Gordon Institute of Business Science
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A framework for organisational adoption of blockchain technology in the financial services sector

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ABSTRACT

The financial services sector is riddled with efficiency challenges and high costs resulting from the use of legacy financial systems. A solution for these challenges exists in the form of blockchain technology. However, adoption of blockchain in the financial services sector remains a challenge for several reasons. Key to this is the fact that the technology is still new, and there is a lack of clear information on how management of financial institutions can configure their organisations to prepare them for the adoption of the new technology.

By investigating the technological aspects of blockchain technology; the organisational preparedness for adoption; and the environmental dynamics of financial services; this paper presents a framework for organisational adoption of blockchain technology. This framework will assist organisations to first reconfigure themselves to prepare for technological adoption; and second, align themselves to the requirements of adoption of blockchain technology.

Through in-depth, semi-structured interviews with experts in the global financial services sector, it was found that there is a methodological approach to the adoption of blockchain technology. Blockchain advocates within organisations will be able to conduct an internal introspection into efficiency challenges they face, learn about blockchain technology, build a business case for adoption, reconfigure the organisation, align the organisation, and adopt blockchain to accord the organisation the necessary efficiencies.

KEYWORDS

Blockchain, blockchain adoption, financial services, distributed ledger technologies

DECLARATION

I declare that this research project is my own work. It is submitted in partial fulfilment of the requirements for the degree of Master of Business Administration at the Gordon Institute of Business Science, University of Pretoria. It has not been submitted before for any degree or examination in any other University. I further declare that I have obtained the necessary authorisation and consent to carry out this research.

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CHAPTER 1: INTRODUCTION TO RESEARCH PROBLEM

1.1 Introduction

The global financial system moves 6.6 trillion US Dollars per day (Bank of International Settlements, 2019), amongst billions of people around the world. The financial sector undoubtedly plays an important role in the global economy (Badunenko & Kumbhakar, 2017). Unfortunately, the financial services sector is riddled with challenges that bring it into disrepute (Bartolini, Hilton, & McAndrews, 2010; Bech & Hancock, 2020; Gomber, Kauffman, Parker, & Weber, 2018; Qiu, Zhang, & Gao, 2019; Rella, 2019; A. V. Thakor, 2020b; Zhou, Geng, Abhishek, & Li, 2020). These challenges are, regrettably, leaving financial institutions embattled with consistent systemic inefficiencies that cause them to fail again and again at a fundamental level, with serious consequences (Bryce, Chmura, Webb, Stiebale, & Cheevers, 2019). A solution that can address the inefficiencies of the financial services sector is blockchain technology (Gomber et al., 2018).

While blockchain technology has different uses for different industries, its primary target industry is financial services (Nofer, Gomber, Hinz, & Schiereck, 2017), where strong impacts of the technology are expected (Holotiuk & Moormann, 2018). Every major financial institution is considering application of blockchain in different areas of their business (Beck & Müller-Bloch, 2017). This is especially relevant considering the inefficiencies and high costs that are specific to the financial services sector (Nofer et al., 2017). It becomes quickly apparent that most of the research on blockchain technology is focused on the benefits of the technology to financial institutions. What is lacking in literature is how these institutions can configure and align themselves for adoption of this technology. Accordingly, this research will explore blockchain technology adoption through the Technology-Organisation-Environment framework (Tornatsky & Fleischer, 1990), to gain valuable insights into how organisations prepare themselves for adoption of blockchain technology.

1.2 Description of the problem

Financial institutions provide significant value to the economy (Badunenko & Kumbhakar, 2017). However, the global financial system is rife with challenges of costs, delays, redundancies, and issues of trust (Demirguc-Kunt, Klapper, Singer, Ansar, & Hess, 2018; Tapscott & Tapscott, 2017). As the finance industry is controlled by large financial institutions, they have created systemic inefficiencies that demean customer well-being, diminishing the esteem people once held for the sector (Bostandzic & Weiß, 2018; Gomber et al., 2018). Services such as payment processing are problematic for financial institutions (Qiu et al., 2019; Tapscott & Tapscott, 2017). Admittedly, the financial services sector is a much wider sector than payment processing, but it is mentioned here for its relevance in epitomising intermediation, a key role of the financial sector (Asmundson, 2020; Pitt-Watson, 2015). It becomes clear that the financial services sector has some shortcomings, three of which are discussed in this paper.

The first identified shortcoming of the financial services sector is around process efficiency (Bech & Hancock, 2020; Qiu et al., 2019; Zhou et al., 2020); the second shortcoming is costly services (Gomber et al., 2018; A. V. Thakor, 2020a; Zhou et al., 2020); and the third is lack of transparency (Bech & Hancock, 2020; Pazarbasioglu et al., 2020). We live in an era where digital technology provides efficiencies of processes, cost, and scope, where the internet allows for instantaneous communication. However, it appears these efficiencies are characteristics of digital technology that are lost with the financial sector where services are still slow, costly, and lack transparency (Bank of International Settlements, 2020b; Bech & Hancock, 2020; Qiu et al., 2019; Zhou et al., 2020). The challenges of efficiency in the financial services sector are a result of an economic sector that is not adapting to a changing technological landscape.

Process inefficiency is the first highlighted shortcoming of the financial services sector is process inefficiency, exemplified by delays of settlements in financial markets. A study by Bartolini, Hilton, and McAndrews (2010) found that financial institutions strategically delay payment settlement and remittances as well as loan

deliveries for anywhere from a few hours to multiple days. This is done for a number of reasons including internal risk management and liquidity control (Bech & Hancock, 2020). Settling a payment immediately may expose a financial institution, such as a bank, to lower cash balances rendering it incapable of performing subsequent transactions. An unfortunate conundrum from this characteristic of the financial system is that these payment and settlement delays not only cause operational efficiency issues within the system, but also emanate from inefficiencies.

Liquidity issues exist because financial institutions such as banks are required by regulation to hold reserves to be able to serve customers (Rella, 2019). Furthermore, banks need cash reserves in foreign countries for correspondent banking purposes, where "Nostro-Vostro accounts" are held to serve markets in those foreign countries, where the banks do not directly operate (Rella, 2019). Both these issues of regulatory reserve requirements and correspondent banking create a shortage of liquid cash in the global economy, and at the same time, results from a lack of adequate liquidity to be able to serve all customers of the institutions as and when required, causing the strategic delays. These delays cause congestion, creating a potential for risks of gridlocks, resulting in efficiency issues in the financial market (Bartolini et al., 2010).

The second highlighted shortcoming of the financial services sector is costly services, from foreign exchange transfers and remittances (Gomber et al., 2018), to search costs, to verification costs. Because of their need for branch networks, most legacy financial institutions face higher operating costs (A. V. Thakor, 2020b; Zhou et al., 2020). These costs are usually passed on to the customer through services offered by the institution. Evidence shows that cross-border transfers cost as much as 6.8% on average (Bech & Hancock, 2020; The World Bank Group, 2020). In the US, bank fees are found to approximate $21 monthly per person, becoming an area of concern for policymakers (Adams, 2017). Furthermore, it is not uncommon for banking customers to unintentionally incur costs as these financial institutions hide their fees within copious documentation about accounts (Adams, 2017).

The third highlighted shortcoming of the financial sector is a lack of transparency, leading to issues of trust. Financial institutions are facing challenges of transparency, even though it is a regulatory requirement (Fanning & Centers, 2016). This is

especially because modern regulations in finance emphasise the importance of financial disclosure, where transparency is a leading factor (Peters & Panayi, 2015). The Bank of International Settlement has especially shown concern over the lack of transparency that exists in cross-border payments (Bech & Hancock, 2020). Because of lack of access to data on cross-border payments, it becomes difficult to analyse the challenges associated with this problem, such as terrorist financing and money laundering (Bech & Hancock, 2020).

Blockchain technology is a decentralised protocol that provides a platform to efficiently and verifiably record transactions, asset ownership, and anything of value (Biais, Bisière, Bouvard, & Casamatta, 2019). It has also been defined as a digital protocol meant to operationalise a decentralised economy through the internet (Allen, Berg, Markey-Towler, Novak & Potts, 2020). Since its public introduction by Nakamoto (2008), blockchain has revolutionised other technologies through its foundations, such as financial technology, or "fintech" for short. As Thakor (2020) posits, blockchain technology is the backbone of fintech. Holotiuk and Moormann (2018) argue that strong impacts of blockchain are expected in the financial sector, with Müller-bloch (2017) claiming that every major financial institution considers application of blockchain in different areas of their business. Fuster (2019) found that financial institutions that implemented fintech display some distinctive characteristics over their competition. One would deduce from this information that blockchain technology adoption is the next natural step in the evolutionary process of the global financial services sector.

Through blockchain, the financial services sector is presented with an opportunity to address process inefficiencies, costs, and transparency issues as. Some financial institutions have identified that application of blockchain technology in financial transactions is likely to reduce costs and increase operational efficiency (Wu & Duan, 2019). In cross border payments, Deloitte (2016) claims that blockchain technology reduces costs by up to 80%; settles payments almost instantaneously; ensures security of transactions; and provides verifiable transaction records. The prevalence of the internet and smart devices allow blockchain technology to avail financial services instantaneously to any part of the world (Qiu et al., 2019; Ripple, 2020; Stellar Foundation, 2020), bringing efficiencies of scope and creating access to

financial services for all humans. Unfortunately, because the technology is still new, not much is yet known on what features of blockchain have relevance for which industries, and how such industries should be organised (Risius, 2018). It remains especially unclear to financial institutions how management can configure the organisations to prepare them for adoption of the new technology.

1.3 Purpose of the research

The purpose of this research is to gain an in-depth understanding of how organisations align their technological, organisational, and environmental elements in consideration of adoption of blockchain technology in the financial services sector. Against the backdrop of the value-generating characteristics of blockchain (Beck, Müller-Bloch, & King, 2018; Iansiti & Lakhani, 2017a), it is not unreasonable to expect financial institutions to consider adoption and implementation of the technology (Müller-bloch, 2017) to address institutional inefficiencies. However, since financial institutions are complex (Bazot, 2017), and blockchain technology is relatively new (Holotiuk & Moormann, 2018), and therefore likely to introduce further complexity (Benbya, Nan, Tanriverdi, & Yoo, 2020), it presents potential challenges and dilemmas for managers attempting to align conventional organisational structures to the digital technology, (Svahn, Mathiassen, & Lindgren, 2017). This research, therefore, explored how financial institutions configure and align themselves in consideration of adoption of blockchain technology. It is hoped that the insights gained will provide value to organisations considering adoption of the technology.

1.4 Conclusion

This paper has identified that the global financial services sector provides services that are significant to people's well-being. Unfortunately, the sector has been found to have inefficiencies that demean consumer well-being. This paper suggests that blockchain technology can address the identified inefficiencies of financial services, and consequently seeks to understand how organisations can ready themselves for adoption. The following sections of the paper will: first, discuss through literature, the inefficiencies of the global financial services sector; second, argue that blockchain

technology is the most relevant solution to these inefficiencies; and third discuss how the financial services sector can adopt blockchain technology to address their challenges, through a framework that considers the technological, organisational, and environmental aspects of an organisation. Finally, the proposed research methodology and design for the research will be outlined.

CHAPTER 2: LITERATURE REVIEW

2.1 Introduction

Three main points of discussion the overarching structure for this Chapter. The first is from research by Zhou et al. (2020), who discuss efficiency as a challenge of the financial services sector. While the research was on the banking industry, the findings of the paper can be generalisable to the financial services sector. The second point discusses performance of financial institutions efficiency and details what Harker and Zenios (2000) identify as the drivers of financial institution efficiency. The discussions of the book provide comprehensive answers to efficiency challenges highlighted by Zhou et al. (2020). Included within this is a detailed discussion of blockchain technology through various sources.

The drivers of financial institution efficiency by Harker and Zenios (2000) are categorised into three main areas of strategy, execution of strategy, and the environment (Harker & Zenios, 2000). These categories are an elegant link to the third point of discussion for this Chapter, which is the detailing of the Technology-Organisation-Environment (TOE) Framework (Tornatsky & Fleischer, 1990). The constructs of this framework, which are Technology, Organisation, and Environment, align effortlessly with the drivers of efficiency of financial institutions detailed by Harker and Zenios (2000). The TOE Framework has accordingly been adopted as the relevant theory base for this research.

2.2 The financial services sector

Broadly speaking, financial services are modalities through which consumers and businesses acquire financial goods (Asmundson, 2020). A comprehensive definition of financial services is: "firms in retail banking, commercial lending, insurance (other than health), credit cards, mortgage banking, brokerage, investment advisory, and asset management (mutual funds, hedge funds, etc.)" (Hatzakis, Nair, & Pinedo, 2010, p. 633). But, perhaps the most efficient description of the financial sector is one by Badunenko & Kumbhakar (2017), who simply state that financial institutions

are such institutions that control finance. Driving from these, the financial services sector as discussed by this research is the part of the economy serviced by entities through which customers can access financial assets including asset management, banking, remittance, insurance (other than health), payment processing, financial advisory and brokerage, fintech providers, tax, accounting, and financial regulation.

