learning. Within the context of the Interbank Spunta project, the adoption of blockchain technology through a coopetitive strategy for back-office processes leads to economies of scale, improved transparency, and enhanced security for all actors in the network (Cucari et al., 2022; Demirel et al., 2013).

This culminates in the second research proposition (P2): that the benefits of a coopetitive strategy applied to back-office processes can indeed promote the adoption of blockchain technology.

Blockchain technology has also been viewed as a catalyst for organizational ambidexterity, which is the capacity of an organization to efficiently manage its present activity (exploitation capacity) while simultaneously developing the flexibility to take advantage of new opportunities arising in the environment. Blockchain has the potential to improve the efficiency of back-office activities by facilitating data gathering and storage and by giving new tools and methods for the development of novel goods and services. This might significantly increase the bank's competitiveness and performance (Cucari et al., 2022).

This results in the third research proposition (P3), suggesting that blockchain-driven ambidexterity can help banks identify crucial areas to recover competitiveness and improve performance.

From an information processing standpoint, blockchain technology can facilitate optimal information processing mechanisms. Blockchain as a technology enables the effective management of large volumes of data, providing a competitive advantage especially in the context of Know Your Customer (KYC) processes which collect detailed customer information. The adoption of blockchain in this context can offer internal advantages, such as creditworthiness assessment, and external benefits like the sale of data to third parties (Cucari et al., 2022)

This leads to the fourth research proposition (P4), suggesting that blockchain can help banks adopt optimal information processing mechanisms.

Even though blockchain implementation offers several benefits, it also exposes banks to new types of risks, particularly IT risks. The Interbank Spunta project led to a shift in operational hazards from errors made by humans to IT risk. However, disaster recovery strategies have been developed to mitigate these risks. Despite the heightened IT risks, the overall operational risk has reduced due to the implementation of the blockchain, leading to an improved operational efficiency and competitiveness in the banking sector (Cucari et al., 2022; Boscia, Schena, and Stefanelli, 2020).

This culminates in the final research proposition (P5), suggesting that even though blockchain application may expose banks to higher IT risks, the benefits of operational risk reduction outweigh the drawbacks.

- **Relation to the Present Research**

In relation to the present research, both the ongoing study and the case study entitled "The Impact of Blockchain in Banking Processes: The Interbank Spunta Case Study" by Nicola Cucari and colleagues, exhibit a shared purpose: to investigate the integration and implications of advanced technologies, notably blockchain, in the financial sphere. Emphasizing on the revolutionary potential of blockchain technology in myriad banking operations such as interbank reconciliation, back-office functions, data processing, and security, both studies reveal the advantages of this innovative technology including augmented efficiency, cost minimization, increased transparency, and elevated customer experiences. Our present study aims to dissect factors contributing to the adoption of blockchain technology, specifically in Vienna's financial sector, drawing from the Unified Theory of Acceptance and Use of Technology (UTAUT) model to understand the perceptions and experiences of key actors in the financial ecosystem, such as top-ranking executives, employees, IT specialists, and blockchain experts. This enhances the comprehension of determinants influencing successful blockchain adoption, leading to insightful recommendations for financial institutions, policy makers, and stakeholders to effectively weave blockchain technology into their operational fabric. In addition to the practical implications, it also broadens the academic perspective on technology

adoption in the financial landscape, laying a foundation for future investigations and practical applications. Furthermore, the article by Cucari et al. offers complementary insights that bolster the understanding of the factors influencing blockchain adoption. The Interbank Spunta case study delves into trust-building mechanisms and collective decision-making processes within the banking realm, reinforcing the importance of trust and collaboration in successful blockchain adoption. It showcases how blockchain can augment trust among participants in interbank procedures, thus enhancing efficiency and transparency. Additionally, the role of governance structures in driving blockchain implementation resonates with the findings of our current study, stressing the importance of solid governance models and regulatory frameworks for the successful uptake of blockchain. The applicability of the case study's findings in the context of Vienna's financial sector is substantial, particularly in how they emphasize the transformative potential of blockchain in revolutionizing banking processes, bolstering operational efficiency, and reducing costs. These insights are coherent with the findings of our study, which underscore the advantages of blockchain in capital markets, payments, and trade finance. Moreover, the importance of organizational readiness, knowledge, and expertise in successful blockchain integration, as highlighted by Cucari and colleagues, aligns with the themes in our current research. Taking into account these complementary findings and their potential applications, the current research provides a comprehensive understanding of the dynamics of blockchain adoption in the financial sector, in Vienna and beyond.

2.6 The Advantages and Disadvantages of Blockchain In Banking

2.6.1 The Advantages of Blockchain to Process Financial Bills

Financial bills that reflect an unconditional payment obligation from the issuer to the bearer include drafts, promissory notes, and checks (Nakamoto, 2008). Yet, concerns associated with bill counterfeiting and credit concerns exist with the conventional method of producing paper banknotes (Vigna & Casey, 2015). A digital payment system can be formed through the use of blockchain technology that would solve these problems. The three basic parts of the system are the data layer, network layer, and application layer (Swan, 2015). The effective capital liquidation is improved by the secure functioning of the digital billing system, which ensures the protection of transactional data. Moreover, a dedicated server is neccessary, due to the decntralized nature, and even if

some parts of the network are attacked, the database system can keep operating (Zheng et al., 2017). Furthermore, In conventional networks, the transaction data for both the transaction's participants is verified by the center node. But with blockchain technology, all transaction activities are reliable, thus eliminating the need to confirm the legitimacy of both sides (Nakamoto, 2008.). So, the benefits of blockchain in bill operation may be summed up as a reduction in default risk and bill fraud (Vigna & Casey, 2015). This demonstrates how blockchain technology has the potential to enhance the safety and effectiveness of financial bill procedures.

2.6.2 The Advantages of Blockchain In Cross-border Payments

Several nations concentrate on the expansion of global commerce and finance in order to increase domestic economic growth. Currently, payments can be made through traditional means, for example, cable transfers through SWIFT, credit cards and payment businesses, and third-party services (Arner et al., 2015). The drawbacks of these techniques include the expensive service fees for bank cable transfers, the modest remittances from remittance providers, the restricted use of credit cards for minor daily cross-border purchases, and the lengthier wait periods for third-party payments.

These restrictions can be overcome by blockchain technology thanks to the Ripple payment network. With the capacity to immediately execute big value transfers, this network makes it possible to send money across borders between several nations for almost no transaction charges (Swan, 2015). Two banks communicate with each other using the Ripple network during the initial step of the payment process, and then funds are settled on the blockchain network utilizing the Interledger Protocol Ledger, FX Ticker, and Validator.

Global financial institutions like Currencies Direct, dLocal, Bexs Banco, Credit Agricole, MUFG Bank, MoneyGram, and CIMB Bank have partnered with Ripple. These institutions can function as gateways within the Ripple network with the use of blockchain technology to make international transfers easier for banking customers

2.6.3 The Advantages of Blockchain for Asset Securitization

Banking institutions have been prioritizing asset securitization business development more recently in order to improve the framework of credit funds as well as speed up the turnover of credit funds (Gomber et al., 2018; W. Pan & Qiu, 2020). By assessing and improving the creditworthiness of the underlying assets in accordance with their anticipated future earnings, asset securitization entails the creation of asset-backed securities. Banking institutions are able to participate in the procedure as investors or originators. Asset securitization entails a number of steps. An originator first sells assets to a special purpose vehicle (SPV)(W. Pan & Qiu, 2020). Following a pooling of these assets, the SPV issues securities to investors in collaboration with an investment bank. Eventually, the principal and interest on the asset-backed securities are paid with future cash flows from the underlying assets. With the participation of several market participants, it is essential for the asset securitization process to ensure stable cash flows and guarantee on-time debt repayment. Risks associated with credit and cash flow are typical in traditional asset securitization. The use of blockchain technology in the asset securitization industry can have many advantages in reducing these risks. Blockchain technology ensures transaction data immutability and provides a detailed breakdown of the asset securitization process. This can lessen the asymmetric information among parties, lowering credit and cash flow risks (Gai et al., 2018).

2.6.4 Disadvantages and Barriers Of Blockchain Technology Banking

As Blockchain technology increases efficiency and security, it has been considered very beneficial for the banking sector. Despite that, blockchain technology growth in the banking industry has its share of restrictions and drawbacks, though. Hence, before applying this technology in banking organizations, it is crucial to consider its shortcomings and constraints.

One of the major limitations of blockchain in the banking sector is the scalability issue, the capacity of present blockchain technology to manage a large number of transactions is constrained. Banking institutions require real-time processing of massive quantities of transactions, which creates a challenge because blockchain technology relies on a network of nodes to confirm transactions, resulting in transaction processing lag (Croman et al., 2016).

The substantial energy consumption needed for cryptocurrency mining is another important barrier to the use of blockchain technology in banking. Mining cryptocurrencies with blockchain technology requires a substantial amount of processing power and energy, which may be expensive and environmentally hazardous. Given that it may lead to higher expenses and a bad reputation among the public, this problem could have major repercussions for banking institutions that adopt blockchain technology (Mora et al., 2018).

Another important restriction is the absence of rules and regulations in the blockchain sector. The blockchain industry lacks standards, which can lead to confusion and unpredictability among financial institutions. This may cause blockchain-based solutions to fall short of regulatory compliance, which might have significant legal and economic consequences. (Tapscott & Tapscott, 2018; Zetzsche et al., 2018).

The possibility of hacker attacks using blockchain technology is another drawback. Despite that security is one of the major strengths of blockchain technology, it is not impermeable. Hackers can still target blockchain technology in a variety of methods, such as exploiting weaknesses in smart contracts or focusing on certain nodes. Because it could result in the loss of confidential financial information and harm to their image, this drawback could have major repercussions for banking institutions.

Blockchain technology has the capacity to completely change the banking sector, but its drawbacks must be overcome. Other obstacles that need to be addressed include scalability difficulty, high energy usage, a shortage of rules and regulations, and potential safety breaches. Thus, it is essential to carry out additional research on such restrictions and create plans to lessen these negatives. Banking institutions can more successfully implement blockchain technology and benefit from its potential advantages by resolving these constraints and drawbacks. Furthermore, below you will find a table that contains a summary of the advantages and disadvantages.

TABLE 2 SUMMARY OF ADVANTAGES AND DISADVANTAGES

Advantages	Disadvantages
Reduced default risk(Luo & Yan, 2022)	Scalability problem (A. Singh et al.,

	2023)
Lower fees, faster payment processing times, and enhanced privacy and transparency in cross-border transactions (Swan, 2015)	High energy consumption for cryptocurrency mining (Golosova & Romanovs, 2018)
Reduced asymmetric information among parties, lowering credit and cash flow risks in asset securitization (Golosova & Romanovs, 2018)	Lack of standardization and regulations (Swan, 2015)
Enhanced security and immutability (Niranjanamurthy et al., 2019)	Potential security breaches (Singh et al., 2023)
Increased efficiency and reduced operational costs (Niranjanamurthy et al., 2019b; A. Singh et al., 2023)	Legal and regulatory uncertainty(Niranjanamurthy et al., 2019a)
Improved transparency and traceability (Niranjanamurthy et al., 2019a; A. Singh et al., 2023)	Technological complexity and lack of expertise (Niranjanamurthy et al., 2019a)

3 THE UTAUT MODEL

A theoretical framework that describes users' acceptance and usage of technology is the UTAUT (Unified Theory of Acceptance and Use of Technology) paradigm.(Venkatesh et al., 2003) created the model by combining eight previous technological acceptance models into a single, all-encompassing framework. Performance expectancy, effort expectancy, social influence, and facilitating conditions are the four main components that the UTAUT model recognizes as influencing users' behavioral intention and usage behavior.

The degree to which a person expects that using technology would enhance their performance is known as performance expectancy. The degree to which a person anticipates finding to use of a technology tool to be simple is known as their effort expectancy. The extent to which a person believes that others think they should utilize the technology is known as social influence. The extent to which a person thinks that an organization or setting encourages the use of technology is known as the facilitating conditions.

The variation in the behavioral intention of users to use new technology can be accounted for by these four constructs with up to 70% accuracy, combined with gender, experience, age, and voluntariness of use as moderating factors (Venkatesh et al., 2003).
The UTAUT model has been used to explain technology acceptance and use in a wide range of settings, such as telemedicine (Y.-L. Wu et al., 2007), e-books (Marchewka & Kostiwa, 2014), and mobile banking (Yu, 2012).

In summary, the UTAUT model provides a thorough framework that outlines four fundamental characteristics that affect behavioral intention and usage behavior and explains users' acceptance and use of technology. Performance expectancy, effort expectancy, social influence, and facilitating situations are these constructs. The model has been widely used to show technology acceptance and use in a number of contexts, and it may be a useful tool for technology developers and organizations wanting to better explain user behavior and promote technology adoption.

3.1 Research On The UTAUT Model

The UTAUT paradigm has received extensive study and application across several industries, particularly in the banking industry. (Al-Gahtani, 2016) explored the UTAUT model in the context of online banking in Saudi Arabia and discovered that behavioral intention to use online banking was highly influenced by performance expectancy, effort expectancy, and social influence. The UTAUT model was also explored by (S. Singh & Srivastava, 2018) in the setting of mobile Indian banking, and they found that performance expectancy, effort expectancy, and facilitating conditions were the main factors influencing behavioral intention to use mobile banking. Additionally, (Alalwan et al., 2017) used the UTAUT model to investigate the factors influencing customer adoption of mobile banking in Jordan and discovered that behavioral intention to use mobile banking was strongly correlated with performance expectancy, effort expectancy, social influence, and facilitating conditions. In a related study, (Yu, 2012) used the UTAUT model to examine the variables influencing the adoption of mobile banking in Taiwan and discovered that social influence, perceived financial cost, performance expectancy, and perceived credibility had a significant impact on users' intentions to adopt mobile banking. Furthermore, Other researchers have also looked at how blockchain technology is being adopted. In order to investigate the factors impacting people's behavioral intentions to use blockchain technology, (Yusof, Munir, et al., 2018) study on the adoption of blockchain technology in the Malaysian banking industry discovered that performance expectancy, social influence, and facilitating conditions were important determinants of the behavioral intention to embrace blockchain technology.

Overall, the acceptance and use of various technologies, such as online banking, mobile banking, and blockchain technology in the banking industry, have been studied using the UTAUT model. It has been discovered that the key elements of performance expectancy, effort expectancy, social influence, and facilitating conditions—are key indicators of behavioral intention to use technology. In order to increase customer acceptability and utilization of their technological services, the study advises banks to take these elements into account while designing and putting them into practice.