2.3 Efficiency in the financial services sector

The discussions of financial services sector efficiency by Zhou et al. (2020) start with the assertion that because prior financial services sector inefficiencies caused the global economic meltdown of 2008, financial institutions now face steeper regulatory oversight, which brings further inefficiencies in the sector. This is further argued by Peters and Panayi (2015), who clarify that the financial crisis resulted in some significant regulations not only in banking but in insurance as well as accounting. In continuing their discussion in financial services, Zhou et al. (2020) argue that retail banking, by its nature, delivers its products through branch operations, which result in high operational costs.

Banks are not the only financial institutions that offer their services through branch operations. Hatzakis et al. (2010) agree with Zhou et al. (2020) on this point, and further argue that financial services at branches tend to have some inefficiencies. Furthermore, it has been found that transaction costs of branches are significantly higher than online transactions (Zhou et al., 2020). This argument is substantiated by Thakor (2020), that the need for branches is the reason for banks' higher operating costs from the financial requirement to maintain the branch network. The challenge of transparency in financial services is argued by Bech and Hancock (2020), who find that shortcomings exist in cross border payments where there is a lack of data that is vital in improving challenges in cross-border payments.

The first point raised by Zhou et al. (2020) alludes to systemic inefficiencies caused by regulatory requirements. The financial services sector is an intermediary sector that operates on intermediated services (Asmundson, 2020; Pitt-Watson, 2015). This has mainly existed because of lack of core technologies at the time the sector's

infrastructure was developed (Feenan et al., 2020). The need for intermediation, in the beginning, has resulted in the financial system taking shape through business models and regulations that furthered the need for intermediaries, complicating the system further, and creating inefficiencies that have not served customers well (Feenan et al., 2020). This is especially because intermediation is not only time consuming and costly, but also carries with it a credit risk where the intermediary fails (Nofer et al., 2017).

Three independent studies by Badunenko and Kumbhakar (2017), Bostandzic and Weiß (2018), and Bryce et al. (2019) have all found that despite the regulatory measures put in place to protect financial institutions, they have systemic inefficiencies that cause them to consistently fail at a fundamental level. These consistent failures identified by Bryce et al. (2019) emanate from failures in risk identification and mitigation. One fundamental failure of financial institutions has been their inability to properly identify asset owners and retrace ownership, especially in the long chain of different buys in global transactions (Nofer et al., 2017). An example is when the US investment bank Bear Stearns failed in 2008 and had to be acquired by JP Morgan Chase. "The number of shares offered to JP Morgan Chase was larger than the shares outstanding in the books of Bear Stearns. It was not possible to clarify the accounting errors and JP Morgan Chase had to bear the damage from excess (digital) shares" (Nofer et al., 2017).

Moreover, Bostandzic and Weiß (2018) warn that the banking industry poses a systemic risk to the financial sector because of innate factors of banks such as bank size and complexity; banks' funding structures; banks' business models; regulatory regime; and macroeconomic controls. They find that larger banks pose a higher risk to the financial sector as they are considered "too big to fail" (Bryce et al., 2019), and therefore might engage in risky business behaviours at the knowledge that they will be bailed out for their operational transgressions. Unfortunately, as such banks are interconnected with other financial institutions (Bostandzic & Weiß, 2018), the result of their inefficiency could cascade throughout the financial sector (Bryce et al., 2019). Badunenko and Kumbhakar (2017) agree with this analysis in their claim that banks operating under government protection are likely to engage in more risky business.

The second assertion by Zhou et al. (2020) is with regards to cost efficiencies in the financial services sector. Financial institutions have been found to have high costs across the board; from foreign exchange transfers and remittances (Gomber et al., 2018), to search costs, to verification costs. The high costs of financial institution as highlighted by Hatzakis et al. (2010), Qiu et al. (2019), Thakor (2020) and Zhou et al. (2020) are usually passed on to the customer through services offered by the institutions. In the US, high banking fees have become an area of concern for policymakers (Adams, 2017). What is interesting is that financial institutions are likely to hide their fees within copious documentation about accounts (Adams, 2017), leading to customers unintentionally incurring costs. Moreover, the cost of having access to formal financial services has been cited as one of the reasons some people do not have a transactional account (Demirguc-Kunt et al., 2018), resulting in financial exclusion as will be discussed later.

On the issue of transparency in financial services, Myers (2013) makes an interesting argument on the role of transparency that alongside accountability, transparency must be ensured in financial services through reporting guidelines where financial services ought to be contributing to a socially responsible and sustainable financial system. However, transparency in financial services has been argued by Bech and Hancock (2020), who decry the lack of information and data from cross-border payments, leading to a challenge in analysing and addressing challenges that exist in the system. Other authors, such as Pazarbasioglu et al. (2020) argue that a lack of transparency in financial services is a consumer protection issue as it leads to a lack of distrust in the system. This is especially highlighted by Adams (2017), who finds that financial institutions have the likelihood of hiding costs from consumers within copious documentation.

2.4 Blockchain technology

2.4.1 Definition

Blockchain technology has been defined in various ways in the literature. Two definitions distil blockchain into its essence: the first is provided by Fanning and

Centers (2016), who state that in the simplest form, blockchain is a collection of pieces of information that have been validated, and linked together chronologically, based on the transactions that take place (Fanning & Centers, 2016); another is one of the easiest to understand definitions by Peters & Panayi (2015) who define blockchain as a ledger, or simply a "chronological database of transactions recorded by a network of computers" (Peters & Panayi, 2015). All the definitions, however, refer to the same suite of technologies that came to public attention with the introduction of Bitcoin by Nakamoto (2008), who described a decentralised, stateless form of currency meant for peer-to-peer movement of money. To record and validate Bitcoin transactions, blockchain technology was required (Fanning & Centers, 2016). In terms of financial transactions, blockchain stores information for every transaction that has occurred on the ledger, and stops double-spending, through a process simplified in the image below:

Figure 1: How blockchain works in a financial transaction

How a blockchain works

1 A wants to send money to B

2 The transaction is represented online as a 'block'

3 The block is broadcast to every party in the network

4 Those in the network approve the transaction is valid

5 The block then can be added to the chain, which provides an indelible and transparent record of transactions

6 The money moves from A to B
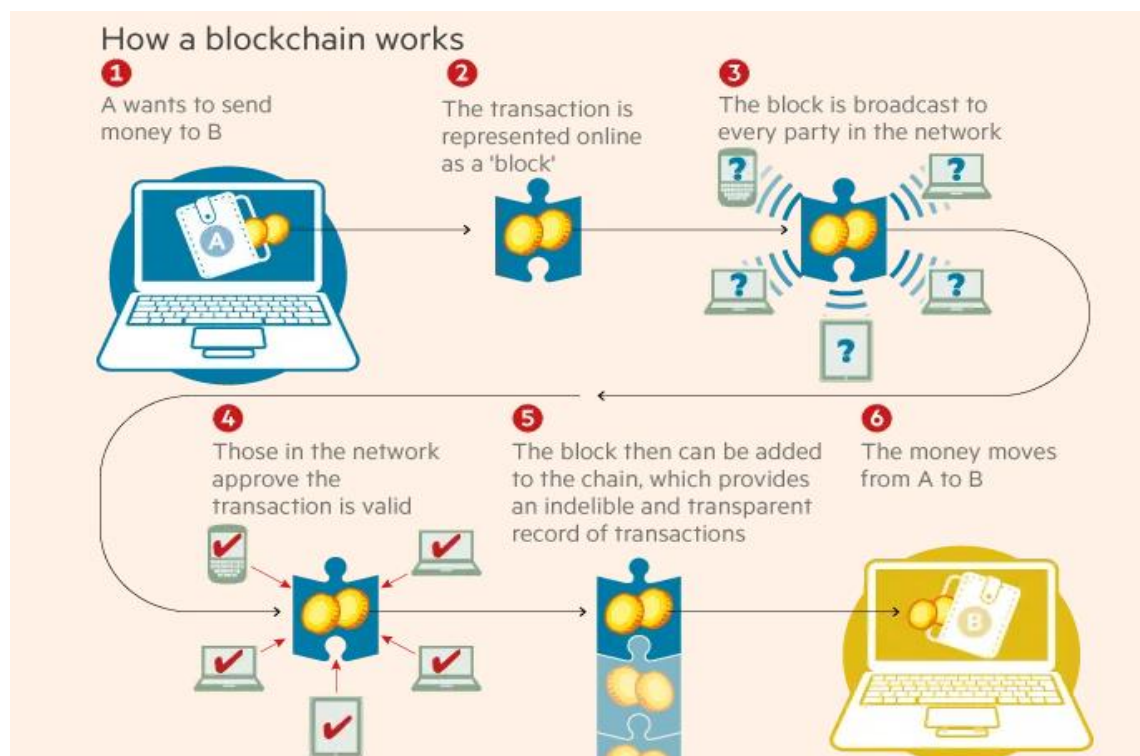
Source: (Stafford, Wild, & Arnold, 2015)

2.4.2 How blockchain functions

2.4.2.1   How blockchain works

In financial services, a transaction can be executed within a short period, and usually without human interaction. However, settlement of these transactions, which involves ownership transfers of assets, can take a long time, as long as a week (Iansiti & Lakhani, 2017a). This occurs because the two parties do not have access to each other's ledgers and without this transparency and availability of information they are not able to verify asset ownership, and the rights to transfer such ownership. For this verification to occur, intermediaries are usually required, to guarantee asset ownership and maintain records of such ownership, and the ledgers are individually maintained (Iansiti & Lakhani, 2017a). The use of blockchain allows users to not only validate transactions but also maintain a permanent record of such transactions (Fanning & Centers, 2016).

Blockchain technology allows for multiple identical copies of ledgers to be replicated through many databases, maintained by interested parties. Should a change be effected in one copy, all the other copies update simultaneously, giving all interested parties access to the same information (Iansiti & Lakhani, 2017a). As the information on the blockchain is validated and tamper-free, the protocol surrounding the blockchain and the storage of the information becomes a source of trust where users of the technology and the data can do so with confidence. Blockchain has natural capabilities that ensure trust is maintained in transactions and therefore, it eliminates the need for a third party in transactions, in essence removing costs related to this third-party intermediation (Fanning & Centers, 2016).

2.4.2.2   Hashes and Hash Functions

More than it being economic or monetary, blockchain is essentially about information (Marc Pilkington, 2016). It is an invention that relies heavily on hashes and hash functions. A hash is a function that transforms an input of letters and numbers into an output of a specific length (Frankenfield, 2020). It is basically a transformation of the original information (Marc Pilkington, 2016). A hash function is one of the most

prevalent cryptographic algorithms in blockchain technology, and it is the backbone of the blockchain network (Frankenfield, 2020). A characteristic of a cryptographic hash function is that it presents extreme difficulty to any attempts to reverting or recreating the original input data from the harsh value by itself (Marc Pilkington, 2016). Despite the above, Peters and Panayi (2015) makes an argument on the distinction among the types of blockchains, to which Zheng, Xie, Dai, Chen, and Wang (2018) argue that in some types of blockchains, information and records are susceptible to tampering. A follow-up on both these points by these sources will be discussed below. A pictorial representation of a hash function appears in Figure 2 below where the architecture of a blockchain is displayed:

Figure 2: Blockchain architecture
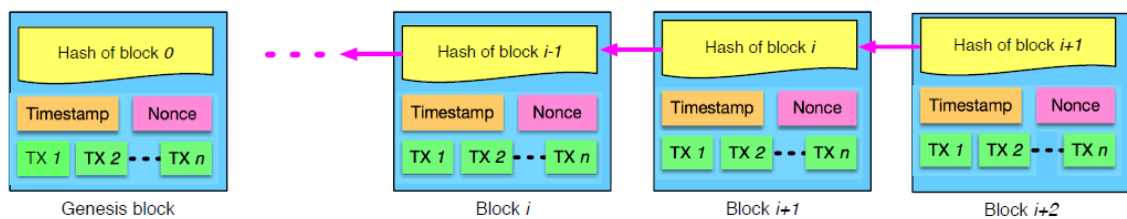
Source: (Zheng et al., 2018)

Zheng et al. (2018) present an easy-to-read description of the architecture of a blockchain. Concerning their image above: *Block version* indicates what set of block rules to follow; *timestamp* is the current timestamp since 01/01/1970, 00:00 UTC; and *nonce* refers to a 4-byte field, usually starting with zero and incremental with every has calculation. All these factors create a block and are essential in the formation, function, and security of a blockchain.