3.2 Gaps In The Research On Blockchain Technology In The Banking Industry

The synthesis of the literature review offers important new perspectives on how the adoption and application of blockchain technology are currently being researched, notably in the financial industry. The study clarifies previous studies on the Unified Theory of Acceptance and Use of Technology (UTAUT) model, which is frequently employed to comprehend the variables that affect a person's acceptance and usage of technology. The huge gap in research surrounding the use of UTAUT in the context of blockchain technology constitutes one of the main conclusions of the literature review. Despite its broad usage in assessing technological acceptability, there has been minimal study on the UTAUT model's applicability to blockchain adoption in the banking industry, particularly in Austria. Furthermore, it is necessary to look into the variables that affect banking institutions' intentions to employ blockchain-based solutions in the Vienna, Austria, financial industry.

The review also emphasizes the significance of two crucial elements in the context of technology adoption: perceived compatibility and innovativeness. According to the research, these two elements can have a big impact on someone's intention to accept technology. When it comes to the adoption of blockchain technology in the financial sector, the literature review reveals a dearth of studies that have taken into account both of these elements in the UTAUT model.

Furthermore, the literature review emphasizes numerous gaps in the current research. (D, 2019; Guo & Liang, 2016a) discuss the potential advantages and difficulties of using blockchain technology in the banking sector, but their research is primarily conceptual, and practical studies that look at how banks are actually using blockchain technology are needed. (Ali et al., 2020) provide a systematic literature review on the present state of blockchain technology in the financial sector, but their assessment is limited to published research articles and does not include grey literature, which might offer a deeper understanding of the adoption of blockchain technology. (Counsell et al., 2020) carried out an organized mapping analysis of blockchain applications for central banks, but their research is restricted to central banks and does not look at how commercial banks are utilizing blockchain technology.

The goal of the thesis is to examine the UTAUT model's usefulness in determining banking institutions' intentions to employ blockchain-based solutions in the Vienna, Austria financial industry. The thesis intends to fill a research vacuum in the application of the UTAUT model within the setting of the adoption of blockchain technology and to look into how innovativeness and perceived compatibility affect the adoption of blockchain technology in the financial industry. This research question aims to address the identified gaps by using the UTAUT model in the context of blockchain technology adoption in the financial sector within Vienna, Austria, specifically focusing on commercial banks and incorporating grey literature for a comprehensive understanding of the current state of adoption. The deficiencies revealed in the existing research point to the necessity for additional study, and this thesis aims to contribute to filling these gaps.

3.3 Innovativeness And Perceived Compatibility As Additional Constructs

3.3.1 Innovativeness:

In order to better understand technological adoption, a number of researchers have recently included innovativeness as a construct to the UTAUT model. In one study, (San Martín & Herrero, 2012) included innovativeness into the UTAUT framework to examine the impact of individual psychological characteristics on online purchase intention in rural tourism. They discovered that innovativeness had a substantial effect on one's intent to make purchases online, underscoring the significance of taking into account personal traits in technology acceptance. Parallel to this, (Patil et al., 2020) added personal innovation to the Meta-UTAUT model to better comprehend Indian consumers' adoption of mobile payments. Their findings revealed that the intention to use mobile payments was significantly positively impacted by personal inventiveness.

One other research (Slade et al., 2015) extended UTAUT with innovation, risk, and trust to predict customers' adoption intentions of remote mobile payments in the United Kingdom. They discovered that innovation had a substantial impact on adoption inten-

tions, underscoring the significance of taking into account unique traits while developing mobile payment systems.

To better explain consumers' acceptance intentions of self-service technologies in the restaurant business, (Jeon et al., 2020) supplemented the UTAUT model with perceived risk and innovativeness. They discovered that innovativeness mitigated the impact of perceived risk and positively increased acceptance intention. The study emphasized the need of taking into account personal traits and risk perception when determining technological uptake.

To sum up, research that included innovativeness as a construct in the UTAUT model has emphasized the significance of taking into account human traits and behavior when forecasting technology acceptance. Innovativeness considerably shaped how people behaved and felt about adopting new technologies.

3.3.2 Perceived compatibility

To fully comprehend user intents and behavior toward the adoption of technology, perceived compatibility has been integrated into the Unified Theory of Acceptance and Use of Technology (UTAUT) paradigm. The UTAUT model has been used in numerous research studies to examine how perceived compatibility affects the adoption of new technologies.

An expanded UTAUT model was used in one study by (Faqih, 2016) to examine behavioral intention to adopt Internet shopping technology among non-shoppers in a developing country. According to the study, users' intentions to embrace internet shopping technology were influenced by their perception of compatibility. The study also emphasized the significance of offering proper assistance as well as guidance to improve their perception of compatibility with the technology.

One other research by (Marinković et al., 2020a) used a UTAUT-based viewpoint to investigate the moderating impact of gender on customer satisfaction and continuance intention in mobile commerce. According to the research, perceived compatibility had a

big impact on consumer happiness and desire to stick around, and it had a bigger impact on female users than on male users.

(R. Wu & Lee, 2017) used UTAUT and DOI to study the usage intention of mobile fingerprint payment in China. According to the research, consumers' behavioral intention to embrace mobile fingerprint payments was highly influenced by their perception of compatibility. The study also emphasized the significance of improving perceived compatibility by making technology and consumers' interests and preferences more compatible.

To describe the elements influencing the acceptance of mobile government services, (Almaiah et al., 2020) suggested a mobile government adoption model based on fusing the UTAUT and Government Adoption Model (GAM). According to the survey, individuals' intentions to use mobile government services were highly influenced by their perception of compatibility. Their study also stressed the need of ensuring that technology is suitable with users' requirements and preferences in order to boost their willingness to utilize the technology. These studies underline the need of ensuring that technology is suitable with users' needs and preferences in order to boost their willingness to use the technology.

3.4 Conceptual Model (Extended UTAUT)

Informed by the current literature and the need to comprehensively understand the variables that influence users' intention to adopt and utilize technology, this study employs a refined version of the UTAUT model. This expanded model integrates performance expectancy, effort expectancy, facilitating conditions, innovativeness, and perceived compatibility as the principal constructs influencing behavioral intention.

The basis for this study's extended UTAUT model is the original UTAUT model introduced by (Venkatesh et al., 2003), This model highlighted performance expectancy, effort expectancy, social influence, and facilitating conditions as the central elements shaping users' behavioral intention and usage behavior. However, the current study will exclude social influence as a construct since the study will be looking at blockchain

adoption from a banking institution's perspective and instead focus on innovativeness and perceived compatibility.

In the vein of previous research, these additional constructs are crucial for an improved understanding of user acceptance and use of technology. In addition, this extended UTAUT model anticipates that performance expectancy, effort expectancy, facilitating conditions, innovativeness, and perceived compatibility will all positively influence users' behavioral intention to adopt and use technology.

This conceptual model becomes necessary due to identified gaps in the research on blockchain technology in the banking industry, as suggested in section 3.2. In the context of financial institutions' adoption of blockchain technology, it has been noted that prior research has not sufficiently addressed the potential influence of innovation and perceived compatibility. This study addresses this gap, offering a more nuanced understanding of blockchain adoption .

In employing this extended UTAUT model, the study intends to provide an in-depth understanding of the factors that influence users' behavioral intention to adopt and utilize blockchain technology within the banking sector. An illustrative representation of the relationships among the constructs based on the insights from the UTAUT model research, is provided

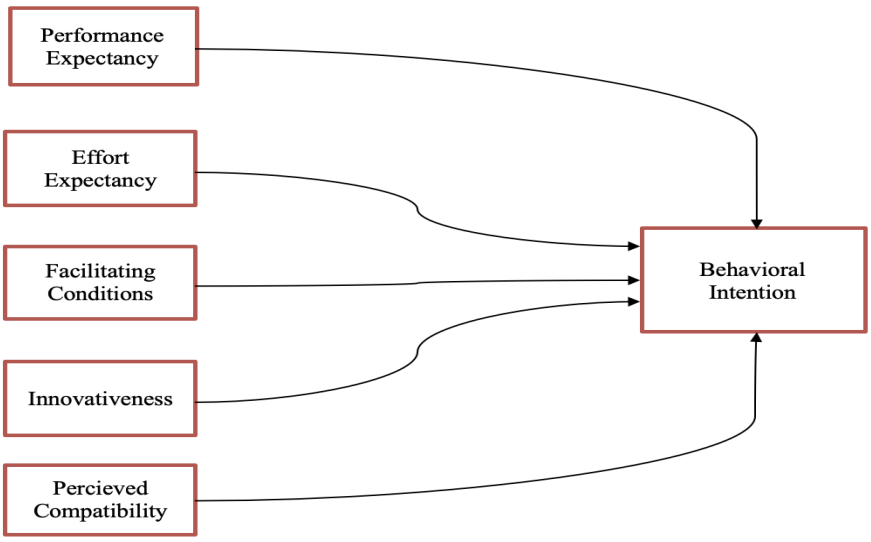

FIGURE 2 EXTENDED UTAUT MODEL WITH INNOVATIVENESS AND PERCEIVED COMPATIBILITY AS ADDITIONAL CONSTRUCTS (BY AUTHOR)

4 METHODOLOGY

4.1 Research Design and Approach:

The methodological pathway that we chose to guide this thesis was embedded in the qualitative research realm. This research strategy bestowed upon us an amplified and more in-depth understanding of the components influencing the acceptance of blockchain technology. Owing to the depth intrinsic to qualitative research, which facilitated our ability to accumulate comprehensive and robust information, this approach was optimally suited for our investigative pursuits.

Our primary strategies for data collection and analysis were executing interviews and leveraging thematic analysis. We arranged semi-structured interviews with seasoned professionals from Vienna's financial landscape, those armed with practical experience in dealing with blockchain technology. These interview sessions were facilitated via video conferencing, in tune with the interviewee's preferences. These conversations were documented through audio recording and subsequent transcription, ensuring an accurate record of all data. Furthermore, we used thematic analysis as our primary tool to decipher the data gathered from these interviews. This approach empowered us to unearth patterns, themes, and categories concealed within the data, thereby enhancing our grasp on their inherent meanings. For executing this analysis, we harnessed NVivo, a sophisticated tool designed specifically for handling and organizing qualitative data.

The decision to pursue a qualitative research trajectory was driven by the desire to intimately understand the variables influencing the uptake of blockchain technology in Vienna's financial sector. This methodological inclination allowed us to intensely probe the research topic from assorted perspectives while also stimulating the creation of fresh hypotheses and theories ripe for exploration in subsequent studies. Furthermore, using interviews as our key data collection instrument offered us the chance to procure exhaustive and nuanced insights into the lived experiences, viewpoints, and convictions of our participants. The fluid nature of interviews added to our advantage, offering us the flexibility to dig deeper into responses by posing follow-up inquiries. Employing NVivo

for our data analysis assisted us in controlling and systematizing vast amounts of qualitative data while spotting recurrent patterns and themes.

The research framework and strategy that we put into effect for this study were perfectly aligned to respond to our research question: What are the factors influencing the adoption of blockchain technology in Vienna's financial sector? By engaging with qualitative research, interviews, and thematic analysis, we obtained a panoramic understanding of the factors instigating this adoption, and the logic underlying these factors. This guided us toward addressing our research question and generated invaluable insights that could nourish future academic and practical pursuits in this field.

4.2 Participants and Sampling

For this investigation, the focal point consisted of individuals embedded within Vienna's financial sector who exhibited knowledge or practical experience in dealing with blockchain technology. Our selection process encompassed professionals across various financial institutions, such as esteemed banks including Raiffeisen Bank, ERSTE Bank, Oesterreichische Kontrollbank AG, and Schoeller Bank - a member of the Unicredit group. The locus of the investigation rested on these individuals, their extent of acquaintance with, and proficiency in blockchain technology within the prevailing temporal framework.

Our methodological approach for participant selection amalgamated purposive and snowball sampling techniques. The application of purposive sampling was based on the ability to selectively identify and recruit participants with requisite understanding and exposure to blockchain technology, thereby enriching our research inquiry. Participant selection was predominantly predicated on their professional roles, tenured experience within the sector, and their acquaintance with blockchain technology.

Inclusion criteria were explicit: participants were required to be of at least 18 years of age, to have a seasoned understanding or experience within the financial sector, and to hold current employment within a bank, demonstrating some knowledge of blockchain technology.

Supplementing this approach, the study also availed the use of snowball sampling, wherein existing participants would nominate future potential participants from within their professional networks, thereby expanding our participant selection whilst ensuring a diversity of perspectives.

Regrettably, time constraints and limited accessibility to individuals fulfilling the selection criteria resulted in a total of 8 interviews being conducted over the duration spanning from early March to late May. Despite the quantitative shortfall from the aspirational participant count of 15, it is conjectured that the study may have reached the point of data saturation, signifying the state where successive interviews cease to offer novel or unique information. It is proposed that the insights procured from these 8 discussions adequately captured a breadth and depth of perspectives germane to the research inquiry.

Professionals satisfying the study's criteria were contacted via an array of communication mediums including phone calls, emails, and LinkedIn. Potential volunteers were repeatedly reminded that their participation in the study was entirely optional, with the option to withdraw at any time. Data was captured in relation to participants' tenure within the financial sector, specifically within banking, and their age. It remains imperative to highlight that participant confidentiality and anonymity were safeguarded throughout the study, with no personally identifying information being disclosed in the research findings.

4.3 Data Preparation

Data preparation is a very important step in the data analyzing process, guaranteeing that the data set is ready for analysis and aligns with the research objectives and research questions of the study. This section highlights the steps used to prepare the data, including transcription, anonymization, data cleaning, and formatting procedures.

4.3.1 Transcription:

Transcription involves converting audio or video recordings into written text, enabling easier analysis and interpretation. In this study, the recorded interviews were transcribed

verbatim, capturing the participants' responses and preserving the richness of their experiences and perspectives. The transcription process followed established guidelines for accuracy and consistency.

4.3.2 Anonymization:

During the study, the confidentiality of the participants was given paramount importance. Therefore, identifiable information such as personal names, specific geographical locations, and other unique details was substituted with pseudonyms or generic labels. This anonymization process ensured the safeguarding of participants' privacy during the course of the study and subsequent analysis.

4.3.3 Enhancement and Structuring of Data:

The enhancement and structuring of data were significant procedures carried out to ensure the integrity and quality of the dataset. This involved two primary steps:

- **Rectification of Discrepancies:**
  A thorough review of the transcribed data was undertaken to detect and rectify any discrepancies, such as errors in transcription, indistinct speech, or omitted text. These inconsistencies were corrected in order to provide an accurate depiction of the participants' comments.

- **Uniformity in Data Format:**
  The transcription was organized and structured in a uniform format for ease of analysis. To simplify the coding process and theme creation, the textual data was split into several groups such as participant replies and interviewer questions. Timestamps or pertinent contextual data were also incorporated to give a clear context to each segment.

4.3.4 Alignment With Research Objectives and Research Question:

The prepared data set aligns closely with the research objectives and research questions of the study. The selection of participants for the interviews was guided by the study's research aims, ensuring that their perspectives and experiences would provide valuable insights into the research topic. The study topic was carefully crafted to address the important areas of investigation, and the transcribed data record the participants' comments and perspectives on this question.

Furthermore, the diversity in the data collected from the participants, enriches the data analysis process, enabling a comprehensive exploration of the research topic from various angles. The transcribed data also includes important nuances, expressions, and contextual elements that lead to a better comprehension of the phenomenon under inquiry. Additionally, by preparing the data through transcription, anonymization, and data cleaning procedures, the research team has ensured that the data set is primed for thorough analysis. The subsequent sections will detail the thematic analysis process, where patterns, themes, and interpretations will be derived from the prepared data, contributing to the fulfillment of the research objectives and the addressing of the research questions.

4.4 Coding and Theme Development:

Initial Coding Process and Coding Framework The initial coding process involved systematically examining the qualitative data to identify meaningful segments and assign descriptive labels or codes to them. A coding framework was created to guide this process and ensure consistency in code generation. The coding framework was created with the study aims in mind, and it was guided by relevant ideas or notions in the field. It provided a structure for organizing and categorizing the data, facilitating the emergence of themes during the analysis.

4.4.1 Coding Process:

The coding process consisted of open coding and selective coding. Open coding involved line-by-line analysis of the data, identifying concepts, ideas, and patterns within each segment. This procedure enabled the creation of preliminary codes that caught the

substance of the data. Selective coding involved further refinement and organization of the initial codes, clustering them into meaningful categories or themes.

4.4.2 Instances of Sub-themes and Their Relation to Research Question:

To illustrate the sub-theme extraction process, here are some instances of sub-themes extracted from the data and their relevance to the research queries:

- Sub-theme: "Openness to Innovation" Relevance: This sub-theme encapsulates discussions around the institutions' willingness to embrace and experiment with new technologies like blockchain. It aligns with the research question exploring the factors influencing an institution's openness towards adopting innovation, thus highlighting the impact of these elements on their technological advancement.

- Sub-theme: "Risk Tolerance" Relevance: This sub-theme reflects the institutions' shared experiences regarding the potential risks associated with the adoption of new technologies, particularly blockchain. It addresses the research question probing the perceived barriers and tolerance towards risk, shedding light on the factors that influence the strategic decisions within an organization.

- Sub-theme: "Alignment with Goals" Relevance: This sub-theme signifies the institutions' perspectives about the perceived alignment of blockchain technology with their strategic objectives. It relates to the research question investigating the factors contributing to the perceived compatibility of new technologies with existing systems and goals, emphasizing the role of strategic alignment in the adoption process.

4.4.3 Consolidation and Structuring Sub-Themes Into Initial Themes:

Following the generation of a comprehensive collection of initial sub-themes, the researchers participated in a process of consolidating and organizing these sub-themes into preliminary themes. Similar sub-themes were grouped based on

their conceptual similarities and relevance to the research questions. To uncover overarching themes that represented the underlying patterns in the data, connections and linkages between sub-themes were examined.

For instance, sub-themes related to openness to innovation, risk tolerance, and alignment with goals could be consolidated under a broader theme of “Innovativeness.” This theme reflects the interconnectedness of these factors and underscores the institution's approach toward embracing new technologies, specifically blockchain.

5 MAIN THEMES, SUB-THEMES, AND FINDINGS:

This section provides a comprehensive interpretation and analysis of various themes, shedding light on their significance and implications. By examining insights gathered from interviews with industry professionals, this research aims to provide valuable insights into these themes and their sub-themes.

5.1 Performance Expectancy:

- Performance Expectancy is an important theme that affects the adoption of blockchain technology. Perceived Efficiency, Perceived Effectiveness, and Competitive Advantage. Perceived Efficiency focuses on the extent to which institutions believe that blockchain technology enhances their operations. Perceived Effectiveness examines the degree to which blockchain technology is perceived to improve service delivery. Competitive Advantage investigates the degree to which blockchain adoption is seen as prociding a competitive advantage over industry competitors.

5.1.1 Perceived Effectiveness:

- “Smart contracts used on the blockchain may generate automation... eliminating a lot of traffic of information and confirmation actions by customers”

- “With the lower costs of the service, we may make this service more available to the users”

- “In my opinion, it can simplify many processes if you take the step and build it up from scratch. ”

- “Blockchain for me is a transaction system. It's a network for transactions, and that's what it's made for and what it can really do best. ”

Interpretation and elaboration:

The statements provided underscore the predicted efficacy of blockchain technology across a variety of financial service spheres. They accentuate the opportunity for process automation, cost economization, procedural streamlining, and blockchain's innately transaction-oriented nature.

Utilizing blockchain's inherent self-executing smart contracts allows for the removal of repetitive tasks and human interventions, effectively reducing intermediary reliance and amplifying operational productivity. This kind of automation can notably lessen information traffic and customer confirmation requirements, simplifying user interaction and elevating the overall service standard.

Moreover, cost reductions emerge as another anticipated advantage of blockchain technology. By harnessing the decentralized and transparent qualities of blockchain, financial organizations may be able to cut costs linked to intermediaries, administrative paperwork, and reconciliation procedures. This could render services more affordable and accessible to a broader demographic, fostering financial inclusivity and expanding their market influence.

Additionally, the concept of creating processes from the ground up is mentioned, indicating a method to exploit the benefits of blockchain technology. By establishing systems and workflows around the core characteristics of blockchain - immutability, transparency, and decentralized agreement - organizations can tap into the technology's intrinsic capabilities. This strategy allows for the streamlining and improvement of complex procedures, removing superfluous steps and amplifying operational productivity.

Lastly, the quotes underline the transaction-oriented nature of blockchain as a key strength. Blockchain is regarded as a platform engineered specifically for transactions, offering a secure and efficient medium for recording and validating digital transactions.

5.1.2 Perceived Efficiency:

- “The first area is capital markets. So what we see also on the market is that everything is moving on to blockchain.”

- "So banks are preparing, let's say crypto custody, so custody of this tokenized securities, also cryptocurrencies, and then you have asset managers that are preparing the infrastructure, you have digital exchanges that are preparing to be able to trade this tokenized securities."

- "The second one is payments area... there are already some considerations that also payments can help make payments faster, cheaper."

- "One additional area is also trade finance. This is everything from issuing letters of credit guarantees... here in theory blockchain makes perfect sense because you have a common database that cannot be tampered."

- "The banking industry or the security services industry let's put it that way because that's a subset of the banking industry and lending is something all together different, trade finance is different, deposit taking and all, that thing is very different but when dealing with securities and through the lifetime of the security, and that is what we call lifecycle management. And throughout the last whatever decades, we've managed to optimize the process and to minimize human intervention, and it's called straight through processing. So what I'm trying to say is the process has been built or was built 50 or 30 years ago and it's been continuously refined, but essentially it's the same process and in the past we had t + 30, T +7 and now it's t + 2."

- "With DLT, we can have atomic settlement... achieving the Holy Grail of security settlement."

- "The mainframe technologies in some banks are 50 years old and still running because they don't want to touch it."

Interpretation and elaboration:

The selected excerpts underscore the perceived efficacy of blockchain technology in diverse segments of the financial sector. They illuminate the potential advantages and

transformative capabilities blockchain can introduce across multiple domains within the banking and securities services ecosystem.

Capital markets emerge as a significant sector where blockchain's influence could be paramount. The excerpts stress the ongoing migration towards blockchain within these markets, suggesting participants are acknowledging the efficiency gains and value proposition that blockchain presents. Institutions ranging from banks to asset managers and digital exchanges are proactively equipping their infrastructure to support the custody and trading of cryptocurrencies and tokenized securities. This trend signifies an industry-wide recognition of blockchain's potential to enhance operational efficiency, security, and transparency.

Another area where blockchain's efficacy is predicted to be considerable is payments. The excerpts suggest that blockchain could expedite and make payment transactions more cost-effective. The decentralized and immutable nature of blockchain can streamline payment processes, reducing dependency on intermediaries, and improving transaction speed and cost efficiency.

The excerpts also identify trade finance as a domain where the benefits of blockchain are notably applicable. Blockchain's decentralized, immutable nature provides a common database that can enhance the security and efficiency of trade finance procedures. It can facilitate activities such as issuance of letters of credit, guarantees, and other trade-related procedures, minimizing human intervention and optimizing processes. This indicates blockchain's potential to revolutionize trade finance by reducing paperwork, bolstering trust, and streamlining the process.

Lifecycle management is also handled in the securities services business. The excerpts emphasize the historical optimization of processes like straight-through processing, intended to streamline security lifecycle management and minimize manual intervention. With the advent of blockchain and distributed ledger technology (DLT), the opportunity for atomic settlement arises, potentially significantly improving the integrity and efficiency of security settlement. Achieving atomic settlement, characterized by the simultaneous transfer of assets and funds, is often termed as a significant breakthrough, the "Holy Grail" of security settlement. Moreover, the excerpts indirectly touch upon some

banks' reliance on outdated infrastructure. While legacy mainframe technologies have seen use for decades, change is often resisted due to disruption and risk concerns. Nonetheless, the recognition of blockchain's potential efficacy signifies a growing necessity for modernization within the banking industry. By adopting blockchain technology, banks could overcome the constraints of obsolete systems and seize the benefits of enhanced security, efficiency, and innovation.

5.1.3 Competitive Advantage:

- "If you take the example of Germany, they have a really good regulatory environment and there they already have financial instruments that are issued on blockchain."

- "So capital market is definitely one of the areas where I see the biggest impact."

- "The faster you get, the more difficult it is to correct mistakes and to do something about it."

- "And if things go wrong, who do you turn to and what do you do about it?"

- "And that is also a challenge in blockchain or the DLT. Who do you turn to? And people are concerned about losing that human element."

- "DLT is something very different... You give up control, and that is not attractive to the incumbents of the current processes"

- "The first bank started with tokenization of assets, and it works very nicely when you have realized it."

- "But like internal processes and for the bank and also one thing is the point of tokenization. So the tokenization of assets is still a big topic."

Interpreation and elaboration:

The chosen responses highlight the competitive advantage that financial institutions can garner from blockchain technology. They underscore aspects like the regulatory environment, blockchain's impact on capital markets, challenges related to rectification speed, issues of accountability and control, and the pivotal role of asset tokenization.

The regulatory environment is a key determinant in the adoption and deployment of blockchain technology. The excerpts point to Germany as a country with a supportive regulatory backdrop that facilitates financial instruments issued on the blockchain. This suggests that a clear and supportive regulatory environment can give financial institutions a competitive edge, particularly in jurisdictions that foster the application of blockchain technology.

Capital markets have been identified as one of the major sectors where blockchain can have a disruptive impact. Blockchain's decentralized, transparent nature can redefine capital market operations, fostering efficiency, security, and transparency. By leveraging blockchain, financial institutions can seize a competitive advantage in the capital markets landscape, offering pioneering services and enhancing overall market efficiency.

The excerpts also discuss the challenge of error rectification speed and the immutable nature of blockchain records. While blockchain can provide efficiency and speed benefits, the difficulty of swiftly rectifying errors presents a challenge. This emphasizes the importance of cautious implementation and robust error prevention strategies to sustain a competitive edge while ensuring accuracy and reliability.

In the context of blockchain adoption, the questions of responsibility and control are posed. Given the dispersed nature of blockchain and the lack of a centralized authority, questions about who to contact in the event of a disagreement or problem arise. This concern mirrors the apprehension of incumbent players used to traditional, centralized processes. Overcoming this challenge and setting up mechanisms for accountability and dispute resolution are vital for maintaining a competitive advantage through blockchain adoption.

Finally, the tokenization of assets is underscored as a key factor in gaining a competitive edge. Financial institutions can explore new opportunities in asset management, trading, and liquidity by employing blockchain technology for asset tokenization. Tokenization allows for fractional ownership, increased accessibility, and increased liquidity of assets, giving a competitive edge in the production of novel financial goods and services.

5.2 Effort Expectancy:

Another important theme in blockchain adoption. This theme encompasses three sub-themes: Perceived Ease of Use, Complexity, and Resource Availability. Perceived Ease of Use evaluates how institutions perceive the ease of adopting and integrating blockchain technology into their operations. Complexity assesses the perceived complexity of blockchain technology and its potential impact on adoption. Resource Availability examines the availability of necessary resources, such as human and financial resources, required for the successful implementation of blockchain technology.

5.2.1 Perceived Ease of Use:

- “I do believe that people don't have to know everything about blockchain to utilize blockchain. So this has to be somehow also hidden from people.”

- “Maybe they just have to know, OK, there is a new use case there, there's a new idea what we could do on blockchain and we will take care of the more technical part.”

- “Institutions paid basis points, right? They don't pay percentage points. All in, right? Safely paying transaction costs, CSD fees, lawyers, notaries, all taken together, it's basis points. So it's really a fraction of a percentage point and the institutional side of this industry drives the development.”

- "Compared to the requirements of blockchain technology, this is a completely different environment... there is a place where we need to either via API or some other interface, the old part with the new part... trying to create the touch points by interfaces or APIs between those two infrastructures."

- "I would say that in many cases people are not willing to change."

- "You have to convince that this is absolutely not failing."

Interpretation and elaboration:

The chosen passages emphasize the perception of blockchain technology's accessibility, stressing the importance of simplifying its intricate aspects, building a link between legacy and contemporary systems, and mitigating inherent resistance to change.

At its core, users do not need to possess a profound comprehension of blockchain's technological nuances to harness its power effectively. The complexities of the blockchain mechanism can be veiled from users, enabling them to focus on the innovative opportunities and strategies the technology introduces. By eliminating technical obstacles, users can more readily embrace blockchain offerings, reaping their benefits without delving into the highly sophisticated technology that drives it. Moreover, financial entities conventionally function on a fee model centered on basis points, portions of a percentage point. This fee structure steers the industry's developmental path, highlighting the pressing need for blockchain solutions to deliver evident cost reductions and process improvements. The unique value proposition of blockchain centers on its ability to optimize transaction procedures, diminish the involvement of middlemen, and curtail expenses tied to transactional activities such as fees, legal services, and notarial actions.