2.4.3 Principles of blockchain

2.4.3.1   *Centralised versus decentralised ledgers*

A ledger is a record of ownership, transactions, identity (Biais et al., 2019) or other valuable information. For transactions to be facilitated among parties to a transaction by a ledger, such parties must have a consensus on the authenticity of the recorded information in the ledger. Arguments for decentralised ledger technologies hinges on

the notion that the decentralised nature of the technology means it is tamper-proof. However, (Peters & Panayi, 2015) make an interesting distinction of the differences in the kinds of blockchains, which presents varying levels of this security feature. As mentioned earlier, verification of the information in the ledger has traditionally been done by some intermediary, creating centralisation of the ledger (Biais et al., 2019).

A challenge with centralisation is the risk of opportunistic behaviour from the central authority managing the ledger. Taking into consideration the shortfalls and designs of some types of blockchains detailed by Zheng et al. (2018), the distributed ledger technology presented by especially public blockchains exists to overcome this risk of opportunistic behaviour in financial services.

2.4.3.2   Permissioned and permissionless blockchains

Although blockchains are presented as having security features that rely on public participation (Fanning & Centers, 2016; Nakamoto, 2008), little analytic emphasis is placed on the distinction that exists between such blockchains where anyone can participate, and those where access is restricted, per the purpose of the particular blockchain. One of the clearer distinctions is provided by Peters and Panayi (2015), who seek to bring clarity among *permissioned*, *permissionless*, *private*, and *public* blockchains. Through their discussions, the authors collapse the four categorisations of blockchains into two: *permissioned*, and *permissionless*, for the obvious similarities that exist where a public blockchain has characteristics of a permissionless blockchain, and a private blockchain is imbued with those of a permissioned blockchain. An addition to Peters and Panayi's (2015) discussion comes from Zheng et al. (2018), who introduce a *consortium* blockchain, a hybrid leveraging the qualities of both public and private blockchains.

2.4.3.3   Distributed database

Although various types of blockchains exist (Peters & Panayi, 2015; Zheng et al., 2018), all parties on a blockchain have access to the database and its history in entirety. The distributive nature of the database is meant to allow for no tampering or changes by a single party. In fact, verification of the records is done by every party

directly, with no need for an intermediary (Tapscott & Tapscott, 2017). While this is true for permissionless blockchains, permissioned blockchains allow for a majority controller of the system to make such changes that would not be allowed in a public or permissionless blockchain.

2.4.3.4   *Peer to peer transmission*

In traditional finance, there is usually a payer, a payee, and a go-between. The go-between is usually a trusted third party required in all payments (Marc Pilkington, 2016). In the financial service sector, this third party is usually a financial institution. Going one level in, *within* a financial institution, this go-between would be an individual or a group thereof, employed to verify and execute transactions. The requirement of this third party has been necessary until the introduction of blockchain in finance. Communication with the blockchain occurs directly among the peers in the system where there is no need for a central node. All nodes store and forward information to all others accordingly (Iansiti & Lakhani, 2017b).

2.4.3.5   *Transparency with pseudonymity*

Blockchain ensures visibility of all transactions and their associated values to everyone with access to the system. The users or nodes each have a unique alphanumeric address that identifies them individually (Iansiti & Lakhani, 2017a; Zheng et al., 2018). The choice to remain anonymous or provide proof of identity to other users remains the prerogative of the user. Transactions on the blockchain are traceable, but they are enabled without disclosing the identity of the parties to the transaction (Marc Pilkington, 2016). This anonymity allows for entities to transact any sums of money to any part of the world without government intervention, and at very low costs (Clohessy, Acton, & Rogers, 2019). However, as Zheng et al. (2018) argue, a consortium blockchain has constraints and cannot ensure perfect privacy from this feature. Furthermore, it may become a challenge for financial institutions in some jurisdictions where regulations do not permit, to move sums of money, especially cross border transacting, without the knowledge of the government.

2.4.3.6   *Irreversibility of records*

In the natural state of a public blockchain, once a transaction has been entered in the database and updated, it cannot be altered as it is linked to all historic records that have occurred on the ledger (Zheng et al., 2018). This linking of records gives rise to the term "chain". Digital and computational security measures ensure that recordings on the database remain permanent, chronologically ordered, and are transparent (Iansiti & Lakhani, 2017a; Zheng et al., 2018). Nevertheless, where a blockchain is owned by a group of entities (consortium blockchain) where one party or a sect controls the majority of the nodes on the blockchain, they can temper with the blockchain and reverse information or transactions (Zheng et al., 2018).

2.4.3.7   *Computational logic*

Transactions between the nodes on the blockchain ledger can be triggered by complex computational algorithms. This is allowed for by the digital nature of the ledger which is tied to computational logic (Iansiti & Lakhani, 2017a).

2.4.4 Advantages of blockchain

The principles of blockchain highlighted by both Iansiti and Lakhani (2017) and Tapscott & Tapscott (2017) above give blockchain its advantages. Fanning and Centers (2016) provide a useful list of the advantages of blockchain technology, especially as it pertains to the financial services sector.

Firstly, blockchain exists as a peer-to-peer network and as such does not have "a single point of failure" (Fanning & Centers, 2016). This is because of the decentralised nature of blockchain where the system exists through multiple computers. Should a node fail, other nodes continue to function normally, ensuring optimal system performance.

Secondly, blockchain's recording of information is digital, allowing for utility over various applications and needs. While this research is focused on financial services Zheng et al. (2018) provide an illustrative display of the application domains of

blockchain in their paper, where blockchain has use cases in security and privacy, Internet of Things (IoT), reputation system, public and social service, and of course, financial services.

Thirdly, many blockchains in existence are accessible to any member of the public with internet access. Also, such blockchains are replicated numerous times across the participating computers in the network (Peters & Panayi, 2015). The transparency of transactions to all participants on the blockchain provides an increased undisputed point of auditability and trust in the system (Zheng et al., 2018). However, it is worth noting that there are in existence private versions of blockchains, as discussed on permissioned and permissionless blockchains, whose behaviours may be different from what is described here.

Fourthly, effecting changes to the blockchain becomes difficult because of the decentralised nature of the protocol, and where this occurs, it becomes visible to other users in the system (Fanning & Centers, 2016). Blockchains rely on public and private key cryptography to ensure that there is no unauthorised use of accounts on the network (Peters & Panayi, 2015). These private and public keys allow for encrypted information to be communicated among parties to a transaction, where the recipient of the information can determine the validity of the sender's authenticity, or whether there has been tampering with the received information, through the use of hash functions (Peters & Panayi, 2015). In the publication that made blockchain a topic of interest, Nakamoto (2008) illustrates how verifications using these public and private keys would occur, as shown in figure 3 below.

Figure 3: Use of private and public keys for verification
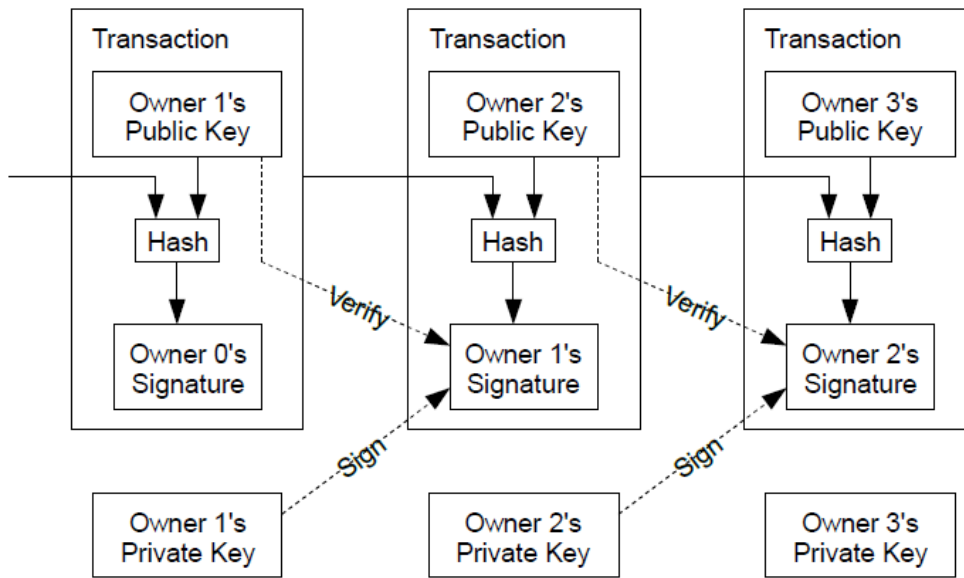
Source: (Nakamoto, 2008)

2.5 Relevance of blockchain technology in financial services

2.5.1 Overview

There has been growing attention towards applicability of blockchain technology in the area of finance (Guo & Liang, 2016; Rella, 2019). These applications are centred around inefficiencies of the global legacy financial system. Inefficiencies of cost, process, and scope have been identified to have their direct solution in blockchain technology (Bartolini et al., 2010; Gomber et al., 2018; Stellar Foundation, 2020; Wu & Duan, 2019). What is overwhelmingly prevalent in the literature on blockchain is that the technology is one of the most valuable innovations for the financial services sector (Chen, Wu, & Yang, 2019; Courtneidge & Burelli, 2015; Mckinsey, 2015; McLean, 2016). It could therefore be argued that the technology is poised to improve different facets of the sector.

Perhaps the most comprehensive detailing of the disruptions of blockchain technology to the financial sector is that of Gomber et al. (2018), who present arguments that blockchain technology will bring: a transition to branchless banking

(Borrás & Edler, 2020); "real-time transaction and credit monitoring; credit scoring and approval; transformations in customer acquisition and retention"; faster settlements of payments (Ripple, 2020; Stellar Foundation, 2020); deposit service innovations; and financial inclusion (Gomber et al., 2018). Furthermore, Zhou et al. (2020) claim that adoption of digital technologies in financial services presents opportunities for cost reductions in operations and improved efficiency. With elimination of branches and focusing on digital channels, these costs are significantly reduced (Zhou et al., 2020). Fuster (2019) explores the role of fintech on mortgage lending and finds that lenders who use fintech show improved efficiency and speed in their operational processes. These disruptions of blockchain technology to financial services are discussed below.

2.5.2 Blockchain disruptions for financial services

As highlighted above, an interesting discussion of disruptions brought by blockchain to financial services is that provided by Gomber et al. (2018) who, in their review of financial technology, assert that the technology will bring changes to core aspects of financial services. Their discussions provide an interesting insight into the potential of blockchain.

2.5.2.1   Transition to branchless banking

Naturally, in the financial services sector, branches have been the primary point of contact between the customers and the financial institutions or banking services (Gomber et al., 2018). Availability of branches ensures that customers have access to financial services, leading to financial inclusion. It has also been shown to have a relationship with household wealth (Célerier & Matray, 2019). However, as Demirguc-Kunt et al. (2018) argue, some factors lead to individuals in many parts of the world not having access to financial services, even with the availability of branches. Nevertheless, with the improvements in digital technologies, customers who are already using branches are switching from in-person services to digital transactions made possible by the enhanced customer experience and convenience (Gomber et al., 2018) of these digital technologies.

Also, individuals that would not have had transaction accounts or access to formal financial services are accorded this opportunity by the prevalence of mobile phones, especially in developing countries (Lashitew, van Tulder, & Liasse, 2019). In combination of both branchless banking and mobile services, blockchain becomes a preferred backbone of financial services (Kawasmi, Gyasi, & Dadd, 2017), where the financial institutions benefit from the rich data, security, and inexpensive execution of services; and the customers benefit from access to finance, faster transactions and improved efficiency provided by the blockchain system.

2.5.2.2   *Real-time transaction and credit monitoring*

To be able to detect fraudulent activities on their transaction accounts, customers usually must rely on their financial institutions' fraud detection systems and notifications. Monitoring of transactions and credit has become stressful for customers and is also a subject of significant time delays (Gomber et al., 2018). In response to customers, financial institutions, especially banks, have provided platforms through which customers can track their transactions and monitor their credit. The unfortunate happenstance of this arrangement is that consolidating a customer's information into one platform or system subjects such information to significant security risks and concerns, where hackers can gain access to such sensitive information consolidated in one place (Gomber et al., 2018).

The risks posed by the legacy systems are significantly reduced with the use of blockchain technology, which offers real-time settlement of payments. With technology such as that of Ripple (Ripple, 2020), payments can settle immediately because the technology offers both messaging and settlement (Qiu et al., 2019). This contrasts with the SWIFT network used by most of the banks in the world, which is a messaging network and creates delays and inconveniences in processing and settlement of payments. Furthermore, Deloitte (2016) claims that payments through blockchain technology are data-rich, secure, and settle in seconds, as opposed to days as is the case with legacy systems.

2.5.2.3 Credit scoring

Credit scoring systems are modalities through which organisations determine an individual's credit worthiness for the purpose of grating or denying access to financial services (Gomber et al., 2018), such as loans, mortgage approvals, interest rates, or insurance premiums (Bringer, 2020). Essentially, credit scoring systems assess the chances of borrower defaults and consequently determine whether such a borrower participates in the financial sector. These gateways to the financial sector have an important role to play in the livelihood of many individuals globally. However, currently, the credit scoring system in place at the majority of financial institutions is a flawed system (Bringer, 2020), which takes credit opportunities from those that need it the most.

The credit scoring process relies heavily on an individual's ability to repay loans. This creates a conundrum for some individuals, where they need a credit score to have access to financial services, and they are not able to have a credit score because they do not have access to finances. The revolution brought to credit scoring and approval by blockchain is that blockchain, as a decentralised system, presents non-traditional factors and data which can then be used to determine an individual's credit worthiness (Bringer, 2020). An individual without a credit score can be assessed through other matrices, according to their access to financial services. Furthermore, blockchain provides data security not matched by the current systems used in finance (Bringer, 2020; Fanning & Centers, 2016; Keeffe, 2019). The use of blockchain in this process brings with it the other advantages provided by the technology.

2.5.2.4 Customer acquisition and retention

Through the use of blockchain technology, companies have claimed to have reduced customer acquisition costs (Gomber et al., 2018). This is made especially possible by blockchain's ability to mine and store valuable data securely. Unfortunately, this quality of blockchain also makes it easier and cheaper for the same customers to switch financial service providers.

2.5.2.5 Faster settlements of payments

According to Neyer and Geva (2017), in terms of domestic payments, blockchain has a smaller potential to transform already existing systems. This is majorly because the steps involved in these transactions are fewer and simpler, therefore not requiring disruptions. Also, the competitive nature of the domestic market has led to efficiencies of the existing firms. However, there are claims from some blockchain providers that the technology brings as much as a ten-fold performance/cost advantage of the existing systems in the USA (Neyer & Geva, 2017).

2.5.2.6 Financial inclusion

A financial institution that provides services across diverse locations has efficiency of scope (Alber, Elmofty, Walied, & Sami, 2019). Financial inclusion is a matter that has been given attention by United Nations (United Nations, 2020), and it occurs when people able to access financial services that satisfy their fundamental livelihood requirements (The World Bank Group, 2018). Financial inclusion is seen as a factor important to the fight against poverty. Unfortunately, the world financial system excludes 1.7 billion adults globally who do not have access to formal financial services (Demirguc-Kunt et al., 2018). In perspective, that is almost a quarter of the world population.

A discussion by The World Bank Group (2018) shows that having a transaction account is a primary factor in determining financial inclusion. As a result of the nature of the legacy financial system, some reasons cited for a lack of a financial account are: individuals do not have the requisite amount of money to warrant a bank account; cost and distance between an individual and a financial institution; lack of documentation; as well as distrust of the financial system (Bank of International Settlements, 2020a; Demirguc-Kunt et al., 2018). These challenges are eliminated through blockchain technology, such as that offered by the Stellar Foundation (2020a), a wide-reaching technology that brings efficiency to the financial system.

2.5.2.7   Cost reductions

As already mentioned, Zhou et al. (2020) discuss cost efficiencies in the financial services sector. Financial institutions have been found to have high costs across the board; from foreign exchange transfers and remittances (Gomber et al., 2018), to search costs, to verification costs. Also, as most traditional financial systems operate through branch networks, they face higher operating costs (A. V. Thakor, 2020b; Zhou et al., 2020). The high costs of financial institution as highlighted by Hatzakis et al. (2010), Qiu et al. (2019), Thakor (2020) and Zhou et al. (2020) are usually passed on to the customer through services offered by the institutions. Cross-border transfers costs are as high as 6.8% on average (Bech & Hancock, 2020; The World Bank Group, 2020). In the US, high banking fees have become an area of concern for policymakers (Adams, 2017). What is interesting is that financial institutions are likely to hide their fees within copious documentation about accounts (Adams, 2017), leading to customers unintentionally incurring costs. Moreover, the cost of having access to formal financial services has been cited as one of the reasons some people do not have a transactional account (Demirguc-Kunt et al., 2018), resulting in financial exclusion as discussed in this paper.

As blockchain brings efficiencies of process, operations of financial organisations through blockchain technology leads to cost reductions that not only benefit the organisations but the customer, who is usually the recipient of the financial burden of costly operations. Some financial institutions have identified that application of blockchain technology in financial transactions is likely to reduce costs and increase operational efficiency (Wu & Duan, 2019). In cross border payments, Deloitte (2016) claims that blockchain technology reduces costs by up to 80%.

2.5.2.8   Improved efficiency

Blockchain technology is disruptive as it can perform complex transactions without a third party, making such transactions cheaper and traceable (Borrás & Edler, 2020). Chiu and Koeppl (2019) find that in asset trading and settlement, blockchain technology increases the speed of transactions and at the same time lowers costs, a juxtaposition against the legacy financial system, which is slow and costly (Bech &

Hancock, 2020; Qiu et al., 2019; Zhou et al., 2020). Cong and He (2019) explore blockchain disruption and smart contracts, where they find that blockchain-based smart contracts are a solution of informational asymmetry, and lead to improved consumer surplus by enhancing market entry and competition.

Payments with smart contracts are tamper-proof. In comparison with traditional contracting, blockchain technology accords institutions a consensus that reflects the most optimum outcome, an occurrence that is not only relevant to business operations, but enhances efficiency (Goldstein, Jiang, & Karolyi, 2019). Thakor (2020) agrees with the above and claims that blockchain will significantly affect financial contracting, as well as trading and insurance, while Qiu et al. (2019) and Rella (2019) purport that blockchain technology brings an efficient cross-border payment.

2.6 Blockchain technology adoption in financial services

Zhou et al. (2020) claim that adoption of digital technologies presents opportunities to reduce operational costs and improve efficiency. With elimination of branches and focusing on digital channels, these costs are significantly reduced (Zhou et al., 2020). Fuster (2019) explores the role of fintech on mortgage lending and finds that fintech lenders process mortgage applications 20% faster, and this does not result in higher defaults. To address efficiency issues, Walch (2015) claims that most of the largest financial institutions are availing significant resources towards determining how blockchain technology could improve their operations, while Gomber et al. (2018) claim that leading institutions in the financial services sector who are not able to identify a framework for adoption of new financial technology will likely lose their dominance.

The biggest potential for blockchain technology in financial services is in the technology's ability to replace third parties naturally employed by financial institutions for various services. An argument is made here that due to the case made for blockchain in this paper, some roles in financial services such as transaction recording, validation of transactions, prevention of payment and transaction

duplication (Peters & Panayi, 2015) need not be conducted by parties employed but through the functionalities of blockchain. As already discussed, this technology does not only bring efficiencies to these services but also reduces the costs of service.

2.6.1 Cryptocurrencies

Existing evidence suggests that there are no standardised blockchain applications that can be acquired from the market (Holotiuk & Jürgen, 2018). However, in terms of payments in financial services, the biggest disruptor is in the form of cryptocurrencies (A. V. Thakor, 2020b). Perhaps the most well-known cryptocurrency is Bitcoin, introduced by Nakamoto (2008). Bitcoin, alongside other similar cryptocurrencies, was created to allow for person-to-person transactions. Financial institutions will be able to leverage the Bitcoin network for transfer and movement of value with the advantages of the technology. For example, Gomber et al. (2018) suggest that banks will be able to reduce costs and streamline cross-border transacting and settlement if they used blockchain.

2.7 The Technology-Organisation-Environment Framework

To understand adoption of blockchain technology by financial institutions, the TOE (Technology-Organisation-Environment) Framework has been adopted for this research. The TOE Framework is introduced by Tornatsky & Fleischer (1990), in their book *"The Process of Technological Innovation".* The TOE framework deals with how the organisation's context is a determining factor in adoption of technological innovations. The TOE framework is adopted amidst other theories for two main considerations. The first is that most technology adoption theories/models are either user/individual-oriented or would require recognisable adaptations to answer the research question for this study. The second reason is that the TOE framework, as already mentioned, is innately an organisation level theory (Dwivedi, Wade, & Schneberger, 2012).

The framework explains that three elements (technology, organisation, environment) of an organisation's context influence adoption decisions. These elements align with

Harker & Zenios' (2000) drivers of financial institution efficiency, where strategy, strategy execution, and environment are identified as leading factors that drive institutional efficiency. Since this research seeks to answer the question of how organisations can adopt blockchain technology to improve efficiency, the TOE Framework becomes most relevant. The three constructs of the TOE Framework are technological context, organisational context, and environmental context of the organisation; all deemed necessary for adoption of blockchain technology. These elements will be discussed individually.

2.7.1 The Technological context

Three main issues are discussed as the main technological factors of blockchain technology. The first is organisational technology use, the second is relative advantage of blockchain technology, and the third is compatibility of blockchain with existing systems. An organisation that intends to adopt blockchain technology must have identified the purpose for which the technology will be used. Because blockchain technology is a disruptive technology (Goldstein et al., 2019; Gomber et al., 2018), it is defined as a radical innovation (Chiu & Koeppl, 2019). Prior to adoption of blockchain technology, a financial institution will need to review its current technological setup, review the features and characteristic of blockchain technology, and assess compatibility of current technology and blockchain technology.

This is done with the understanding that blockchain technology not only presents the potential for systemic efficiency (Chen, Wu, & Yang, 2019; Courtneidge & Burelli, 2015; Mckinsey, 2015; McLean, 2016), but could bring challenges for the organisation's existing information systems (Benbya et al., 2020), especially since the organisation's existing technologies determine the scope adoption rate of the new technology. This is a relevant factor for financial institutions in adoption of blockchain technology which is unique in the sense that it originates from outside of the major financial institutions (Goldstein et al., 2019).

2.7.2 Organisational context

Organisational factors determining adoption of blockchain technology are based on Harker and Zenios' (2000) *Performance of Financial Institutions.* The book discussed drivers of performance of financial institutions by identifying three broad categories of performance drivers. These are strategy, strategy execution, and environment. The organisation's context element of the TOE framework is populated by elements of Harker and Zenios' (2000) strategy and strategy execution. These elements include organisational form, product and client mix, the geographical scope of business, distribution channels, human resource management, product design and alignment of everything (Harker & Zenios, 2000).

Organisational form in the financial sector refers to a determination taken by an organisation to align itself with the requirements of the market and the industry (Harker & Zenios, 2000). A detailed account by Park and Mithas (2020) is relevant in organisational adoption of blockchain technology, where they answer the question of how organisations should configure organisational capabilities such that they can obtain competitive advantage in a complex digital environment. This is perhaps one of the biggest internal considerations in adoption of blockchain technology. A study by Kopalle, Kumar, and Subramaniam (2020) in determining how legacy firms can embrace digital technologies found that one catalyst to change is the sheer size and scope of an organisation. They found that large legacy firms can propel themselves towards new digital technologies by leveraging their vast resources. Verganti, Vendraminelli, and Iansiti (2020) found that organisational strategy is a determining factor in organisations adopting digital technologies. A "learning organisation", for instance, would find it easier to adapt its strategy to the disruptive technology that is blockchain as opposed to an organisation with a rigid setup.

Digital technologies affect ecosystems, processes, human capital, technical setup, and organisations (Benbya et al., 2020). An organisation has to have multiple considerations prior to adoption of blockchain technologies as the technology has characteristics that increase complexity, such as embeddedness of the technology, connectedness, editability, programmability, communicability, identifiability, and associability (Benbya et al., 2020).

To maintain customer satisfaction and obtain efficiency, products of financial institutions have to contain qualities of: easy to be understood by the customer, easy to use, operational risk-free, sustainable, and efficiently priced (Hatzakis et al., 2010), as well as easy to access. Consideration may be whether financial products offered on blockchain technologies need to be delivered to clients that have also adopted blockchain technology, such as peer-to-peer networks (Goldstein et al., 2019; Sun Yin, Langenheldt, Harlev, Mukkamala, & Vatrapu, 2019), or whether blockchain technology offers interoperability with other financial technologies in existence (Rella, 2019). It may be possible that issues of speed and cost-efficiency, like other information technology systems, only become beneficial once there are network effects. Holotiuk and Moormann (2018) advise that the potential for blockchain technology is in networks and therefore adopting entities must encourage open innovation such that the network gains multiple partners necessary for it to deliver. This study hopes to provide insights that will contribute to acceleration of blockchain technology adoption in financial services.

Blockchain technology offers financial inclusion (Rella, 2019), which by its nature implies efficiencies of scope (Alber et al., 2019). Should a financial institution consider that its services can better serve a wider geographic scope, which they should (Demirguc-Kunt et al., 2018; Lashitew et al., 2019; The World Bank Group, 2018; United Nations, 2020), then adoption of blockchain technology would be an efficient consideration. A consideration with today's financial system is that for a financial entity to operate in diverse geographical locations, issues of regulation and cost become a concern (Harker & Zenios, 2000; Hatzakis et al., 2010), as financial institutions usually have operations in such locations.