In addition, bridging the gap between the incumbent and emerging systems calls for the development of interfaces like APIs, fostering smooth interaction between the two spheres. This amalgamation process is essential to establish connective points between traditional systems and blockchain, guaranteeing a smooth transition and enabling ease of use for financial institutions. Furthermore, resistance to change has been highlighted as a recurring barrier when implementing new technology, including blockchain. Individuals might be reluctant to embrace blockchain owing to uncertainties about its de-

pendability, security, or potential upheavals to established procedures. Tackling this resistance demands convincing stakeholders that blockchain technology is resilient, reliable, and holds distinct advantages over conventional systems. Cultivating trust and confidence in the technology is a vital element to boost its acceptance and diminish worries. Lastly, it's of utmost importance to position blockchain as an unerring solution to stimulate its broad adoption. Users must be assured of the technology's dependability, safety, and capacity to fulfill its commitments. By addressing these concerns and building confidence, stakeholders can overcome their hesitations and see blockchain as a dependable and efficient solution.

To summarize, the perceived simplicity of blockchain usage hinges on de-complicating its intricacies, removing technical barriers, demonstrating cost benefits, bridging the divide between traditional and modern systems, managing resistance to change, and providing a sturdy and fail-safe solution. By taking these factors into account, the adoption of blockchain can become more enticing and feasible for both individuals and institutions within the finance sector.

5.2.2 Complexity:

- “One set of challenges is definitely the technical challenges because this is also when you're talking about blockchain and often discussions get very technical quite soon.”

- “Then you have the problem of forks, for example, what do we do in the case of fork?”
- “Maybe data protection could be an issue and the question for me is whether a bank really wants to have complete transparency... Maybe regulation would be an issue?"

- “With the ability to reconcile with some higher levels or CSDs or agent banks... the risk of losing them all is minimal... Except for the weakest part in the chain which is the human being... If you don't have a proper technology that addresses this topic... the risk is high...."

Interpretation and elaboration:

The excerpts put forth offer an illuminating perspective on the intricate nature of blockchain technology, underscoring its technical hurdles, the conundrums posed by forks, considerations regarding data safety, regulatory hurdles, and the part human elements play in preserving system integrity.

The technical complexity stands out as a significant challenge when examining blockchain. The nuances of the blockchain technology can be intimidating, requiring profound comprehension for its effective application and utilization. Technical dialogues regarding blockchain frequently delve into highly specialized dimensions, underscoring the importance of understanding these complexities and ensuring efficient communication between tech experts and various stakeholders.

The occurrence of forks, implying the divergence of a blockchain into two distinct paths, brings forth another layer of complexity. Dealing with forks in the blockchain ecosystem raises essential questions as it demands careful thought and decision-making. Making informed choices during a fork event is pivotal to the stability and integrity of the blockchain network.

Data security takes center stage when contemplating the adoption of blockchain technology. Financial institutions may harbor apprehensions about absolute transparency and potential exposure of confidential information. Striking an equilibrium between transparency and data security turns into a crucial determinant in complying with regulatory norms and assuaging privacy worries.

The challenge of regulatory compliance adds another facet to the complexity of embracing blockchain. Adhering to existing regulations and tailoring blockchain technology to meet these regulatory standards can prove taxing. Navigating the regulatory landscape becomes critical to ensure that blockchain solutions are in sync with the legal framework governing the financial sector.

Human elements add to the intricacy of blockchain implementation. Despite the inherent robust security and efficiency of the technology, the system's most fragile link often resides in human involvement. Errors or vulnerabilities arising from human intervention

can compromise the system's integrity. As a result, it is critical to have appropriate technology solutions in place to mitigate these risks and maintain the stability and resilience of blockchain networks.

To summarize, the intricacy inherent in blockchain technology envelops technical challenges, considerations around managing forks, data security issues, regulatory compliance, and managing human-induced vulnerabilities. Addressing these complexities necessitates a profound understanding of the technology, informed decision-making during fork events, achieving a balance between transparency and data protection, ensuring regulatory compliance, and adopting robust technological safeguards to mitigate human-associated risks. By addressing these complexities, stakeholders can harness the power of blockchain while effectively navigating potential challenges that may arise.

5.2.3 Resource Availability:

- "The problem here is that currently, we're not. It's tricky if we hold cryptocurrencies on our balance sheet. There were also some guidelines about that if we have some cryptocurrencies on our balance sheet we need to have a lot of capital reserves for that and this would make the whole process super costly."

- "Yes, I think it's it's a big effort actually to implement and I believe that this will slowly get implemented, but it's not something that would get implemented in, yeah, in short term let's say."

- "The adoption of blockchain technology requires additional resources and investment to run two ecosystems simultaneously."
- "Traditional institutions may be resistant to embracing blockchain due to the potential impact on their roles and the need for standardization."
- "It's almost impossible to replace the technology just like that... this would require a lot, a lot of things and investment."
- "At the current state, it would be more costly to implement DLT than to stay on an Oracle database."
- "There certainly has to be Technical Support required with any new technology."

- "Effort to implement anything that deviates from the current setup is an effort in a big organization."
- "They are searching for people who are already retired because there are no young people knowing this language."

Interpretation and elaboration:

The shared quotes illuminate the challenges pertaining to resource availability that comes with the adoption of blockchain technology. These encompass issues related to capital reserves, the demand for added resources and investment, opposition from established institutions, the intricate task of superseding existing technologies, the financial implications, the need for technical backing, and the shortage of proficient professionals.

Another challenge that has been highlighted is the matter of accounting for cryptocurrencies in balance sheets. The rules pertaining to capital reserves for cryptocurrencies can make the adoption of blockchain technology an expensive proposition for institutions. Such financial considerations form an obstacle to blockchain adoption as the potential ramifications on capital reserves demand meticulous management.

Integrating blockchain technology necessitates substantial resources and effort. It is acknowledged that the process is lengthy and will not be completed in the short run. Adopting blockchain implies operating two ecosystems concurrently, inferring extra expenses and resource allocation.

Conventional institutions may exhibit reluctance towards embracing blockchain due to its anticipated disruption of established roles and the demand for standardization. The onset of blockchain technology unsettles existing practices and requires synchronization with new norms, posing challenges regarding organizational adaptation and coordination.

Supplanting current technologies with blockchain is an intricate and resource-draining exercise. It demands hefty investment and effort, making it a daunting task for organizations. The financial implications of implementing distributed ledger technology (DLT)

may currently overshadow the benefits for certain institutions, particularly when juxtaposed with the costs of retaining existing Oracle database systems.

Technical backing forms a crucial component of any novel technology implementation, including blockchain. Introducing blockchain calls for sufficient technical support to ensure flawless integration, system upkeep, and troubleshooting. Organizations need to have access to proficient professionals who can unravel the intricacies of blockchain and provide requisite support.

A further challenge alluded to is the dearth of competent individuals skilled in blockchain. The limited availability of young professionals familiar with blockchain technology creates hurdles in sourcing suitable talent. Institutions may find themselves resorting to retired professionals who hold the necessary expertise and experience.

To summarize, the uptake of blockchain technology is confronted by hurdles related to resource availability, which include concerns about capital reserves, the demand for further investment, opposition from established institutions, the complexity of superseding existing technologies, financial implications, the need for technical support, and the shortage of competent professionals. Surmounting these challenges necessitates careful financial planning, long-term commitment, organizational preparedness for change, cost-benefit analysis, access to technical support, and efforts to attract and cultivate a skilled workforce in the blockchain technology domain. By addressing these resource-related roadblocks, organizations can position themselves for successful blockchain adoption and harness the potential benefits of this revolutionary technology.

5.3 Facilitating Conditions:

Facilitating Conditions play a crucial role in the successful adoption and integration of blockchain technology. This theme involves three sub-themes: Organizational Readiness, Regulatory Environment, and Support Availability. Organizational Readiness evaluates the institution's infrastructural preparedness to adopt and integrate blockchain technology. The Regulatory Environment examines the effect of regulations and laws on the adoption of blockchain. Support Availability focuses on the

availability of external technical support for integrating blockchain technology within organizations.

5.3.1 Organizational Readiness:

- "So you do need some in-house knowledge, you need some IT guys that understand these systems, IT security."
- "I think that every major bank is building their own custody solution."
- "We've undergone a couple of proofs of concepts regarding DLT."
- "We work with a Swiss Crypto asset provider and we developed this green Bond in token format in a proof of concept, so in a closed environment."
- "The bank has little experience with this topic, and the employees even more."
- "We have a bank with over, I don't know exactly, but maybe over 5000 people working in Austria, and maybe 10 or 20 people are working on this topic."
- "The bank is always trying to keep it modern, especially in terms of data security."
- "I think we have the necessary financial resources to integrate blockchain technologies into our infrastructure."
- "Compared to the requirements of blockchain technology, this is a completely different environment."
- "Trying to create the touch points by interfaces or APIs between those two infrastructures."
- "So we are building a parallel universe or parallel infrastructure through which we are either duplicating or communicating with each other."
- "Definitely, you would have to have some experts external or internal."

Interpretation and Elaboration:

Organizational readiness is a critical factor in facilitating blockchain adoption. The presence of in-house knowledge and expertise, particularly in IT and security, is emphasized as crucial for successful integration. Major banks are even investing in building their own custody solutions, highlighting the importance of internal capabilities. Additionally, engaging in proofs of concept and conducting closed environment testing demonstrates an institution's readiness to explore blockchain technology. However,

challenges arise when institutions lack the necessary expertise and struggle to align existing systems with blockchain infrastructure. Despite resource constraints, the commitment to maintaining modern data security and the availability of financial resources indicate a willingness to integrate blockchain technologies. Integrating blockchain into traditional infrastructures requires the creation of interfaces or APIs, enabling communication between existing systems and the new blockchain environment. The involvement of external experts is considered essential in providing the technical support required for successful implementation.

5.3.2 Regulatory Environment:

- "But also kind of not everybody that is in the front is a front runner in the marketing of his activity is exactly the front runner in real activity. But we have some prominent players that already offered certain blockchain products. We are again not one of those. And this is mainly due to the different regulatory framework."
- "Banks in Switzerland are far, you know, in front because certain regulations have been already adopted."
- "In case of American SEC interpretation... affects the custody of digital assets and capital requirements. It is becoming a risk-weighted asset, and you have to build the capital. If you have to build capital one-to-one, basically this means that you cannot offer the service."

Interpretation and Elaboration:

The theme of Regulatory Framework and Compliance underscores the significance of regulations in blockchain adoption. The institution acknowledges that being at the forefront of marketing activities does not necessarily reflect their level of innovation in blockchain products. They credit their position in comparison to other significant entities to the distinct regulatory frameworks under which they operate. This indicates that variations in regulatory requirements have a direct impact on the institution's ability to adapt and offer blockchain-related services. Additionally, the transcripts highlight the regulatory advantages enjoyed by banks in Switzerland due to the early adoption of certain regulations. This suggests that regulatory frameworks can create disparities in the adoption and implementation of blockchain technology across different regions. Furthermore, The impact of the American Securities and Exchange Commission (SEC) interpretation is also emphasized, particularly in relation to custody of digital assets and capital requirements. The interpretation treats custody as a risk-weighted asset, necessitating the allocation of capital accordingly. However, the transcript points out the practical challenges of meeting capital requirements, potentially hindering the institution's ability to provide certain services.

In summary, the theme of Regulatory Framework and Compliance emerges as a critical factor influencing the adoption and implementation of blockchain technology within the institution. Differences in regulatory frameworks contribute to variations in the institution's position compared to other players. The impact of the SEC's interpretation on custody and capital requirements presents practical challenges, making it crucial for institutions to navigate the regulatory landscape effectively. By understanding and addressing regulatory considerations, institutions can ensure compliance while leveraging the benefits of blockchain technology.

5.3.3 Support Availability:

- “They're building their own custody solution in-house, but in parallel, they are also partnering up with a custodian and a broker that will enable them to offer cryptocurrencies.”
- “Well, certainly, there has to be Technical Support required with any new technology, you would have to have some experts external or internal.”

- "Two things you need and will need in the future, a lot of developers who understand the technology because it's different to program a decentralized system than some single application or handy app." "And the second thing is that there is so much wrong information out there about this topic, where articles are completely wrong"

Interpretation and Elaboration:

The availability of technical support is crucial for successful blockchain integration. In some cases, institutions may rely on external expertise rather than requiring extensive in-house technical knowledge, particularly when partnering with trusted third parties. Building collaborations with custodians and brokers allow institutions to leverage external support for offering cryptocurrency services alongside their in-house solutions. External experts, whether contracted or internal, are seen as essential for providing technical guidance and support during the implementation process. Furthermore, recruiting developers with specialized knowledge of decentralized systems is vital for effectively programming blockchain-based applications. Furthermore, the findings highlight the significance of organizational readiness, regulatory environment, and support availability in facilitating the adoption and integration of blockchain technology. Organizational readiness necessitates in-house expertise and investments in infrastructure, with major banks even developing their own solutions. Institutions should consider regulatory requirements and seek partnerships with regulated entities for a smoother adoption process. External technical support, whether through collaborations or in-house experts, plays a vital role in overcoming challenges associated with blockchain integration. Understanding these facilitating conditions will aid institutions in formulating strategies for successful implementation and harnessing the benefits of blockchain technology.

5.4 Innovativeness:

The theme of Innovativeness focuses on the institution's approach to embracing new technologies, particularly blockchain. This theme includes two sub-themes: Openness to Innovation and Risk Tolerance. Openness to Innovation evaluates the institution's willingness to embrace new technologies, specifically blockchain. Risk Tolerance assesses

the institution's tolerance for potential risks associated with the adoption of new technologies.

5.4.1 Openness to Innovation:

- "We always like to say that we're a smart followers, not the innovator because you have those that when a new technology comes. They start to experiment with it and try to find what's new business models, what new use cases we can do with this technology. We are not like that. We are more of a smart follower, meaning that we see the other banks experimenting. And then when after one or two years when there are some proven concepts, then we also try to implement this."

- "I think that applies to every bank, unwilling is the answer. That is not because we don't want to. But it's pretty difficult to implement new technology with all the constraints that you need to fulfill, regulatory, security, and efficiency."

- "We are very willing to embrace new technologies."

- "The willingness is high, but very selective."

- "We are innovative in relation to our size and specialization."

- "Some bigger private banks or wealth management banks are keener on adopting new technology."

- "In some cases quite willing, such as open banking, digital banking, and blockchain initiatives."
- "We are quite advanced compared to competitors, with dedicated teams for new ecosystems and partnerships."