2.7.3 Environmental context

The environmental context discusses the industry type, kinds of service providers within the industry, as well as regulation (Harker & Zenios, 2000). Four factors are considered with regards to environmental considerations that financial institutions must make towards adoption of blockchain technology. These are competition, research and development, client taste, and regulations. A study by Huang, Dyerson, Wu, and Harindranath (2015) explored the determinants of competitive advantage

and found that to maintain sustainable competitive superiority, an institution has to possess technological resources that are not surpassed by the competition. Blockchain technologies are varied in nature, and each dependent in networks. An entity that invests human and capital resources into understanding and mastering blockchain technologies can leverage the efficiencies of such technology, staying ahead of the competition. This is in line with the claims of Kopalle, Kumar, and Subramaniam (2020) who find that large organisations can stay ahead of the competition by leveraging their resources and scope.

A question that legacy financial institutions must consider is what the regulatory implications are of adopting and operationalising blockchain technology. As blockchain technology is new (Holotiuk & Moormann, 2018), it has attracted attention in the areas of law (Sun Yin et al., 2019). However, few, if any, regulatory frameworks exist for blockchain technologies (Finck, 2018). The financial sector is a heavily regulated sector (Adams, 2017), and financial institutions may not be keen to adopt a technology that has not yet had regulatory clarity.

2.8 Conclusion

The global financial sector is embattled with systemic inefficiencies that demean customer wellbeing. Blockchain solution has been seen as a solution to the efficiency challenges faced by the sector. As already mentioned in the introduction of this paper, it becomes quickly apparent that a majority of the literature on blockchain technology is focused on the analysis of the benefits of blockchain technology to financial institutions (Frizzo-Barker, Chow-White, Adams, Mentanko, Ha, Green, 2019). Another area of literature that is increasingly becoming available is on what the leading determinants of blockchain technology adoption in the financial sector are (Holotiuk & Moormann, 2018). What is lacking in literature is how financial institutions can prepare themselves for adoption of blockchain technology.

Holotiuk and Moormann (2018) identified four factors: technology, organisation, people, and project management, as the leading determinants of blockchain technology adoption in the financial sector. Their study makes recommendations for

further research on how the factors they have identified can be turned into measures for adoption of blockchain technology. Literature has so far revealed that the financial sector has inefficiencies of process, cost, and scope, that can be addressed by blockchain technology. The contribution of this research, therefore, was on how organisations can prepare themselves for adoption of blockchain technology by introspecting on their technological, organisational, and environmental contexts, as guided by the TOE Framework discussed.

CHAPTER 3: RESEARCH QUESTIONS

In line with the elements of the Technology-Organisation-Environment Framework, this research aimed to answer three questions, as rooted in the reviewed literature.

3.1 Research Questions

1. **What are the major qualities of blockchain technology that are considered to provide organisational efficiencies?**

Blockchain technology presents some systemic efficiencies to financial institutions (Chen, Wu, & Yang, 2019; Courtneidge & Burelli, 2015; Mckinsey, 2015; McLean, 2016). However, the technology could also present some challenges for the organisation's existing information systems (Benbya et al., 2020), especially since the organisation's existing technologies determine the adoption rate of the new technology. This is a relevant factor for financial institutions in adoption of blockchain technology which is unique in the sense that it originates from outside of the major financial institutions (Goldstein et al., 2019).

Question one of this research seeks to establish what business need financial institutions have for blockchain technology. Within this aspect is the need to especially find out what particular business challenges the organisation was facing. The intent is to find whether such challenges, if they exist, have anything to do with efficiencies of scale (process), cost, and scope. Once a business need has been identified, it is important to establish whether other technologies than blockchain technology are considered for this business need. This establishes whether, and how, blockchain is the best solution for the business challenge faced by the organisation. This is then followed by the challenges and concerns around compatibility of blockchain technology with already existing systems, and how such challenges are addressed. In consideration of the arguments that through blockchain technology, the financial services sector is presented with an opportunity to address process inefficiencies, costs, and scope of operations as highlighted, it is important

to establish what the perspectives are, around the value proposition of blockchain technology over legacy systems.

2. How does the organisational strategy of a financial institution affect adoption of blockchain technology?

Organisational factors determining adoption of blockchain technology include strategy and strategy execution. Issues around these factors include: organisational form, product and client mix, geographical scope of business, distribution channels, human resource management, product design and alignment of everything (Harker & Zenios, 2000). Organisational form in the financial sector refers to a determination taken by an organisation to align itself with the requirements of the market and the industry (Harker & Zenios, 2000). A study by Kopalle, Kumar, and Subramaniam (2020) in determining how legacy firms can embrace digital technologies found that one catalyst to change is sheer size and scope of an organisation. This question seeks to establish what challenges and concerns organisations in financial services face with adoption of blockchain technology because of their corporate strategies.

In following the research of Kopalle et al. (2020), the question further seeks to explore how large legacy firms can propel themselves towards the new digital technology by leveraging their vast resources. In other words, to identify how they can address the challenges and concerns that emanate from the corporate strategy. Verganti, Vendraminelli, and Iansiti (2020) found that organisational strategy is a determining factor in organisations adopting digital technologies. A "learning organisation", for instance, would find it easier to adapt its strategy to the disruptive technology that is blockchain as opposed to an organisation with a rigid setup. In consideration of this information, the question seeks to further establish what strategy changes are implemented by organisations to accommodate adoption of blockchain for the organisation.

Moreover, it has been found that digital technologies affect ecosystems, processes, human capital, technical setup, and organisations (Benbya et al., 2020). An organisation has to have multiple considerations prior to adoption of blockchain technologies as the technology has characteristics that increase complexity, such as

embeddedness of the technology, connectedness, editability, programmability, communicability, identifiability, and associability (Benbya et al., 2020). To establish the perspectives around this area, this question seeks to explore the effect of the decision to adopt blockchain on the organisational structure. Lastly, since this research is about how organisations in financial services can configure and align themselves for adoption of blockchain, question two focused on how organisations ensure that adoption of blockchain technology aligns with everything about the organisational strategy.

3. What environmental factors in the financial services sector influence an organisation's decision to adopt blockchain technology?

The environmental context explores the industry type, kinds of service providers within the industry, as well as regulation (Harker & Zenios, 2000). Industry type has a bearing on how competitive the players in the industry are. A study by Huang, Dyerson, Wu, and Harindranath (2015) explored the determinants of competitive advantage and found that to maintain sustainable competitive superiority, an institution has to possess technological resources that are not surpassed by the competition. In addition to competitive forces, the financial sector is a heavily regulated sector (Adams, 2017); adoption and use of new technologies may have to be approached in accordance with regulatory requirements.

Question three will help identify whether industry competition and regulations are a determining factor in the decision to adopt blockchain technology. In line with the claims of Kopalle, Kumar, and Subramaniam (2020) who find that large organisations can stay ahead of the competition by leveraging their resources and scope, this question will interrogate the role of competition in influencing the decision to adopt blockchain. This will in consideration of the technology's need for networks, which may connect competitors in the sector.

Additionally, since blockchain technology is new (Holotiuk & Moormann, 2018), it has attracted attention in the areas of law (Sun Yin et al., 2019). A question that legacy financial institutions must consider is what the regulatory implications are of adopting blockchain technology.

CHAPTER 4: RESEARCH METHODOLOGY

4.1 Introduction

This Chapter discusses the research methodology that was used in gathering the data for this study. Chapter 2 presented arguments around efficiency challenges of the financial services sector and presented blockchain as the solution for the identified challenges. Nevertheless, the same Chapter makes the argument that literature on the topic of blockchain and blockchain adoption is not prevalent as this is a relatively new topic on a nascent technology. The literature reviewed led to the adoption of the TOE Framework through which research questions in Chapter 4 were formulated. These questions became the guiding material for the in-depth, semi-structured interviews that were then conducted with individuals in the financial services sector, who have directly dealt with adoption of blockchain for different organisations.

4.2 Choice of methodology

This research sought to explore the decision-making framework of organisations regarding adoption of blockchain technology. While the financial services sector is made up of unique and complex institutions (Bazot, 2017), blockchain technology is a nascent invention in financial services with limited literature (Allen et al., 2020; Holotiuk & Moormann, 2018). The majority of the existing research into blockchain technology evaluates the benefits of the technology to the financial sector (Frizzo-Barker et al., 2020). Little, if any, research exists relating to organisational decisions around adoption of blockchain (Holotiuk & Jürgen, 2018).

Qualitative research was appropriate for this study (Holmlund, Witell, & Gustafsson, 2020), as the research addressed questions on how and why certain decisions were made with regards to adoption of blockchain technology. Because of this, the researcher found it incumbent to conduct an explorative study to uncover what those organisations who have adopted blockchain did right. An explorative research allows for gathering of data which will then be evaluated and simplified into information

(Bluhm et al., 2011) that will lead to a greater understanding of the topic. As such, this research took form of an inductive, exploratory, qualitative study (P. T. Bansal, Smith, & Vaara, 2018) where inductive theorising has helped explain blockchain technology as a new phenomenon (Bluhm, Harman, Lee, & Mitchell, 2011).

Following from the above, this research lent itself to interpretivism (P. T. Bansal et al., 2018) as the researcher sought to address issues of description and interpretation (Bluhm, Harman, Lee, & Mitchell, 2011). Ospina, Esteve, and Lee (2018) found that interpretivist qualitative studies are better at successfully explaining how researchers moved from raw data to research findings. Interpretive studies can highlight the role of specific events and practices and how they epitomise a particular time period from the perspective of the key actors involved (Bansal, Smith, & Vaara, 2018).

In terms of data collection, in-depth, semi-structured interviews were conducted with individuals who have been involved with blockchain technology adoption in financial services organisations. An interview guide was used to provide structure and direction of the interviews. By utilising an interview guide with this technique there was an opportunity for the interviewer to probe for further information allowing for an in-depth understanding of the answers provided. To fully understand the decisions around adoption of the new technology that is blockchain, a multiple case study design (Ridder, 2017) was adopted for this research, where cases of different organisations in the financial services sector were being studied for adoption of blockchain. Case study research is one of the qualitative genres (Bansal et al., 2018) commonly understood to examine a single phenomenon and understand behaviour within a real-life context (Rodgers et al., 2016). The researcher, through this study, set out to understand adoption of technology within the context of organisational settings.

Finally, due to the nature of the research being time-bound research, a cross-sectional study was implemented (Ridder, 2017). Primary data was collected, and not tracked, once-off over a time period. Bono and McNamara (2011) caution against choosing cross-sectional data for questions that involve change, while a justification made by this paper on utilisation of a case study above includes the explanation by

Bansal et al. (2018) that this research involves change and transformation. A clarification is required here that while the above implies this research studied change, its scope was, in fact, limited to organisational decisions surrounding implementation of change (adoption of blockchain technology), and not the change itself. As such, taking into consideration Bono and McNamara's (2011) advice to carefully match the research design to research questions to ensure the study measures the question of interest, the author is comfortable that a cross-sectional study was appropriate.

4.3 Population

For an in-depth understanding of the new topic of blockchain technology (Holotiuk & Jürgen, 2018), the researcher set out to explore management decisions around adoption of the technology by financial institutions. This was done through individuals in the financial services sector who have been actively involved with blockchain adoption for different organisations. The target institutions were asset management firms, banks, remittance companies, insurance companies (other than health), payment processing firms, financial advisors, and brokers, fintech providers, and financial regulators. Because the financial system is global, the study will be conducted on financial institutions from around the world.

4.4 Sampling

This study adopted a qualitative and exploratory approach (P. T. Bansal et al., 2018). This was influenced by the topic of interest, which is still new, with little literature (Allen et al., 2020). These factors already determine the sampling approach as inductive approaches rely on purposive sampling (K. Eisenhardt, Graebner, & Sonenshein, 2016). The selection of the sample was determined by their ability to provide the requisite in-depth knowledge on organisational adoption of blockchain. To enhance transparency, in accordance with recommendations of Aguinis, Ramani, and Alabduljader (2018), the sample included senior executives from banking, banking solutions provider, payments solutions provider, liquidity management, blockchain development consortium, consultants, investment, savings, insurance,

and banking group, believed to be representative of the population as described in the population section above.

Bono and McNamara (2011) reiterate the value of ensuring that the sample and procedures match the research question. This study identified the Technology-Organisation-Environment (TOE) framework to anchor the study. It was imperative that among other criteria stated, the interviewees were able to answer questions pertaining to all three factors of the framework. The sampling method for this research then was non-probability sampling, with twelve interviews targeted. Due to some challenges among them time constraints (this research being conducted at the end of the year around the holidays), blockchain being a new topic, some organisations not willing to be forthcoming about their blockchain plans as a business intelligence issue, and the target sample being senior executives, a maximum of ten interviews were conducted.

Ospina et al. (2018) present in their paper details of how about nine out of every ten studies they have reviewed failed to state why they selected their study sample. The respondents interviewed for this research for each organisation are individuals who have been actively involved in the adoption of blockchain adoption for financial services institutions. The following minimum criteria for sampling was used to select the relevant interviewees:

1. They have worked directly with blockchain adoption for financial services.
2. They understand the determining factors of the organisation adopting blockchain.
3. They understand the relevance of organisational strategy to blockchain adoption.
4. They understand the internal organisational factors that led to adoption of blockchain.
5. They understand the environmental factors with regards to blockchain adoption.