- "Spanish banks are advanced in blockchain, with dedicated departments and divisions."

- "What is possible and that's what also I do is to make some proof of concept."

- "So you have two or three people in the bank who are allowed to spend their time on this new technology so that we don't miss something and that we have a look."

Interpretation and elaboration:

The provided quotes reveal a propensity towards innovation within the banking sector, illustrating various viewpoints on adopting novel technologies, piloting proofs of concept, and maintaining a balance between being an innovator and a strategic follower.

Certain banks categorize themselves as strategic followers, opting to scrutinize and learn from others' trials with new technologies prior to their implementation. This methodology permits them to leverage validated concepts and diminish the risks tied to early adoption. Challenges related to regulatory compliance, security, and efficiency form obstacles to the incorporation of novel technologies, making it difficult for banks to readily accept innovation. Regardless of these constraints, a readiness to delve into new technologies and their potential advantages is apparent.

The eagerness to incorporate new technologies differs among banks, with some displaying more openness and selectiveness. Larger private banks and wealth management banks often show increased interest in adopting novel technologies, acknowledging the value these can contribute to their operations and client experience. Spanish banks, notably, are recognized for their advancements in blockchain, boasting dedicated departments and divisions focused on these initiatives.

Innovation is deemed a priority by numerous banks, and they designate resources and establish dedicated teams to probe new ecosystems, partnerships, and emerging technologies. Having personnel within the bank committed to researching and staying informed about novel technologies ensures that the organization stays in tune with potential opportunities.

Proof of concept initiatives assumes a pivotal role in appraising the viability and potential of novel technologies. Through the execution of proof of concept projects, banks can weigh the possibilities and decide if the technology is in alignment with their strategic objectives and operational demands.

In summary, even though there might be hurdles and limitations in the implementation of novel technologies, the shared quotes imply a general readiness and inclination towards innovation within the banking sector. Banks acknowledge the significance of remaining competitive and are actively seeking methods to utilize novel technologies to augment their services, enhance operational efficiency, and cater to the changing needs of their clientele.

5.4.2 Risk Tolerance:

- “I think the first one is really culture.”
- “DLT currently does not address customer convenience. It addresses different things, and that makes it difficult.”
- “It's a challenge to implement unproven technologies. The alarm bell goes on. Is it safe? Are we going to keep our license? Because we're not allowed to fail.”
- “Banks are conservative organizations, not only in approaching new technologies but also in addressing current existing topics.”
- “Regulatory obligations, such as AML checks, can be a challenge when dealing with clients who invest in cryptocurrencies.”
- “The American SEC's interpretation on custody of digital assets and capital requirements presents difficulties and impacts the ability to offer certain services."
- “Building capital one-to-one for custody of digital assets makes it difficult to afford keeping even the current volume of bitcoins.”
- “We have limited budgets and are required to prove good business cases.”
- “We are not a fintech with the luxury of trying multiple ideas without consequence.”
- “The willingness is high, but very selective.”
- “We are more conservative as a private bank compared to fintech companies.”
- “Regulations can restrict and may not always result in positive changes.”

- "Considerations regarding GDPR and blockchain's immutability conflicting with the right to be forgotten."

Interpretation and elaboration:

The provided quotes illuminate the risk tolerance within the banking sector, underlining the impact of organizational culture, regulatory responsibilities, capital requirements, and budget constraints on the adoption of emerging technologies such as DLT.

Organizational culture wields substantial influence over risk tolerance. Banks are often regarded as conservative entities, approaching novel technologies with circumspection. The obligation to uphold regulatory compliance, safeguard their licensing, and guarantee the security of client data and funds takes precedence. This cautious approach originates from the need to minimize failure probability and preserve the trust invested in the banking industry.

Regulatory responsibilities, such as anti-money laundering (AML) checks and compliance with data protection regulations like GDPR, can introduce challenges when dealing with cryptocurrencies and blockchain. To guarantee compliance with these regulations while exploiting the advantages of blockchain's transparency and immutability necessitates meticulous consideration and implementation.

The interpretation and application of regulations also affect the ability of banks to offer specific services. For instance, the interpretation of the American SEC regarding the custody of digital assets and capital requirements introduces obstacles and can limit the range of services banks can provide in the digital asset domain. Capital prerequisites for the custody of digital assets can impose strain on budgets and make it difficult to afford the infrastructure needed to manage the escalating volume of cryptocurrencies.

Restricted budgets and the necessity to present solid business cases contribute further to the cautious approach toward the adoption of novel technologies. Contrary to fintech firms that might possess more flexibility in testing multiple ideas, banks operate within resource limitations and are required to justify investments based on robust business cases.

While there is a willingness to adopt innovation, it is often done selectively, taking into account the risks and potential benefits associated with each technology or use case. Private banks, in particular, may display a more conservative stance compared to fintech firms due to their focus on wealth management and the necessity to uphold client trust and security.

It's important to acknowledge that regulations can both empower and restrict innovation. While they provide a framework for customer protection and maintenance of market integrity, they can also present challenges and obstruct the adoption of certain technologies or business models. Conflicts may surface between the immutability characteristic of blockchain and the right to be forgotten under GDPR, necessitating careful consideration and solutions that harmonize regulatory compliance and technological capabilities.

In summary, the quotes spotlight the risk-averse nature of banks and the challenges they encounter when adopting emerging technologies like DLT. Regulatory compliance, capital requirements, budget constraints, and the need to protect customer data and trust contribute to the cautious approach. Nevertheless, there exists a readiness to innovate selectively and discover methods to harness the benefits of burgeoning technologies while maneuvering through the complexities of the regulatory landscape.

5.5 Perceived Compatibility:

Perceived Compatibility is a theme that examines the alignment of blockchain technology with the institution's strategic goals and the ease of integrating it into existing systems. Alignment with Goals evaluates the perceived alignment of blockchain technology with the institution's strategic objectives. Integration with Existing Systems assesses the perceived ease of integrating blockchain technology with the institution's existing systems.

5.5.1 Alignment with Goals:

- “I mean DLT does not offer you a complete rework. So you still have somebody who issues something and somebody who provides something and somebody

who invests in something. So it's not entirely unknown, it's a different way to accommodate the whole thing."

- "Well, it's remodeling of the whole approach... there needs to be very strong and powerful people on the banking side to make sure that they understand the processes, they understand the risk, connect with those processes and they may control it through the infrastructure that is built."

- "The issue also is that currently... blockchain is some big giant. It's very fragmented, and it has different features... So the choice of this level two infrastructure is kind of determining what you are going to do."

- "So the study we did proved that blockchain can be used for our business and processes but it's also proved that it doesn't really add value or much value to our current business and processes."

- "I don't expect the blockchain really will have a big use for ourselves, might have a use for our competitors or if you change our business model."

- "In my personal opinion, it doesn't align with classical computer backgrounds, computer programs."

- "Maybe even like paperless working... digitally signed and communicated between the customer and the bank."

- "Areas where we get benefit out of it... identity, security services, capital markets, trade finance, and payment infrastructure."

- "Digital identity with zero-knowledge proof is a very interesting concept."

- "There are processes in the bank that could be made much faster and less time-consuming."

- "Moving assets around, where many people have to agree, would be an application with real potential."

Interpretation and elaboration:

The furnished quotes underscore the harmonization of blockchain technology with the objectives and operations of banks, as well as the potential sectors where it can enhance value and boost efficiency.

DLT, or blockchain, does not seek a complete reformation of existing processes, but rather proposes a distinctive methodology to facilitate them. It presents a revamping of the approach, necessitating a profound understanding of processes, risks, and the infrastructure encompassing them. Achieving this synchronization demands influential individuals in the banking sector who can bridge the gap between the technology and existing procedures, effectively managing and controlling them.

However, it's crucial to note that blockchain is still a segmented technology with diverse features. The choice of infrastructure, such as the second layer, plays a pivotal role in determining the potential use cases and benefits that can be derived from blockchain implementation.

Research has demonstrated that blockchain can be utilized for business processes, although it may not always introduce significant value to the current operations. The applicability of blockchain depends on the specific business model and the potential advantages it offers. While it may not align with traditional computer backgrounds and programs, there are sectors where blockchain can contribute value, including digital identity, security services, capital markets, trade finance, payment infrastructure, and processes that necessitate consensus and asset movement.

Potential advantages of blockchain technology encompass paperless working, digital signatures, and secure communication between customers and banks. It provides the opportunity to streamline processes and reduce the time they take, especially those in-

volving multiple parties agreeing on asset transfers. The concept of digital identification with zero-knowledge proof is also thought to be a fascinating topic of study.

In summary, while blockchain may not advocate a complete revamping of existing processes, it offers a distinctive approach that aligns with certain objectives and sectors within banks. Understanding the specific use cases, the choice of infrastructure, and the potential benefits it can offer are crucial considerations when evaluating the alignment of blockchain technology with the goals and processes of banks.

5.5.2 Integration with Existing Systems:

- "In essence, blockchain 5 years ago was like emailing, whatever, 20 years ago or 30 years ago. Nobody nowadays questions what is an e-mail provider, right, and which protocol. It just works. A lot of hiccups we had in the past, I'm sure we'll have enough of our hiccups in the future and already today on blockchain, but we'll overcome that. It's going to be a standard technology, standard processes."

- "If you imagine the world currently is operating through a network of bilateral relationship fueled by things like SWIFT and all of a sudden you are changing completely this concept into the concept of jumping onto some blockchain... there has to be some modification... A lot of question marks, you know."

- "I don't expect the blockchain really will have a big use for ourselves, might have a use for our competitors or if you change our business model."

- "The only thing which might be interesting is that the cost of the infrastructure between these two points... decreases."

- "The cost point doesn't work... banks are so afraid of blockchain, so they just start renaming the current processes and get more efficient there."
- "Securities might be high potential for tokenization... but we didn't see it really now... due to missing regulation and other challenges."

- “The trading of security tokens in the secondary market faces performance issues and problems.”

- “We do obviously transactions for customers, but not that many... But yes, definitely in payment or securities section blockchain technology could be implemented.”

- “If the security levels and regulations are met, it could definitely improve payments, maybe even make them faster.”

- “Security settlement... if you would have a better technology to make this faster... that would be a possibility.”

- “Implementing this technology wouldn't be that easy, but still possible.”

- “Bond issuance for smaller customers with low cost.”

- “Trade financing and payment infrastructure are areas of focus for blockchain implementation.”

- “Blockchain can improve regulatory reporting and general data reporting by avoiding loss, delays, inaccuracies.”

- "Tokenization of assets and stocks allows buying and selling fractions of stocks.”

- “Tokenization could enable selling products in different countries, bypassing certain legal restrictions.”

- “Lawyers and compliance teams need to consider the legal aspects of tokenization.”

Interpretation and elaboration:

The supplied quotes provide insight into the amalgamation of blockchain technology with established systems and procedures in various banking sectors. While challenges and ambiguities exist, potential benefits and opportunities for enhancement are also apparent.

Blockchain is anticipated to mature into a standard technology in the future, analogous to the evolution of email into a universal communication tool. However, transitioning from the existing bilateral relationship-based system to a blockchain-infused system necessitates adaptations and provokes questions about the implementation process and its ramifications on prevailing procedures.

The employment of blockchain technology may not significantly impact certain banks' operations, but could carry relevance for competitors or in the event of a change in business models. Cost reduction in infrastructure between different points of the banking ecosystem is one potential advantage blockchain can offer.

Nonetheless, some banks may exhibit reluctance to fully endorse blockchain, choosing instead to rebrand and optimize their current processes to augment efficiency. This cautious approach could stem from apprehensions about the cost-effectiveness and risks associated with blockchain implementation.

The tokenization of assets, especially securities, holds potential for high-value applications. However, challenges like the absence of regulation and performance issues in the secondary market have curtailed its widespread adoption. Despite this, there's acknowledgment that blockchain technology can be employed in areas such as payment infrastructure and securities, where it could bolster transaction speed, security, and regulatory reporting.

Blockchain's capability to tokenize assets and stocks offers opportunities for fractional ownership and facilitates cross-border transactions, potentially circumventing certain legal restrictions. When adopting tokenization, however, legal and regulatory issues must be thoroughly handled by legal and compliance teams.

Integrating blockchain technology into existing banking systems involves surmounting challenges and uncertainties, while also presenting opportunities for cost reduction, improved transaction efficiency, regulatory compliance, and innovative applications such as tokenization. Banks need to thoroughly evaluate the benefits, risks, and legal implications of implementing blockchain technology in their specific areas of interest.

5.6 Behavioral Intention:

Behavioral Intention is a theme that provides insights into the institutional stance and plans regarding blockchain adoption. This theme includes three sub-themes: Adoption Plan, Anticipated Benefits, and Perceived Barriers. The Adoption Plan assesses the extent of the institution's plan to implement blockchain technology. Anticipated Benefits explores the perceived potential benefits associated with adopting the technology. Perceived Barriers tackles the expected challenges or obstacles in the employment of blockchain technology. Furthermore, as we know from the literature review since all these constructs have a major influence on Behavioral Intention and on our research question, we will have an in-depth analysis of these three sub-themes by looking at three different interviews:

5.6.1 Adoption Plan:

Quoted responses:

- “So many times we're talking about trying to bring the new blockchain use case to business lines... it really boils down to the business decision.”

- “What is the initial investment that we need? Do we need a new infrastructure? Do we need to train our staff?”

- “I think that we were experimenting with closed or permissioned blockchains for our internal needs... probably we would be experimenting with the same concepts used on the higher level, but with open or permissionless blockchains, we will follow the flow.”

- "If we want to benefit from blockchain technology, we should design it as permissionless, because only then will we have a real democratic solution that everybody may enjoy."
- "If we find a platform that becomes the standard for the market and aligns with our area's typical common international standard or platform for security settlement, we would adopt and connect to it."

- "As the blockchain market consolidates, it is crucial for us to pick the right partner in this area. Once we identify the right platform, we will adopt and integrate it."

- "First of all, if you use the technology it needs to be standardized, so this is interchangeable between different banks... you would have to make like a blockchain standard for banking business so that all banks are using the same standard."

- "That doesn't mean that things will not change because I learned that there will be additional budget allocated to this area."

- "So if we are really talking only about blockchain technology, then it would be adapted if it is a cheaper solution to something we have to solve. Maybe buy a product from a company, So a company builds software, building a blockchain, maybe a permissioned blockchain and to say OK for your application in the bank. you can do the same as you do now, here is our product and it saves you 10 million a year with blockchain technology. Yeah, this would be an argument, yeah."