4.5 Unit of analysis

This research explored blockchain adoption by organisations. However, the data is collected from individuals representing these organisations. Spickard (2021) offers advice on unit of analysis in that data can be collected from individuals but a determination must be made whether the data will be analysed by the same units or different ones. He further advises that individual-level data can be combined to represent groups or organisations. In this case, the unit of observation will be the individual while the unit of analysis is the organisation (Spickard, 2021). Accordingly, the unit of observation for this study were the perceptions and experiences of the individuals that were interviewed and considered experts in blockchain adoption in financial services; while the unit of analysis are the organisations represented.

The unit of analysis is higher than individuals, as the study aimed to understand technology adoption at the organisational level. This is done in accordance with both blockchain technology, which is an organisational level innovation, and the TOE Framework, which theorises adoption of innovations at organisational level (Dwivedi, Wade, & Schneberger, 2012). Organisations that have adopted blockchain technology were sought to be studied in their entirety.

4.6 Measurement

4.6.1 Data collection tool and process

Qualitative research by its nature requires that the researcher interacts with the actors in a natural environment (Ospina et al., 2018). This, by definition, makes the researcher the primary instrument in data collection. However, qualitative research provides a myriad of options with regards to data collection and flexibility of analysis (Bluhm et al., 2011). Important to this is alignment of data collection and analysis methods with the research question (Bansal, Smith, & Vaara, 2018). The data collection method for this research involved semi-structured interviews (Blandford, 2013; Bluhm et al., 2011b), as the researcher aimed to explore the topic of blockchain adoption by organisations.

To lend guidance to the interview and ensure the respondents stayed on topic, an interview guide was utilised (Blandford, 2013). This guide, displayed in Appendix 1, contained open-ended questions emanating from the research questions of this study, which were in turn based on the three elements of the TOE Framework, the theory grounding this research. In totality, the questions were deemed to be able to provide enough information to guide the interviews to determine the interviewee's organisational strategies for adoption of blockchain technology. The interview guide allowed for a tangent and further data collection once unexpected valuable insights were provided. Allowing for flexibility in the interviews was concurrent with the exploratory nature of the research as already explained.

For this type of research, data collection was done through interviews. Due to the effects of COVID-19 where movement was limited and in-person face to face interactions were risky, the interviews were conducted online through Zoom. This was also because all the interviews were conducted with participants in geographic locations different from that of the interviewer. Operating through Zoom allowed the interviewer to go on not only the verbal responses of the interviewee but also the non-verbal cues observed during the interview that could be vital to the research question. The research Participants were provided with an informed consent letter, shown in Appendix 2, which they were requested to sign and send back to the researcher. The data was recorded together with notes taken during the interviews.

4.6.2 Quality controls

The most commonly emphasised quality standard for qualitative research is that it should be transparent (Bluhm et al., 2011b; Symon, Cassell, & Johnson, 2018). This communicates to the reviewers of the research the credibility of the methodology of research and that the findings are therefore justified. This further ensures that the results and conclusions drawn by the research are not influenced by inaccurate judgement calls and decisions (Aguinis et al., 2018). Enhanced transparency in qualitative research improves replicability (Aguinis et al., 2018). Careful consideration must be made that there is no trade-off between transparency of the methodology and appropriateness of methodology (Aguinis et al., 2018). As already emphasised, the methodology of this research was designed to be consistent with

the standards of quality required to appropriately answer the research question. This was epitomised by making the methodological choices of this research explicit.

To Ensure Data quality (Blandford, 2013; Ospina et al., 2018), the instrument, which for this research was the interview with an interview guide, was designed, to the best ability possible to, *sufficiently address* the research question. The guide was developed to address the three elements of the TOE framework. The technology element highlighted the technological needs of the organisation; relative advantage of blockchain technology; and compatibility of blockchain with legacy systems. The organisational element focused on the strategy of the organisation. Within this element are considerations of efficiencies and costs as driving factors, as well as resulting benefits of blockchain adoption. This was in consideration of the literature which suggests blockchain technology addresses these factors. The environmental element addresses competition as well as regulations.

Secondly, the instrument was designed to *accurately reflect* the research question of the study. Ensuring that the data collected by the interviewer answers the research question reduced an occurrence of incorrect conclusions. The design of the interview guide allowed for the interviewer to gather all the minimum data required to answer the research question as suggested by McIntosh and Morse (2015). However, it was so developed as to allow the interviewee to provide as much information as possible, where the interview can be steered towards valuable tangents (Blandford, 2013; McIntosh & Morse, 2015).

To ensure that the questions asked were understood by the interviewees, a pilot study was carried involving two steps. First, an unstructured exploratory interview where the respondents were asked to relate the key concepts of the research question. Second, this information was used to construct an interview guide with which the interviewees will be requested to paraphrase the questions and relate to the author what they believe the questions intended to find out. By going through this process, the author believed the data collected through the semi-structured interviews would be consistent with the requirements of the study and aligned with the methodology in answering the research question (P. Bansal et al., 2018; Ospina et al., 2018; Symon et al., 2018).

As already elaborated, this research was anchored by the Technology-Organisation-Environment framework (Baker, 2012; Tornatsky & Fleischer, 1990). Literature has different constructs for each of the three factors of the framework. The author took careful consideration not to have an interview too long such that it might deter potential respondents from the willingness to assist. To avoid the length of the survey becoming a point of concern (Bono & McNamara, 2011), the author adapted from the literature the constructs that were deemed more relevant to considerations of adoption of blockchain technology. A consistency matrix shown in Appendix 3 was used to ensure this consistency between the interview guide and the literature review.

4.7 Research Limitations

Firstly, one of the limitations of this study owes to time constraints. This research was expected to be completed on schedule, and such, it took form of the most common forms of qualitative research in management (Bluhm et al., 2011) that have been prescribed. This constraint dismissed other considerations that could have improved the research and its findings. The data collection period for this study was mostly at the end of the year where participants would generally be on holiday. This presented scheduling challenges that were beyond the control of the researcher.

The second limitation of this study is with regards to the research sample. While 12 interviews were planned, only 10 could be conducted. This was due to a few reasons: the first is what is highlighted above with regards to the time of the year where it would be difficult to obtain commitments from potential participants. The second reason for this limitation is that blockchain technology is a new technology and experts on the topic of blockchain technology adoption are few. This then makes it hard to identify the relevant participants for the study. The third reason for this limitation owes to the sensitivities around blockchain adoption by financial institutions as it is a business intelligence and competitive issue. Because of this, some organisations are not willing to divulge their considerations of blockchain technology for fear of losing this competitive edge. Another such challenge is with regards to regulations, where for many jurisdictions in the world, there is a lack of regulatory

clarity on adoption and use of blockchain technology. Depending on the type of blockchain in consideration by institutions, they would not be forthcoming with information for fear of punitive measures.

The third limitation is concerning the researcher's lack of professional interviewing training: an obvious enhancement to the interview quality would occur had the interviewer had interview training. The author notes the limitation placed on the study by their lack of professional training.

Fourth, the theoretical framework of choice for the study also presents limitations. The research used the technology-organisation-environment framework amidst availability of the gamut of technology adoption theories. This framework is not a perfect fit for the research question, but determinedly the most appropriate as the topic of research is new and organisation oriented, while most technology adoption theories/models are either user/individual-oriented or require adaptations to answer the research question for this study. The TOE framework does not require to be adapted as its three factors cover the bases of the constructs of the research topic.

The fifth limitation is that the sample population is not representative of the entire financial industry but rather a dominant section of the industry. For example, most of the perspectives from the units of observations were related to banking institutions while non-banking financial institutions, regulators, blockchain companies, and remittance companies are under/not represented.

CHAPTER 5: RESULTS

5.1 Introduction

This chapter presents key findings from the semi-structured interviews that were conducted with the 10 participants for this study. The participants were experts in blockchain in the financial services sector. They were drawn from different financial institutions and held different positions. Of guidance to the presentation of the results in this chapter are the research questions highlighted in chapter three. A qualitative analysis of the interviews was conducted in relation to the research question. This led to the emergence of themes that are presented in this chapter. This chapter presents at first, a description of the participants of the study, followed by the presentation of the results of the qualitative interviews.

5.2 Description of the sample

The table below depicts the 10 participants interviewed for the data gathering and analysis process. All participants were from the financial services sector, working, or having worked for various leading financial institutions from different geographical locations around the world.

Table 5.2: Interview participants in order of interviews

RESEARCH PARTICIPANTS		
Participant	**Roles and Responsibilities**	**Interview Length in minutes**
Participant 1	Blockchain discipline leader at one of the largest banks in the world, based in Europe. The blockchain discipline is part of the client Solutions strategy department. The Department oversees the digital transformation of the bank, moving from the traditional banking business to the new digital	60

	banking world.	
Participant 2	Platform lead for one of the investment banks in South Africa, looking after people, the system, and the banking product, having been the product developer for blockchain for cross-border payments.	45
Participant 3	The global chief technology officer for a financial technology (Fintech) company operating in Cameroon.	25[1]
Participant 4	Founder for a global digital exchange specialising in public utility blockchain.	56
Participant 5	Business manager for a global liquidity management and international payments provider for decentralised financial networks.	50
Participant 6	A freelance strategy consultant who works in financial services strategy and blockchain projects.	61
Participant 7	Innovation lead for IT for an international financial services company	64
Participant 8	Country-Lead for the world's biggest blockchain company.	60
Participant 9	Chief technology officer at a bank in South Africa, also involved with Research and Development for the bank.	50
Participant 10	Recently blockchain architect for one of the world's largest financial value processor. Currently working on financial services products.	50
	Average	**52**
	Total	**521**

[1] Participant 3 provided overall short and direct answers to the interview questions, leading to the interview time being significantly shorter than others.

The names of the participants as well as their respective organisations are withheld on the promise of anonymity. The study sought to gain an insight into the individual

perspectives of experts in the financial services sector, whose roles are displayed in the table above. These participants were all senior-level executives of higher and have worked directly with blockchain for the respective organisations from whose experiences they drew. Their roles and responsibility are shown to demonstrate their relevance to the requirements of this study and its objectives. The participants were drawn through a search of financial services institutions that have adopted blockchain, mainly from information obtained on public record, as well as a targeted search on LinkedIn, where they were then contacted and requested to participate in this study.

Data collection took place between late October 2020 and early March 2021. The researcher had targets to conduct 12 interviews. However, due to some challenges, among them time constraints (the data collection period being at the end of the year around the holidays), blockchain being a new topic, some organisations not willing to be forthcoming about their blockchain plans as a business intelligence issue, and the target sample being senior executives, a maximum of 10 interviews were then conducted with the participants. The interviews were all held online through Zoom video call. Owing to the social restrictions and health requirements of Covid-19, Zoom was determined by the researcher the most effective method through which interviews could be conducted. The participants displayed an immense understanding of the topic and a willingness to share perspectives.

5.3 Coding Process

All interviews were recorded with the consent of the participants. The recordings were stored locally on a computer to which no one except the researcher had access. The audio recordings were transcribed then loaded to Atlas.ti, a data analysis software. Codes were generated from the transcripts, as shown in Appendix 4. These codes were grouped into some categories, in accordance with the research questions in Chapter 3 as informed by the literature review and theoretical framework in Chapter 2. The theoretical framework used for this study is the Technology-Organisation-Environment (TOE) Framework (Tornatzky & Fleischer, 1990). The three constructs of the Framework informed the three research questions, which

were each based on each of the constructs. Once the codes were grouped accordingly, themes emerged, which will then be used for the presentation of the results in this Chapter. The following table displays the themes that emerged per research question.

Table 5.3: Research Themes

RQ	Themes		Sub Themes/Categories
1	1	Systemic Challenges	Operations Processes Costs
	2	Blockchain Ecosystem	Ecosystem Participation Ecosystem Collaboration Ecosystem Knowledge
	3	Technology	Blockchain Characteristics Blockchain as an Enabler Inherent Blockchain Advantages Business Case for Blockchain Value Proposition of Blockchain Compatibility with Existing Systems
2	4	Organisation	Adoption Considerations Organisational Knowledge Organisational Culture Top Management Support Alignment Adoption Benefits
3	5	Environment	Role of Competition Role of Regulations

In accordance with the objectives of this research, there must be a case of working towards adoption of blockchain technology. This process includes two major phases, each of which contains some steps. The first major phase of the process is building a comprehensive business case for blockchain technology, and the second phase is

building an organisational adoption plan for the technology. Accordingly, the thematic categories for the research questions present an opportunity to detail the elements that are necessary to be able to build and articulate the business case for blockchain technology, and then build an adoption case with the rest of the categories.

5.4 Results: Research question 1

Research question 1

What are the major qualities of blockchain technology that are considered to provide organisational efficiencies?