- "The second thing when we are now not internally but talking about clients if people are asking for access to cryptocurrencies, for example, or tokens, digital assets. Then finally, the bank will react to that. So there are two things. When people, especially the younger generation, put more pressure, the bank would respond to meet the demand. Additionally, if other banks start offering crypto assets, it would compel the bank to consider providing access through a broker system or developing their own infrastructure."

Interpretation an elaboration:

These statements shed light on the considerations, strategies, and factors that institutions take into account when deciding to adopt blockchain within their operations.

One common theme that emerges from these quotations is the importance of business decisions in pushing blockchain adoption. Financial institutions recognize the need to identify specific areas where blockchain can bring value and align it with their overall business objectives. This underscores the importance of strategic decision-making in the adoption process. Institutions need to assess the potential benefits and evaluate how blockchain can enhance their existing processes and services. Another critical point raised in the responses is the evaluation of the early investments necessary for blockchain adoption. Institutions consider factors such as the need for new infrastructure and the training of staff to effectively integrate blockchain technology. This demonstrates the recognition that successful adoption requires not only financial resources but also the necessary expertise to navigate the complexities of blockchain implementation.

Moreover, the references to experimentation with closed or permissioned blockchains for internal needs indicate a cautious approach to adoption. Before considering widespread deployment, financial institutions are more likely to begin with smaller-scale installations to test the technology and gather important expertise. This iterative approach allows them to evaluate the feasibility, efficiency, and effectiveness of blockchain within their specific organizational context. Furthermore, the notion of designing blockchain as permissionless reflects a belief in the democratic potential of the technology. Institutions emphasize the importance of accessibility and inclusivity for all stakeholders, advocating for open and permissionless blockchain solutions that can be freely accessed and utilized. Additionally, standardization emerges as a recurrent theme within the quotes, underscoring the need for interoperability and compatibility between different banks when adopting blockchain. Financial institutions recognize the importance of establishing industry-wide blockchain standards to ensure seamless integration and collaboration among stakeholders. This emphasizes the demand for a uniform strategy that supports successful collaboration and the widespread implementation of blockchain technology.

The allocation of budgets specifically dedicated to the blockchain area demonstrates the institutions' commitment to exploring and implementing blockchain solutions. This indicates their recognition of the potential benefits and the willingness to invest resources in research, development, and infrastructure required for successful adoption.Additionally, the quotes draw attention to the influence of market trends and client demands on adoption decisions. Financial institutions are responsive to market consolidation and the emergence of other banks offering crypto assets. They consider meeting the demands of the younger generation and view the provision of access to cryptocurrencies or the development of their own infrastructure as potential competitive advantages.

These criteria are consistent with prior blockchain adoption studies, highlighting the need of educated decision-making, technological preparedness, and a proactive response to market dynamics. Understanding these adoption plans contributes to our knowledge of how financial institutions navigate the complexities of adopting blockchain and paves the way for future research in this field.

5.6.2 Anticipated Benefits:

Quoted responses:

- “Can we make money with this or can we reduce costs with this?”
- “We just ran a pilot on tokenization and custody... we do believe there is a big potential in stablecoins.”
- “We've tried Marco Polo, this trade finance thing, and we also did some pilots in the past.”
- “Blockchain technology has a lot of features that could potentially change the paradigm of providing services... it's a very interesting technology with the potential to completely change the way we operate.”
- “We have to make money and have a business case for blockchain adoption.”

- "Settlement with security tokens in commercial bank money is good, but we also see potential in wholesale central bank digital currency (CBDC) as a digital Euro."

Interpretation and elaboration:

These statements highlight the potential advantages that financial institutions envision in integrating blockchain into their operations.

The emphasis on financial advantages and expense reduction is a recurring topic in these statements. Financial institutions recognize the potential of blockchain to generate revenue or reduce operational costs. The quotes reflect the institutions' interest in exploring how blockchain can be leveraged to enhance financial outcomes and improve overall efficiency.

The mention of running a pilot on tokenization and custody demonstrates the institutions' belief in the significant potential of blockchain-based solutions, particularly in the context of stablecoins. This indicates their exploration of blockchain's ability to transform traditional financial instruments and processes, such as asset tokenization and secure custody, which can lead to improved liquidity, transparency, and operational effectiveness. Moreover, the reference to participation in trade finance initiatives like Marco Polo indicates the institutions' proactive engagement with blockchain technology. By conducting pilots and exploring the possibilities within trade finance, they recognize the potential benefits of blockchain in streamlining complex transactions, reducing administrative burdens, and enhancing trust between parties.

Furthermore, Financial institutions acknowledge that blockchain has the potential to reshape the paradigm of providing financial services. This acknowledgment highlights blockchain's disruptive character and its ability to drastically transform existing company models, operational procedures, and consumer experiences. Furthermore, Financial institutions emphasize the need to establish a solid business case for blockchain adoption. They recognize that the integration of blockchain technology should align with their strategic objectives and contribute to financial sustainability. This emphasizes the

significance of assessing the viability and value proposition of blockchain technologies in the context of their individual business setting. Additionally, the quotes reflect the institutions' recognition of the potential benefits associated with settlement using security tokens and the exploration of wholesale central bank digital currency (CBDC) as a digital Euro. These statements indicate the institutions' awareness of the transformative potential of blockchain in facilitating secure and efficient settlement processes, both within the realm of commercial bank money and the emerging landscape of CBDCs.

The analysis of the provided quotes reveals the anticipated benefits that financial institutions associate with the adoption of blockchain technology. These include financial gains, cost reduction, the potential to transform traditional financial instruments and processes, the ability to reshape business models, and the exploration of new settlement possibilities. Understanding these anticipated benefits contributes to our knowledge of the motivations and expectations driving the adoption of blockchain in the financial sector. It also underscores the transformative potential of blockchain technology in revolutionizing the way financial services are provided, enhancing operational efficiency, and delivering value to both institutions and customers.

5.6.3 Perceived Barriers:

Quoted Responses:

- “We just don't know how stablecoins will be used... trying to figure out the killer use case for stablecoins.”

- “Apart from that, we are also part of many working groups for stablecoins.”

- “There is no definitive answer if blockchain is the technology that banks will follow... creating unity would benefit us far more than being separate, but we are driven by our own prejudices and agendas.”

- “Clear regulations, such as the DLT pilot regime, are needed for our adoption of blockchain.”

- "I think you need some kind of a central bank currency token. But the ECB is working on that one. But they are currently focusing on the retail, but they're going in the direction of wholesale now."

- "Regulations were a very big influence on that. The stricter a government is or the stricter regulations are, the harder it would be to implement it into any new technology, into the banking industry."

- "And yes, finally, I mean I haven't talked about that, but budget is a very important question because if it's very expensive, then many banks are just saying, 'OK, I cannot afford that.'... So all these are certainly important factors for that."

- "There are blockchains that are used, but there is no standardization. And the point is, who says this is now our standard? Yeah. And if you think in terms of the European Union, then the only way they can do it is simply to spin up their own blockchain. And this is the standard now, we are the standard."

- "Since Corona and the dump of the cryptocurrency prices, the interest has now really decreased."

Interpretation and elaboration:

These statements reflect the challenges and considerations that institutions face when considering the implementation of blockchain solutions.

One notable barrier highlighted in the quotes is the uncertainty surrounding the use cases and practical applications of stablecoins. Financial institutions acknowledge the need to identify the "killer use case" that can demonstrate the value and effectiveness of stablecoins. This uncertainty underscores the importance of understanding the potential benefits and risks associated with stablecoins before widespread adoption.

The involvement in working groups dedicated to stablecoins indicates that financial institutions are actively seeking collaboration and industry-wide cooperation to address

the challenges and ambiguities surrounding stablecoin adoption. This highlights their recognition that addressing barriers requires collective efforts and shared expertise. Another barrier mentioned is the lack of consensus regarding whether blockchain is the technology that banks should follow. Institutions recognize the need for unity and alignment in adopting blockchain solutions but acknowledge the influence of personal biases and individual agendas that can hinder collective progress. Overcoming this obstacle requires stakeholder participation, open conversation, and a shared vision. Furthermore, clear regulations, such as the Distributed Ledger Technology (DLT) pilot regime, are perceived as crucial for facilitating the adoption of blockchain. Financial institutions emphasize the need for regulatory frameworks that provide clarity, address potential risks, and ensure compliance with legal and regulatory requirements. Clear standards can assist ease compliance, security, and privacy problems.

The mention of central bank currency tokens and the ongoing work of the European Central Bank (ECB) reveals the institutions' recognition of the potential of central bank digital currencies (CBDCs). However, the focus on retail implementation and the shift towards wholesale adoption indicate the complexities and challenges associated with CBDCs' development and integration within the banking industry. Additionally, regulations play a significant role in influencing blockchain adoption. Financial institutions acknowledge that stricter regulations can pose challenges in implementing new technologies within the banking industry. Balancing regulatory compliance with innovation requires careful consideration and cooperation between financial institutions and regulatory bodies. Moreover, budget considerations also emerge as an important factor influencing blockchain adoption. Financial institutions know that implementation costs might be high, with some institutions unable to make the necessary expenditures. Budget constraints highlight the need for assessing the cost-effectiveness and potential return on investment associated with blockchain adoption. A further obstacle is the absence of standards between blockchains. Financial institutions emphasize the importance of establishing common standards to ensure interoperability and seamless integration of blockchain systems. The absence of clear standards poses challenges in selecting appropriate blockchain solutions and achieving industry-wide compatibility. Lastly, the impact of external factors such as the COVID-19 pandemic and fluctuations in cryptocurrency prices is noted. The interest in blockchain adoption may decrease temporarily as institutions focus on navigating the broader challenges posed by the pandemic and mar-

ket conditions. These external factors can influence the prioritization of blockchain initiatives and resource allocation within financial institutions.

These barriers include uncertainty regarding stablecoin use cases, the need for regulatory clarity, the influence of personal biases and agendas, budget constraints, the lack of standardization, and the impact of external factors. Understanding and addressing these barriers are crucial for financial institutions to successfully navigate the adoption of blockchain technology. Collaboration, regulatory cooperation, industry-wide standards, and careful cost-benefit analysis are essential in overcoming these challenges and unlocking the transformative potential of blockchain in the financial sector.

5.7 Summary and Visualization of Findings

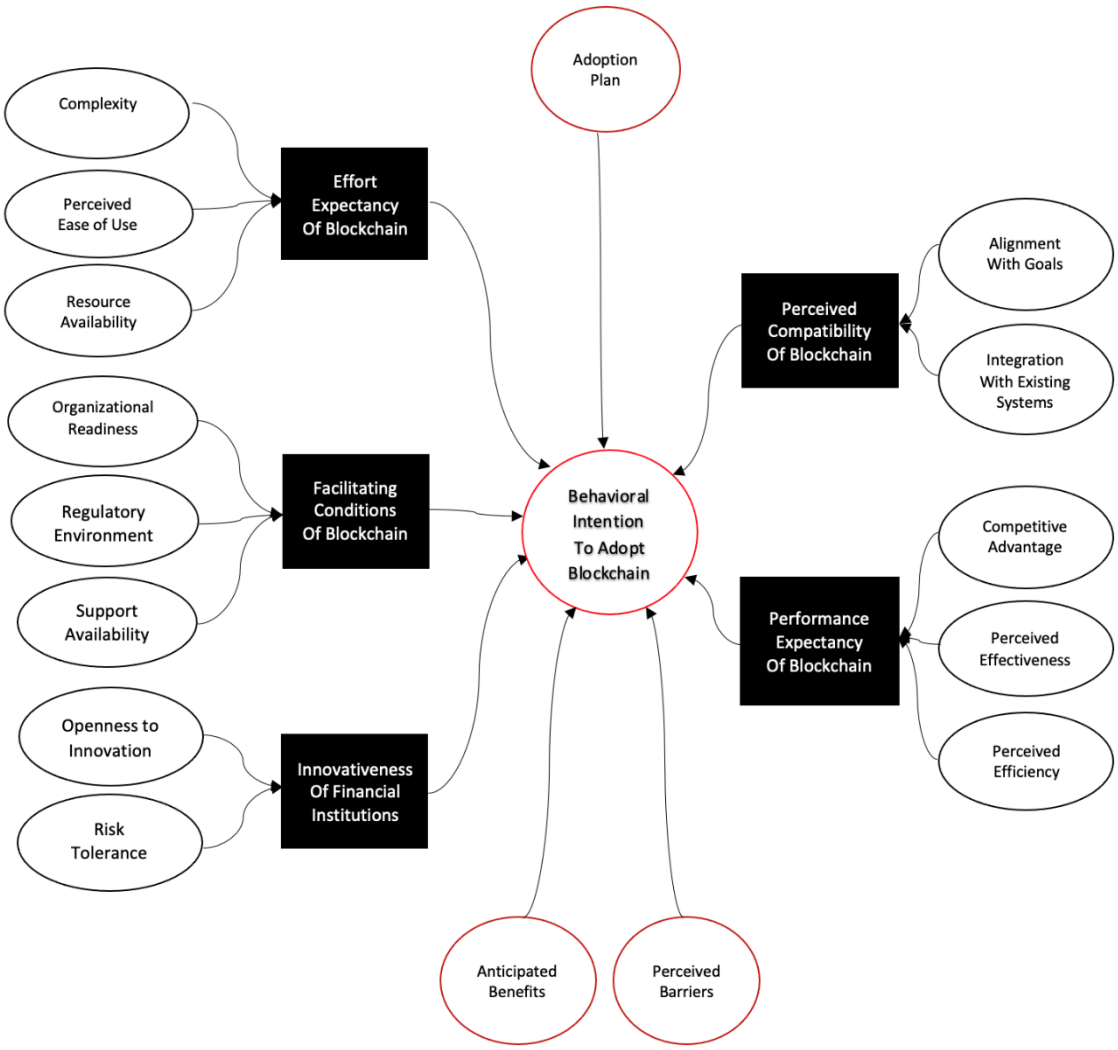

Figure 3 Visualization of the findingds (By Author)

The findings of the study illuminate the intricate interrelationships among the different themes and sub-themes pertaining to blockchain adoption within financial institutions. The theme of Performance Expectancy, encompassing Perceived Effectiveness and Perceived Efficiency, underscores the belief among financial institutions that blockchain technology is an effective and efficient solution that can provide them with a competitive edge in the market. On the other hand, the effort expectancy theme, which includes perceived ease of use, complexity, and resource availability, emphasizes the elements that affect how easy it is for businesses to integrate blockchain into their operations.

The Facilitating Conditions theme, which includes Organizational Readiness, Regulatory Environment, and Support Availability, emphasizes the pivotal role these factors play in facilitating the successful integration of blockchain technology. Financial institutions acknowledge the need of ensuring that their businesses are appropriately equipped for blockchain adoption by having the requisite in-house skills and infrastructure. Moreover, they acknowledge the impact of regulatory frameworks on the adoption of blockchain and actively seek external technical support to ensure a smooth implementation process.

The Innovativeness theme, consisting of Openness to Innovation and Risk Tolerance, explores the mindset of financial institutions toward embracing novel technologies. Financial institutions exhibit a willingness to explore innovative solutions, with larger banks and wealth management institutions demonstrating heightened interest in adopting blockchain. Risk tolerance varies across institutions, with some displaying a more cautious approach while others are more open to embracing the potential risks associated with new technologies.

Perceived Compatibility, which includes Alignment with Goals and Integration with Existing Systems, delves into the extent to which blockchain aligns with the strategic objectives of financial institutions and the ease of integrating it into their existing systems. Financial institutions meticulously evaluate the compatibility of blockchain with their goals and consider its potential to enhance their existing processes and services. They also recognize the importance of seamless integration with their current systems to avoid any disruption to their operations.

Lastly, the Behavioral Intention theme encompasses Adoption Plan, Anticipated Benefits, and Perceived Barriers. Financial institutions develop well-thought-out adoption plans based on their strategic considerations, identifying specific areas where blockchain can bring value to their operations. They anticipate various benefits from adopting blockchain, such as financial gains and cost reduction, while being cognizant of potential barriers such as regulatory uncertainties, budget constraints, and the need for clear industry-wide standards.

Comprehending these complex relationships is paramount for financial institutions in formulating comprehensive strategies for successful blockchain adoption. It enables them to effectively address the challenges and capitalize on the opportunities associated with implementing blockchain technology within their organizations.

6 DISCUSSION:

6.1 The UTAUT Model and Blockchain Adoption:

The UTAUT model provided a solid framework for this study, facilitating an in-depth understanding of the variables influencing the adoption of blockchain technology in the financial sector in Vienna. One of the significant findings was the role of performance expectancy in blockchain adoption. The data suggested that the potential benefits associated with blockchain technology, such as increased efficiency and improved service delivery, strongly encouraged its acceptance (Venkatesh et al., 2003). It emphasizes how heavily financial organizations focus on the possible operational advantages brought forth by blockchain. These findings align with the UTAUT model, where performance expectancy is a crucial determinant of technology acceptance and use (Alalwan et al., 2017). Furthermore, effort expectancy, which involves the perceived ease of use and the inherent complexity of blockchain technology, surfaced as another critical factor. However, it appears to be more of a barrier to blockchain adoption in Vienna compared to other regions, possibly due to the limited technical understanding and resource availability among Vienna's financial institutions (S. Singh & Srivastava, 2018). This research demonstrates how the effects of the UTAUT model's constructs may change depending on the circumstances.

Furthermore, Facilitating conditions, which refer to the degree to which an individual believes that an organizational and technical infrastructure exists to support technology use, were found to significantly influence the adoption of blockchain technology (Yu, 2012). These conditions include factors such as the availability of expertise within the organization, necessary infrastructural investments, regulatory requirements, and the availability of external technical support (Yusof, Jing, et al., 2018). It corroborates the applicability of the UTAUT model in investigating the adoption of blockchain technology.

The insights generated through the application of the UTAUT model have deepened our understanding of the specific factors influencing blockchain adoption within Vienna's

financial sector. By shedding light on the key constructs of performance expectancy, effort expectancy, and facilitating conditions.

Furthermore, below you can find a refined extended UTAUT model that is specifically addressing blockchain technology, based on the findings.

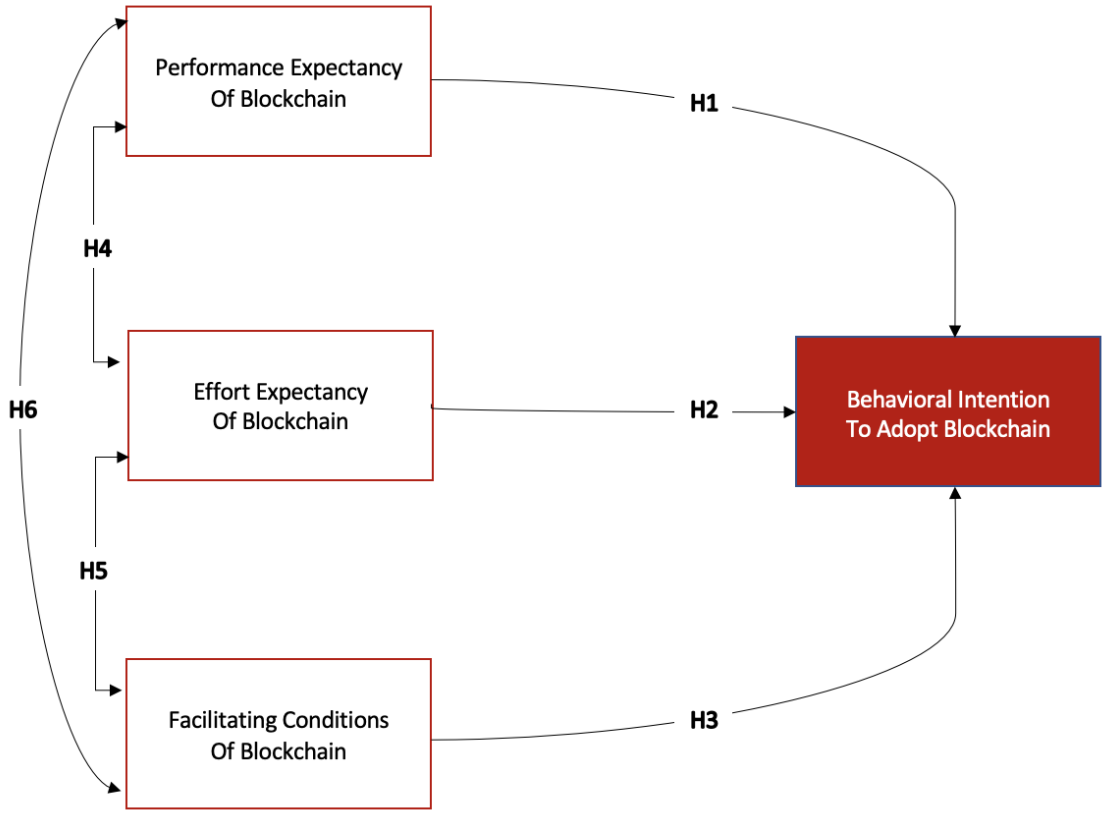

FIGURE 4 REFINED EXTENDED UTAUT MODEL (BY AUTHOR)

Based on the extended model above:

H1: Performance Expectancy affects Behavioral Intention positively

The relationship between "Performance Expectancy" and "Behavioral Intention" is positive and strong. When financial institutions perceive high performance expectancy, meaning they believe that adopting blockchain technology will bring significant benefits and improvements, it enhances their intention to adopt and use the technology. The positive expectations of improved efficiency, service delivery, and competitive advantage act as motivators for adoption.

H2: Effort Expectancy affects Behavioral Intention negatively

The relationship between "Effort Expectancy" and "Behavioral Intention" is negative. When financial institutions perceive high effort expectancy, indicating that blockchain technology is perceived as complex and difficult to use, it may act as a barrier to adoption. The higher the perceived complexity and effort required, the lower the intention to adopt blockchain technology. Limited technical understanding and resource availability in specific contexts, such as Vienna's financial sector, may exacerbate this barrier.

H3: Facilitating Conditions affects Behavioral Intention positively

The relationship between "Facilitating Conditions" and "Behavioral Intention" is positive and significant. When financial institutions perceive favorable facilitating conditions, such as the availability of expertise, necessary infrastructure investments, regulatory support, and external technical assistance, it strengthens their intention to adopt blockchain technology. The presence of these conducive conditions provides the necessary support and resources, making the adoption process more feasible and encouraging.

H4: Performance Expectancy and Effort Expectancy are inversely related

When financial institutions perceive higher performance expectancy, it generally leads to a decrease in the perceived effort required for adopting blockchain technology. In other words, when the potential benefits and positive outcomes of using blockchain are perceived as significant, the perceived complexity and effort associated with its adoption tend to diminish. This association suggests that the perceived benefits of blockchain technology can help to alleviate worries about its complexity and effort.

H5: Effort Expectancy and Facilitating Conditions have a positive relationship

When financial institutions perceive higher performance expectancy, it strengthens the perception that the necessary facilitating conditions exist to support the adoption of blockchain technology. The belief in the potential benefits and improvements offered by blockchain enhances the confidence in the presence of the required organizational and technical infrastructure, expertise, and external support.

H6: Effort Expectancy and Facilitating Conditions have a positive relationship
When financial institutions perceive lower effort expectancy, indicating that blockchain technology is perceived as easy to use and less complex, it reinforces the belief that facilitating conditions are favorable. The perception of ease of use and reduced complexity aligns with the presence of supporting factors such as expertise, infrastructure, and assistance, making the adoption process more feasible and encouraging.

Overall, the relationships among these constructs in the extended UTAUT model shape the behavioral intention to adopt blockchain technology in the financial sector. The perceived benefits and improvements associated with blockchain technology (performance expectancy) positively influence the intention to adopt. However, the perceived complexity and effort required (effort expectancy) may act as barriers to adoption. The availability of facilitating conditions, such as expertise, infrastructure, and support, increases the likelihood of adoption. Furthermore, the positive relationship between performance expectancy and facilitating conditions suggests that when the potential benefits of blockchain are recognized, it reinforces the belief that the necessary conditions for adoption are in place. Furthermore, the positive association between effort expectancy and facilitating conditions suggests that when blockchain technology is seen as less complicated and effortful, the perception of favorable facilitating conditions improves. These relationships highlight the interconnectedness of the constructs and their influence on the adoption of blockchain technology in the financial sector.

6.2 Innovativeness and Perceived Compatibility in Blockchain Adoption

The study also investigated the role of innovativeness and perceived compatibility in the adoption of blockchain technology, expanding on the traditional UTAUT model (Venkatesh et al., 2003). In other words, innovativeness refers to how willing financial institutions to adopt new processes and technology such as blockchain. The findings showed a varied range of attitudes toward innovation among Vienna's financial institutions. Some appeared more risk-averse, preferring to wait until technologies are proven before implementing them, similar to the observations by (Patil et al., 2020). In contrast, others displayed a greater willingness to embrace new technologies and were more actively engaged in proof of concept activities, similar to the the insights by (San Martín

& Herrero, 2012). These insights suggest that a higher degree of innovativeness correlates with a greater propensity to adopt blockchain technology, confirming the relevance of this construct in the extended UTAUT model.

Perceived compatibility is another critical construct that was examined, referring to the degree to which blockchain technology aligns with existing systems and goals within a financial institution. The results align with the findings by (Marinković et al., 2020), showing that perceived compatibility is a significant factor influencing blockchain adoption. Institutions that viewed blockchain technology as being compatible with their existing systems and strategic goals were more likely to adopt the technology. This mirrors the emphasis by (Faqih, 2016) on the role of perceived compatibility in influencing adoption of new technologies. This highlights the need of enterprises considering how to smoothly integrate blockchain technology into their present processes, hence increasing its perceived compatibility.

Furthermore, by investigating these constructs, the study has not only expanded the UTAUT model but has also filled a gap in research, addressing the second objective of this thesis (Venkatesh et al., 2003). These findings demonstrate that the factors influencing blockchain adoption extend beyond the traditional UTAUT model and involve broader organizational characteristics, such as innovativeness and perceived compatibility.

6.3 Identifying Limitations and Obstacles to Blockchain Adoption

The research undertook the task of pinpointing specific hurdles that financial institutions, specifically banks, in Vienna face when it comes to adopting blockchain technology. Uncovering these barriers is critical to understanding what is holding back or slowing down blockchain adoption, thereby achieving the third objective of this thesis.

There was a strong consensus among the interviewees that the lack of standardization and the complexities associated with regulatory compliance are major obstacles in blockchain adoption. Furthermore, it was clear that there were serious worries about possible conflicts with privacy rights, implying that the institutions are taking a careful approach to controlling the risks connected with innovation.

Another factor that emerged was the existing ecosystem and inertia within financial institutions. The natural aversion to change inside current systems seems to be a significant impediment to the adoption of new technologies such as blockchain. Transitioning from a known, efficient system to a new paradigm takes substantial work and resources, which some institutions may be unwilling or unable to contribute.

Internally, limited awareness and understanding of blockchain technology were also highlighted as hindrances. Furthermore, there is a lack of understanding and expertise owing to a lack of resources committed to education and training, which might be an impediment to adoption.

6.4 Implications for practitioners

This study's results hold considerable implications for practitioners within the banking sector, providing vital insights into the incorporation of blockchain technology grounded in the UTAUT model. The delineated primary and secondary themes illuminate key factors that practitioners must contemplate when implementing blockchain solutions in their organizations.

The findings within Performance Expectancy underscore the potential advantages of blockchain technology, such as enhanced operational efficiency and effectiveness. Practitioners should rigorously assess how blockchain can bolster their extant processes and services, leading to cost savings, streamlined operations, and improved customer experiences. Understanding the specific efficiency and effectiveness gains that can be realized through blockchain implementation can steer practitioners in pinpointing the most suitable areas for deployment and justifying the investment in blockchain technology.

The insights within Effort Expectancy underscore the importance of user experience and the perceived ease of use of blockchain systems. Practitioners should focus on making sure that blockchain solutions are easy to comprehend and simple to use. Simplicity in user interactions and minimizing complexity in system architecture and processes are crucial considerations. Furthermore, practitioners need to evaluate the availability of

resources, such as skilled personnel and technical infrastructure, to support the successful deployment and maintenance of blockchain technology within their organizations.

The conclusions within Facilitating Conditions highlight the critical factors that enable blockchain adoption. Practitioners must evaluate their organizations' preparedness in terms of technology capability, organizational culture, and change management methods. It is crucial to establish a supportive regulatory environment that provides clarity and addresses potential legal and compliance issues. Collaborating with regulatory bodies and industry peers can help mold favorable regulatory frameworks. Additionally, practitioners should ensure the availability of necessary support mechanisms, such as training programs and expert guidance, to aid employees in adapting to blockchain technology and surmounting implementation hurdles.

The theme of Innovativeness underscores the need for practitioners to foster an innovative culture and promote risk tolerance within their organizations. Encouraging employees to welcome innovation and taking acceptable risks may assist in blockchain technology adoption. Practitioners should generate an environment that encourages experimentation, rewards creativity, and supports continuous learning. This can involve providing dedicated resources for research and development, incentivizing innovative ideas, and fostering cross-functional collaboration.