The purpose of research question one was to establish what business need financial institutions have for blockchain technology. Within this aspect was the need to especially explore what business challenges the participant's organisation was facing. Once a business need had been identified, it was important to establish whether other technologies than blockchain were considered. This established whether, and how, blockchain was considered the best solution for the business challenge faced by the organisation. The themes that emerged from the results to research question one are displayed in the table below.

Table 5.4: Themes emerging from research question 1 results

Themes		Sub Themes/Categories
1	Systemic Challenges	Operations Processes Costs
2	Blockchain Ecosystem	Ecosystem Participation Ecosystem Collaboration Ecosystem Knowledge
3	Technology	Blockchain Characteristics Blockchain as an Enabler Inherent Blockchain Advantages Business Case for Blockchain

		Value Proposition of Blockchain
		Compatibility with Existing Systems

The themes that emerged are systemic challenges; the role of the blockchain ecosystem; and blockchain technology.

Theme 1: Systemic Challenges

5.4.1 Efficiency challenges of financial services

The participants highlighted some of the challenges of the financial services sector as the main reason blockchain exists and has a business case. These challenges could be grouped into, operational challenges, process inefficiencies, and costs resulting from the use of legacy systems.

One argument is that traditional systems are cumbersome in their set-ups. In detailing a decision-making process for an efficient cross-border payment rail, Participant 2, who works for a commercial bank, explains the challenges of setting up cross-border payment infrastructure through the traditional system.

> Participant 2: "*You need to have your servers in place at both ends to be able to send and receive the payment messages and then need to be able to do clearing of money with your central banks. So, it compounds. In the end, it was easier to go with blockchain because you don't have a lot of these compounding things which you need to solve for, and then what you're going to need to maintain and then going to have to pay money for.*"

Another argument is that there is no traceability of transactions, and therefore transparency. Participant 4 spoke of the challenges with traceability of transactions within the current global financial system, which is neither efficient nor transparent. The Participant highlighted this by saying: *"We're busy with the traceability application. So, the need for public ledgers that are free is massive. And with our model, we pay for the infrastructure and we're now moving it into all sorts of*

industries." This was supported by Participant 5, who illustrated the challenge with tracing payments through legacy systems, by highlighting that when a payment is made from South Africa to Botswana: *"There's no way to trace that payment through an entire value chain. So, once it leaves my bank account, it now gets netted off with some other transactions at the bank."* The inefficiency is compounded by the fact that such a payment: *"is following six loops. And when it hits your bank accounts, there is no way to trace where that money came from."*

Yet another argument is that the centralisation of information that exists in the legacy financial system hinders quick access, if any, to information. Participant 8 explained how after being the Chief Executive Officer (CEO) of a financial institution for twenty years realised that centralisation of information was a challenge for the company as well as parties with whom it dealt.

> Participant 8: *"We centralise all the information of all the trades in the South African financial market. We held the register. We kept it like this secure, secret. It was rubbish because every time that an investor wanted to know their positions in real-time, we couldn't give that. When the issuer wanted to know who's buying and selling their stock, we couldn't give them that information. Why? Because the register had been hidden from everybody between all the intermediaries."*

In addition, there is a challenge of settlement times which has been a concern for some people. Participant 10, who has worked for one of the largest clearing houses in the work, displayed an understanding of this concern, through an explanation that: *"There's also issues with settlement times. A typical transaction at DTCC is a two- or three-day settlement time. And with these leveraged accounts, that presents problems sometimes during high volume and stress, when the system is stressed."*

Finally, the financial services sector faces challenges of costs. This is especially relevant during the effects of the Covid-19 pandemic, where businesses have to be cost-sensitive. Participant 2 commented, highlighting that: *"there's a lot of pressures coming on being cost-conscious. So, the biggest one is just providing the cost benefits, being cost-aware and so on."* The participant continued by introducing the

benefits of blockchain in consideration of the challenge, saying that, "*In itself, the technology provides you with ample cost benefits; it's cheaper, it's easier. So the lifecycle cost is cheaper to introduce and cheaper to maintain. That's one big factor*"

The argument made by Participant 2 was supported by Participant 4, who, in talking about the business need for blockchain, also highlighted the costs that result from traditional banking that can either be reduced or eliminated with blockchain technology, stating that with blockchain technology *"you don't have settlement group registry, you don't need to insure against that. So all of those costs now disappear […]. And then what it does is it eliminates the biggest cost in banking."*

In working towards building a business case for blockchain, the first step would be to understand the challenges that are faced by the organisation. The three that have been identified by the participants are around operational efficiencies, process efficiencies, and cost reductions from blockchain. Once the challenges faced by the organisation, or the sector are identified and appreciated, attention can be focused on the economic subset that brings about blockchain technology, that is the blockchain ecosystem and how it is beneficial to businesses that are utilising blockchain. This ecosystem is able the focal point for gaining first-hand information about blockchain technology itself.

Theme 2: Blockchain Ecosystem

5.4.2 Blockchain Ecosystem

Blockchain technology exists as and within an ecosystem. The decentralised nature of the technology means it is developed by different people often with differing skills and geographic locations. As such, there is a benefit where challenges faced by users of the technology can be solved by the developers. Not only that, but the technology is also meant to be used within and through networks. Because of this, it behoves financial institutions to understand the dynamics of the blockchain ecosystem. This can happen through both participation in the ecosystem, and ecosystem collaboration. Participation ensures knowledge sharing, while collaboration ensures network developments. This section analyses participants

responses by considering the ecosystem, ecosystem participation, ecosystem collaboration and ecosystem knowledge.

5.4.2.1   Ecosystem Participation

To begin with, one of the participant's organisation has a blockchain strategy, which is crystallised into three elements. One such element is in consideration of the blockchain ecosystem. The participant explained one of the organisational blockchain strategy elements.

> Participant 1: *"The second E would be Ecosystem. So being very active in the ecosystem, participating in the main blockchain consortia globally. So, we have been part of Hyperledger. We have been part of R3, we are part of INATBA, European blockchain consortia. We are part of Alastria which is a Spanish blockchain consortia. So, we try to be in the main consortia globally and locally that are dealing with blockchain technology."*

In the second place, the participants explained that some benefits are derived by financial institutions through ecosystem participation as it provides awareness of the developments in the ecosystem, as well as accord an opportunity to influence the development of blockchain technology.

> Participant 1: *"So we are following very closely the different developments all around the world regarding CBDCs and stablecoins. And we are participating in the World Economic Forum in a round table around how CBDCs and stablecoins can impact the traditional financial markets. And we are also actively participating with the national payments clearing house in Spain, Iberpay in our project around programmable payments and programmable money."*

Moreover, there is an identified need to participate in the blockchain ecosystem, especially for the benefit of defining the industry, a stance that is preferable to market or industry leaders. Crystalising this point, Participant 2 highlights that, *"you need to be part of the forums for those conversations. Because one day it's going to come*

into the equation, it will go mainstream, but you have to be there to influence the direction of where this is taking."

This point was supported by a practical example from Participant 4 on both participating and influencing the industry.

> Participant 4: *"And then we've recently last year became part of the working group for Bank of International Settlements and the, and R3. And we, part of the central bank working group, that's defining the standards for CBDC across the world. So, it's the bank of England, European Central Bank, Bank of Japan, Bank of Canada, Switzerland, uh, and about 40 others now. And I'm, I'm on the technical committee. We are creating a sandbox for CBDC wholesale and retail and our exchange will be the first exchange that will be trading in that."*

However, despite this participation in the ecosystem, Participant 4 still expresses frustration at the development of the blockchain ecosystem, with specific emphasis on the South African context. This is because Participant 4 owns, and advocates for, businesses that fully utilise blockchain technology, while the rest of the influencers in the ecosystem are legacy financial institutions with a different understanding of how blockchain can best serve the economy of the country, commenting with concern that *"I've been working with the Reserve Rank and keeping them in the loop from when I started. We have regular interactions, but I'm afraid that the banking cartel controls the Reserve Bank and not the other way around."* This frustration has led to the participant establishing own blockchain-based bank.

On the other hand, Participant 6 argued the overall positive benefits of ecosystem participation. The point also addresses the issue of business case articulation raised earlier. This happens in a few ways. First, a collaboration between the technical experts and the financial services institutions means there is a general development of technology that can better serve financial institutions. Second, this participation in the ecosystem is endorsed by the Reserve Bank, whose credibility in the financial services sector is undeniably paramount to ensure maximum attention to the matter. The Participant states that "*you've got the guys innovating an outside of the big*

organisations, and you've got guys inside big organisations who understand the industry, and the real change happens when the two come together."

Nevertheless, Participant 8, who develops blockchain solutions for the financial services sector emphasises the point that the method through which services is offered for this product encourages active interaction with the technology.

> Participant 8: *"You know, so what I'm saying to you, it's experiential. So, we build sandboxes. So, we saying to people, okay. You don't know how it works. Don't worry. Give me the opportunity to put you into my, excuse me, my sandbox and you play. You can do a proof of concept. If you're more secure as to what you want to achieve, like a POC is when you don't know what, what problem you're trying to resolve that is just play, play. Then we have the pilot. The pilot is when you know exactly your problem, we sit down with you, we define the problem, we give you the basic vanilla technology that resolves the problem. And we say, go and play. Then we have this method called agile. So, we meet with you every second week and we hear, okay, tell me your experience. Tell me what works. Tell me what doesn't work. Whatever you tell me, I go and fix it. And I give you the next version. And the next version, by the time two, three months have gone, your pilot is ready to go into production. And then we do the development for production."*

Participant 9 echoed the sentiments of the other participants by also deliberating on the benefits of ecosystem participation in contributing to the business case of blockchain technology, stating that in South Africa, *"we have the South African Blockchain Financial Consortium, that large number of financial institutions, non-financial institutions were part of. In the beginning […] we identified use cases we wanted to test and to see if the technology would solve."*

The contributions from the participants showed that the blockchain ecosystem is comprised of blockchain technology developers, financial technology (fintech) companies, formal financial institutions, as well as financial regulators. Naturally, such a grouping of entities that are all interested in the growth of the technology would present an opportunity for all to gain insights from each other on how the

technology can best serve business. For Participant 1, this means that an organisation can derive knowledge from the ecosystem, then develop an internal blockchain business case.

> Participant 1: *"And we are so based on the ecosystem knowledge and on our experience on the project we have been doing that help us a lot to decide. So, for example, on the private blockchain space, we understand that we have tested enough now and that we have a clear knowledge of what we can do with the technology, for what use cases in that space we are now, attacking our business teams so that they can join the solutions that are going live."*

The participant continued by elaborating that such a decision to join live solutions "*is a business-driven decision. So, if [our business teams] see business in that platform, they will join."* The participant further explained the role of strategy in encouraging such participation by the bank, and that the approach is, *"We think it could be something that could have a great impact on the bank, in the future, and that we have to be there, and understand it very well. So, it's a way to position and to prepare for the future."*

Moreover, an organisation can gain vital knowledge by taking part in the blockchain system. Furthermore, ecosystem knowledge allows for blockchain technology users to be able to solve challenges presented by the technology by drawing from the knowledge pool that exists in the ecosystem. Where this is usually outside of the organisation as this paper implies, there are some costs benefits realised by the organisations, since the technology is managed by community participation.

> Participant 2*: "whenever there's a need for skills or for training, or for that sort you almost guaranteed that somebody in the community will contribute that which is needed. So, you're almost guaranteed to get a lot done without spending additional amount of money on training, or licensing and other things."*

This point is supported by Participant 4, who recalls that the big impact blockchain had was that *"we had to go offshore for our development. And we landed up doing*

development in India via Canada, and then Australia. And so, definitely one had to look around for the best global expertise." Participant 10 also agrees with the other participants on the value of the ecosystem.

Participant 10: *"a lot of what happens in these tech meetings and boardroom meetings around the globe is that there's certain people on the tech side who can begin to understand business, such as myself. And then there are other people who come from the business side but can pick up the tech really well. So, when you kind of have these bridge, cross-functional people, working with you, they have an understanding of the operations and they have an understanding of the talent needs, and they have an understanding of where the technology's going."*

5.4.2.2   Ecosystem collaboration

The blockchain ecosystem is necessary to ensure both the development and utilisation of the technology. This collaboration occurs when different parties interested in blockchain combine their efforts to develop blockchain products that are targeted to some identified challenges, or for experimentation purposes.

To begin with, one of the most important foundations of blockchain is that it requires a network to operate. This is the need and benefit of collaboration within the blockchain ecosystem, as emphasised by Participant 1 that *"blockchain technology is something collaborative. So, it's something that has to be built within an industry or even cross industry, you know, at very big levels."* The Participant continued to elaborate on the creation of the ecosystem and the business case for blockchain, which is *"really difficult because at the beginning you have maybe five, four actors in the ecosystem, and that's not enough to generate numbers, volumes to generate business."*

In the second place, there is a need for all parties to get involved. This is highlighted as one of the harder objectives to achieving in building a functional ecosystem in blockchain because all the parties to the ecosystem are needed.