The insights within Perceived Compatibility underscore the importance of aligning blockchain initiatives with the organization's strategic objectives and integrating them with existing systems. Practitioners should carefully evaluate how blockchain technology aligns with their long-term vision and objectives. They must determine whether blockchain solutions are compatible with their existing infrastructure, data systems, and procedures. Integrating blockchain with legacy systems can present technical challenges, and practitioners should plan for a smooth transition and consider necessary system upgrades or integrations.

The conclusions related to Behavioral Intention offer practical insights for practitioners in planning and implementing blockchain projects. Understanding adoption plans helps practitioners in defining clear objectives, identifying use cases, and developing an adoption roadmap. Anticipating the benefits of blockchain technology, such as cost reduc-

tion, improved security, and enhanced customer trust, can inform decision-making and aid in prioritizing initiatives. Furthermore, practitioners should address perceived barriers such as regulatory concerns, security risks, and lack of standardization, by actively liaising with regulatory bodies, investing in robust security measures, and collaborating with industry partners to establish common standards.

The results of this study equip practitioners in the banking industry with actionable insights to steer their blockchain adoption initiatives. By considering the performance expectancy, effort expectancy, facilitating conditions, innovativeness, perceived compatibility, and behavioral intentions outlined in the study, practitioners can make informed decisions, develop effective implementation strategies, and realize the potential benefits of blockchain technology.

6.5 Implications for Academics

This study's conclusions bear significant implications for academia, providing critical insights into the adoption of blockchain technology within the banking sector based on the UTAUT model. The primary and secondary themes identified illuminate the factors shaping the acceptance and application of blockchain technology, proffering opportunities for more comprehensive research and exploration.

In terms of Performance Expectancy, the secondary themes of perceived efficiency and perceived effectiveness underline the importance of discerning how blockchain technology can augment operational efficiency and effectiveness in banking processes. This offers academics the opportunity to further investigate the specific mechanisms through which blockchain can yield these enhancements, and to pinpoint best practices for its execution.

Moreover, the secondary theme of competitive advantage underscores the need for academics to probe the ways in which blockchain implementation can provide banks with a competitive edge. This entails exploring how blockchain can foster differentiation, innovation, and improved customer experiences, resulting in superior market positioning.

Another critical area suitable for academic investigation is Effort Expectancy. The secondary themes of perceived ease of use, complexity, and resource availability accentuate the need to comprehend the user experience and the challenges correlated with implementing blockchain technology. Researchers can delve into the design and usability facets of blockchain systems, identify strategies to streamline complex processes, and scrutinize the availability of necessary resources, such as skilled personnel and technical infrastructure, for successful adoption.

Facilitating Conditions present significant opportunities for academic research. The secondary themes of organizational readiness, regulatory environment, and support availability emphasize the importance of organizational preparedness, regulatory frameworks, and supportive infrastructure in facilitating blockchain adoption. Academics can examine the readiness of banks in terms of technological capabilities, organizational culture, and change management processes. Additionally, they can explore the regulatory landscape and discern the requirements and challenges associated with compliance. Studying the availability of support mechanisms, such as training programs and expert guidance, can yield insights into surmounting implementation obstacles.

The theme of Innovativeness offers academics the opportunity to scrutinize the cultural and organizational factors that foster innovation and risk tolerance. Developing measures to encourage the use of blockchain technology can benefit from an understanding of how firms foster an innovative culture and encourage risk-taking behaviors. Researchers can investigate the role of leadership, organizational structure, and incentives in driving innovation and risk-taking behaviors within banking institutions.

It is important to pay more academic attention to the key feature of Perceived Compatibility. The secondary themes of alignment with goals and integration with existing systems underscore the need to examine how blockchain technology aligns with banks' strategic objectives and integrates with their existing infrastructure. Researchers can investigate the challenges and opportunities of aligning blockchain initiatives with organizational goals and the technical complexities of integrating blockchain with legacy systems.

The findings related to Behavioral Intention underscore the importance of understanding adoption plans, anticipated benefits, and perceived barriers. Academics can delve into the decision-making processes, implementation strategies, and considerations influencing the intention to adopt blockchain technology in the banking industry. Further research can investigate the specific benefits expected from blockchain adoption and how these align with financial institutions' objectives. Furthermore, academics may investigate anticipated impediments and challenges to blockchain adoption, such as regulatory concerns, security concerns, and a lack of standards, and offer appropriate mitigation techniques.

These findings furnish academics with valuable insights and directions for further research into blockchain adoption in the banking industry. The identified themes and subthemes offer a comprehensive understanding of the factors influencing technology acceptance and usage, enabling scholars to delve deeper into specific aspects, develop theoretical frameworks, and propose practical recommendations for both academia and industry stakeholders.

6.6 Recommendations for Integration and Facilitation of Blockchain Technology

In line with the fourth objective of this research, the study aimed to offer recommendations for stakeholders, policymakers, and financial institutions on integrating and facilitating blockchain technology into their existing operations.

Firstly, it is evident from the findings that fostering a more supportive regulatory environment could encourage blockchain innovation. Policymakers are recommended to establish clear regulatory frameworks that align with the evolving technological landscape, balancing the need for innovation with consumer protection and financial stability.

For financial institutions, the focus should be on investing in infrastructure and training that would better accommodate blockchain technology. The results showed that the lack of internal awareness and education about blockchain technology is a significant barrier.

Hence, providing relevant training to employees is crucial to increasing the level of blockchain understanding within the institution, thereby facilitating its adoption.

The role of innovativeness was also underscored in the findings. As a result, it is suggested that institutions establish an organizational culture that supports innovation and openness to emerging technology. A company that welcomes blockchain and actively participates in proof-of-concept initiatives may be able to manage the shift more successfully. Furthermore, the study found that perceived compatibility plays a vital role in the adoption of blockchain technology. Financial institutions should thus work on improving the compatibility of blockchain with existing systems. This could potentially be achieved by starting with trialing blockchain in non-critical operations before wider adoption, gradually integrating the technology into their systems and processes. Lastly, there are additional considerations stakeholders, policymakers, and financial institutions can take into account to further promote the adoption and integration of blockchain technology:

- **Emphasizing Collaboration:**
  Collaborations can speed up the adoption rate of blockchain technology. This is can be done through forming partnerships with technology companies, such as fintech companies and companies with high levels of knowledge in blockchain

- **Promoting Standardization:**
  It would be useful to develop industry-wide blockchain technology standards as it would ensure the interoperability of the blockchain systems and make it easier to integrate it into the present IT infrastructure Policymakers can also accomplish this by working with academia and businesses to create these standards.

- **Establishing a Regulatory Sandbox:**

Innovation can be facilitated by establishing a "regulatory sandbox" which would allow financial institutions to experiment freely in a controlled and safe environment without the risk of widespread system failure

- **Investing in Research & Development (R&D):**

To keep up with the latest advancements in blockchain technology, financial institutions require continuous investment in R&D, which gives them the possibility for innovation through effective and safe means

- **Educating Consumers:**

Consumers need to be made aware and educated on the possible dangers and benefits of blockchain technology. As a result, people would be able to trust and adopt blockchain-based financial services more widely.

- **Evaluating Risk Management Strategies:**

Every time a new technology is introduced, appropriate countermeasures must be put in place. Thus, it is of great importance for management strategies to evaluate and take risk into consideration

- **Considering Ethical Implications:**

Ethical considerations by financial institutions are vital for their adoption strategies and since blockchain technology has a great influence on privacy and data, it is essential to balance between gains from efficiency and the protection of consumer data

- **Leveraging Central Bank Digital Currencies (CBDCs):**

Transactions can be streamlined and service delivery can be improved by leveraging CBDCs.. Additionally, by incorporating these recommendations, financial institutions, stakeholders, and policymakers could potentially further expedite the adoption and integration of blockchain technology in the financial sector in Vienna

6.7 Suggested Future Research Directions:

The findings of this study have laid a foundation for understanding the factors influencing the adoption of blockchain technology in Vienna's financial sector. Furthermore, taking into consideration how complex this topic can be and how fast technology morphs and changes, it is important to dive deeper into this area and explore. Below are several areas worth exploring for future research.

- Extended Application of UTAUT Model: While the extended UTAUT model has proven effective in this study, future research could focus on applying the model to different types of financial institutions beyond banking. This is can involve the brokerage firms, fintechs and insurance. An understanding of the similarities and differences in adoption factors across these sectors would provide a more comprehensive view.

- Cross-cultural Adoption Patterns: Given the specific geographical focus of Vienna in this study, the research could benefit from exploring cross-cultural variations. Comparing the factors influencing blockchain adoption in different countries would enrich our understanding of how cultural, socio-economic, and regulatory variations affect the adoption process.

- Impact of Evolving Regulatory Landscape: As highlighted in this study, regulatory issues were a significant concern in the adoption of blockchain. Given the rapidly changing regulatory landscape around blockchain globally, future studies could focus on how evolving regulations influence blockchain adoption.

- Case Study Exploration: In-depth case studies could provide valuable insights into the practical challenges, strategies, and outcomes of blockchain technology adoption in financial institutions. Future studies could go into these unique experiences to offer helpful advice to other organizations thinking about using blockchain technology.

- Consumer Perspective of Blockchain Adoption: This study focused on the financial institutions' perspective. Future studies might change their focus to look into the consumer side. How does the adoption of blockchain-based services affect consum-

er trust, behavior, and satisfaction? These findings may provide institutions with a better understanding of their clients' expectations and demands.

- Interaction Between Blockchain Technology and Other New Technologies: Blockchain is frequently discussed alongside other emerging technologies such as AI, IoT, and cloud computing. Future research could explore how the integration of these technologies with blockchain influences its adoption and the potential synergistic effects.

By delving into these areas, future research could further enrich our understanding of the complexities surrounding the adoption of blockchain technology in the financial sector, shedding light on unexplored aspects and addressing existing limitations in our understanding

7 CONCLUSION:

The main findings from this study highlights several key points. Firstly, performance expectancy, which relates to the potential benefits of blockchain technology, has emerged as a significant factor influencing its adoption. Financial institutions in Vienna recognize the operational improvements that blockchain can bring, including increased efficiency and improved service delivery. Additionally, effort expectancy, which considers the perceived ease of use and complexity of blockchain, has been identified as a barrier to adoption, particularly in Vienna where technical understanding and resource availability among financial institutions may be limited.

The extended UTAUT model has proven effective in this research, shedding light on the role of innovativeness and perceived compatibility. The varying attitudes towards innovation among financial institutions in Vienna were evident, with some displaying a risk-averse approach and others actively engaging in proof of concept activities. Institutions that perceived blockchain as compatible with their existing systems and strategic goals were more likely to adopt the technology. These findings highlight the significance of company culture, objective alignment, and the requirement for seamless integration when using blockchain technology.

The contribution of these studies to the field of blockchain technology adoption in the banking sector is substantial. They provide empirical evidence of the factors influencing adoption, extending the UTAUT model by incorporating innovativeness and perceived compatibility. The findings highlight the specific challenges and considerations faced by financial institutions in Vienna, serving as a basis for future research in similar contexts. On the other hand, from a policy and practical point of view, the gained insights from this study could potentially help financial institutions, update their decision making processes and develop blockchain-based solutions that align with their strategic objectives.

The emphasis on fostering an innovative organizational culture, investing in infrastructure and training, and considering compatibility with existing systems can guide practi-

cal implementation strategies. Furthermore, policymakers can utilize these findings to shape the regulatory framework surrounding blockchain technology in the banking sector. Clear regulatory frameworks that balance innovation, consumer protection, and financial stability can encourage blockchain adoption while ensuring compliance. Establishing regulatory sandboxes and promoting collaboration can provide a safe environment for experimentation and facilitate industry-wide standardization.

The study has significantly contributed to the understanding of blockchain technology adoption in the Vienna financial industry. The findings underscore the importance of performance expectancy, effort expectancy, innovativeness, and perceived compatibility in the adoption process. The practical implications of these findings can guide financial institutions and policymakers in leveraging blockchain technology to enhance operational efficiency and service delivery while addressing the challenges and considerations specific to their context.

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APPENDICES

Appendices contain material that is too large for inclusion in the text or would interrupt the flow of the presentation if it were to be cited in detail. Such texts include the minutes of a meeting, questionnaires, interview outlines and records and the like. References to material in the appendix are indicated by the word appendix and a capital letter beginning with A in the reference sequence in the text. Each appendix begins on a new sheet.

Appendix 1: Information sheet

Title: Factors Influencing the Adoption of Blockchain Technology in the Financial Sector Researcher: Ehab Khizaran

Purpose of the Study: The purpose of this study is to investigate the factors influencing the adoption of blockchain technology in the financial sector in Vienna, Austria.

Participant Eligibility: Participants must meet the following criteria to be eligible to participate in this study:

- Must be at least 18 years of age
- Must have experience or knowledge of the financial sector
- Are currently working at a bank
- Have some knowledge of blockchain technology

Study Procedures: Participants who meet the eligibility criteria will be invited to participate in a 30-60 minute interview with the researcher. The interview will be conducted online using a video conferencing tool, and will be recorded for transcription purposes.

Participants will be asked to describe their background and experience in the financial sector, particularly with regards to blockchain technology. They will also be asked to share their thoughts on the factors influencing the adoption of blockchain technology in the financial sector, and any challenges or limitations they have encountered in their experience with the technology.

Confidentiality: All information collected during the study will be kept confidential and anonymous. Participants' names and any identifying information will not be disclosed in any reports or publications resulting from the study. Furthermore, if necessary, a consent form will be sent and signed by the researcher and the other party.

Participant Rights: Participants have the right to refuse to participate in the study, and may withdraw their consent at any time during the study. Participants also have the right to ask questions about the study or their participation at any time.

Appendix 2: Code Book

Name	Description	Files	References
Behavioral Intention		6	20
Adoption Plan		6	9
Anticipated Benefits		3	5
Perceived Barriers		5	6
Effort Expectancy		8	26
Complexity		3	9
Perceived Ease of Use		5	8
Resource Availability		7	9
Facilitating Conditions		6	18
Organizational Readiness		5	12
Regulatory Environment		1	3
Support Availability		3	3
Innovativeness		7	21
Opennes to Innovation		5	9
Risk Tolerance		6	12
Perceived Compatibility		6	25
Alignment with Goals		6	10
Integration with Existing Systems		6	15
Performance Expectancy		4	23
Competitive Advantage		3	7
Percieved Effectiveness		2	5
Percieved Efficiency		4	11