> Participant 1: *You need to bring everyone on top on board. And this is one of*

the challenges that blockchain has that you need to, it could be transformative, but you need everyone to be on board. And this is not easy when we are talking about supply chain finance, for example, you know, you don't only need the, the banks, you need the banks, you need the insurers, you need the transport agencies. You need the customs, you need everyone in the same solution in the same blockchain platform in order to make it work. And this is a real challenge. It will take years."

Then, when the parties to the ecosystem are involved, there are some cost benefits to the parties that can be derived from the collaboration. This is highlighted by Participant 2, stating that the technology is *"developer orientated, or community orientated. So that means you can tap into multiple developments from all over the place, all over the countries."* Participant continues by commenting on the benefit of this collaboration especially on the skillset that exists with regards to blockchain technology, where "*initially, I said the skillsets is a problem, but if you remove your individual use case and you look at the tech itself as a foundation, there's enough contributions to make it robust, to make it stable."*

Another foundational benefit that emanates from the collaboration is that there is knowledge sharing that occurs, leading to the development of both the technology and the financial services sector. Participant 6 details this by saying that when *"you combine the deep understanding of the industry with a deep understanding of the technology and […] once you put those two together, you start to rebuild the industry or using a new technology and things change radically."* This is supported by Participant 7 who, however, considers that it would be more beneficial if the financial institutions agreed on one type of blockchain because "*interoperability with blockchain is still a problem. So, they have to agree to go on one blockchain platform so they can talk to each other, and what this will do is that it will create efficiencies for the industry."*

The blockchain ecosystem and blockchain technology itself are interdependent. The blockchain ecosystem exists because the way the technology has been designed requires such an ecosystem to function. However, the existence of the ecosystem determines iterations of the kind of blockchain technology that is produced, usually

tailored to optimise benefits for the members of the ecosystem. Therefore, the blockchain ecosystem gives blockchain technology its characteristics, as explored with the research participants below.

Theme 3: Technology Considerations

5.4.3   Blockchain Characteristics

5.4.3.1   Blockchain as an enabler

Blockchain technology is considered an enabling technology. As explained by some of the participants, the technology provides a platform that, first, performs as a base for other technologies, enabling such technologies to perform more efficiently; and second, allows processes and operations to run more efficiently. Participant 1 makes this point by explaining that blockchain allows Central Bank Digital Currencies and stablecoins to both operate through blockchain technology, "*using blockchain as an enabler or as a different way of doing interbank processes.*"

This point was supported by another participant, who highlighted that "*technology comes next. The first thing is the product that you're trying to build.*" Another participant opined on the role of blockchain technology being to enable achievement of a corporate strategy, stating, "*[…] if you had a strategy of seamless frictionless transacting for your customer base, that would be your business strategy at a high level, you would then look for technology that would enable that business.*"

In another instance where the role of blockchain in business has been discussed, Participant 1 explained how the technology would allow a bank to conduct transacting where trust is an issue, with blockchain ensuring business transact where otherwise it would not occur.

> Participant 1: "*When you are working with, with, with counter parties that you don't know very well or that you don't trust. You can use blockchain as a trust system to make sure that everything is correct, and that everything is going to work perfectly and that they are not going to be any issues.*"

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An exploration into the value proposition question enabled the researcher to gain an understanding of the qualities of blockchain technology that the participants believe provide the most value to financial services in its natural form.

5.4.3.2 *Inherent advantages of blockchain*

Blockchain was developed with a view in mind to create an efficient financial services sector. As such, it is a technology that is imbued with some inherent advantages that provide improvements to the financial services sector. All participants commented on the value proposition of blockchain technology by highlighting some advantages of the technology. The most prevalent are discussed below.

5.4.3.2.1 *Transparency*

Some of the participants have commented on the superiority of blockchain brought by its ability to provide transparency where it is most needed. Among these is Participant 5, who comments on the potential advantages of a transparent system provided by blockchain.

> Participant 5: *"The next thing is that you've got a shared ledger of information. So right now, the data sits in many silos around the world. Where it's repeated in a lot of ways. If you take something as simple as our identities right now you know, I don't know how many places have got my name, my cell phone number, my email address, my ID number, et cetera. And the idea with using blockchain is that you end up with the shared ledger of data that everybody can access, but some of the beauty is that you can permission that blockchain, that people only see what they need to see."*
>
> Participant 8 also commented on the benefit of the transparency from a single ledger available to everyone. While narrating Satoshi Nakamoto's thoughts while producing the Bitcoin Whitepaper (Nakamoto, 2008), Participant 8 wondered, "*what if we have one ledger? Everybody inputs the same information. Everybody gets to see one version of the truth."* Further to this,

the participant commented on the efficiency with which auditing will occur, stating, *"the auditors [will] get information real-time, the regulators, the tax man, whoever, and you won't need a bank. You don't have to cover bank."*

One of the main selling points of blockchain technology is that with its transparency it provides what has been termed by some of the participants as the golden source of truth. This ensures that the data that is transferred within the blockchain network is trustworthy, or tamperproof. Participant 1, who considers blockchain to have the capability to simplify complex reconciliation processes. Should all banks work on a blockchain system "*for exchanging assets or exchanging money, we have a single source of the truth. So, a single record that is shared by everyone. Now each one of us has a record and a view of the truth."* Because of the availability of this single source of truth, Participant 1 opines on the current reconciliation processes which are expensive and complex, that *"all this could be improved by having a single system shared by everyone where their positions are in that system. So that way, I know that that's the reality, and I don't have to reconcile because that's the single ledger for everyone."*

On commenting on the benefits of blockchain technology to the financial services sector, Participant 4 simply said, *"the fact that you're having an immutable ledger, one version of the truth"*, while Participant 5 agreed that *"[…] there's a few key things from blockchain. The first one is that you've got an immutable record. So, it's a record that nobody can go back and change any historical transactions in that record."*

Participant 8, while echoing the sentiments of other participants, is an accountant by profession with an interest in ethical business. This resulted in the perspectives being about auditing, where blockchain enables auditors to be able to identify that which enables them to help business function according to the law. In the current financial system, at least three ledgers have to be prepared for different parties with interest in the transaction.

Participant 8: *"So, you can see that when you compile books and records in*

a company, you compile one set for internal book and record another set for the shareholders, another set for tax men, in this case, create one version of the truth, and everybody can see it real-time. The audit assistance, the audit is done real-time."

5.4.3.2.3 Network Security

Blockchain technology provides secure channels for recording, storing, and transferring data. Some participants shared their perspectives on the advantage of blockchain with regards to network security.

Participant 2 commented on the inherent secure characteristic of blockchain technology, stating that blockchain itself is, *"designed on the notion that it must be secure, right? So, there's no additional need to start considering how much firewall you need on top of this, because it's designed in architecture, the security that is considered in it.".* In agreement was Participant 5, who simply stated, *"it becomes far more secure for people to not to let their database get corrupt will be a single source of failure.".* Furthermore, Participant 9 commented on the secure nature of blockchain eliminating concerns that some users might compromise the network, saying that blockchain *"has a built-in a proof mechanism, so that you don't get any false players in the ecosystem. So, the technology itself lends you to that type of use case."*

Participant 10 highlighted some potential risks posed by the legacy systems during long settlement times. The introduction of blockchain would, among others ensure that "*instant settlement solves all those problems, both from a security standpoint, both from a global systemic risks standpoint, and more than anything from a privacy standpoint."*

5.4.3.2.4 Data Security

As already highlighted above, blockchain technology provides data security to which three of the participants commented. The first was Participant 3 who commented that *"blockchain technology is a way to represent the data, right? I mean how do you present data in a manner that the data is always secured and fool-proof"* The

Participant continued that, *"if the data is going over the network, and if it is blockchain data structure, then the other party would know that the data has not been altered."* In support of this view is Participant 5, who views the security value of blockchain to be on *"the two key aspects are data protection around personal information, how that gets handled."*

Participant 10 especially commented on the hesitation of business to utilise blockchain technology as there was a lack of understanding of the security advantages of blockchain technology, especially in the beginning, stating, "*the industry was reluctant to get, have their mission, critical data running, you know, running through a distributed ledger at the time."*

5.4.3.2.5 Disintermediation

Blockchain technology exists to remove intermediaries in transaction. Exactly what types of intermediaries can be removed depends on the type of blockchain in question. Some blockchains exist to render the formal financial services sector irrelevant, while some exist to streamline processes within the financial services sector and within organisations to ensure process efficiencies. As Participant 4 explains it with regards to payments, *"so, you dis-intermediate, you take out a whole lot of intermediaries where you would need a trusted person to release funds."* An efficient summary of this point was made by Participant 8, where the clarification on disintermediation was made as "*everything about the fact that you won't need intermediaries.*"

5.4.3.2.6 Blockchain enabled trust

Another advantage is blockchain is that it is a technology that enhances trust in transactions where trust has not been established, yet necessary. A few of the participants commented on how blockchain allows business to occur under such circumstances.

> Participant 1: *"[…] when you are working with counter parties that you don't know very well or that you don't trust, you can use blockchain as a trust*

system to make sure that everything is correct, and that everything is going to work perfectly and that they are not going to be any issues.”

Participant 5 ventured the disadvantages of a centralised system, contrasting it with blockchain technology, where *“you also are not prone to having any sort of corruption by a central authority.”* This becomes beneficial especially in emerging countries, where Participant 5 continues to explain that “*you might be sitting with something like a deeds office that's keeping record of home ownership and those records can often become corrupt by having the shared ledger where people all contribute to that source of truth.”*

Notwithstanding the above advantages of blockchain technology, some participants have highlighted that blockchain may not necessarily be the best solution for challenges faced by the financial services sector, and especially for challenges that had been identified by their respective organisations. First was Participant 3 who answered the question of whether blockchain was the best solution for identified organisational challenges by saying, *“I don't think that the blockchain technology personally speaking was the best solution, but it was the best workable solution at that time.”*

Participant 5 was in support of Participant 3, where the sentiment was that challenges faced by organisations can be solved through other means, and that blockchain technology is *“one of the technologies that you could use. But I think a lot of people have applied blockchain because it seemed like a good thing to do.”* In addition, Participant 7 also finds that blockchain may not be the best solution for challenges but becomes the solution of choice through purposeful matching with some challenges.

> Participant 7: *“So I don't know whether it's the […] best solution. I've also found that typically with technology, people like, like blockchain is a bunch of techies that come up with this technology. Not a bunch of businesspeople. They normally come to you and go like, Hey, I've got this cool tech, give me a business case. Now you're like, I don't understand your tech, here's a use case. And then they want to sit on your head and ask you a whole lot of*

questions about this use case and then demonstrate it on the platform. And you're like, okay, so what, and how does this integrate with my 175-year-old organisation? You know? So, um, yeah. I'm not sure whether blockchain technology is the best yet. I'm not yet convinced, even though I have written of paper for the African Union on blockchain."

After an understanding of the characteristics of blockchain, some of its use cases can be interrogated. An introspection into the characteristics first allows for an understanding of blockchain where its use cases are enabled by a lot of its natural characteristics. Where there is no direct link between a use case and a characteristic, then the characteristics are an underlying layer allowing blockchain to perform better than traditional systems at such a use case.

5.4.4   Business case for blockchain

Thus far, there has been an appreciation of the challenges faced by financial institutions, as well as the existence and benefits of the blockchain ecosystem. The research Participants were asked what business need their organisations had for blockchain technology, and whether there were any challenges the organisation was facing. Of importance is being able to articulate the business case for blockchain technology. A discussion with the participants has shown that organisational knowledge and understanding of blockchain rests on this ability. However, the participants have also commented on the fact that business case articulation has been and continues to be one of the bigger challenges in financial services.

5.4.4.1   Business case articulation

Once the financial services sector challenges have been understood and the blockchain ecosystem appreciated, there must be an understanding of the fact that adoption of blockchain has been slow partly because of the inability of individuals to articulate a business case for blockchain. The participants were aware that articulating the business case for blockchain technology is a challenge both within and outside the financial services sector. In the beginning the technology was developed by individuals whose business currency was not up to par with their

technological currency. They were able to develop products whose marketable value they were not able to articulate to those for whom the products were developed, being, financial institutions. Interestingly, even experts within the financial services sector find it hard to articulate the business case of a technology that is not only new but is meant to be a base technology, and customers will not directly interact with it.

Participant 1 works for one of the world's largest financial institutions as the blockchain vertical lead and explained the challenge around crystalising the business case for blockchain within the organisation. In this case, articulation of the business case is reliant on being able to understand the value proposition of blockchain within the organisation. The challenge with Participant 1 was that *"the main driver is it's been business oriented, so there should be a business case, but obviously we have to do a risk assessment, a compliance assessment, a legal assessment. And in some of the cases, we have had problems."*

Participant 2 explains that the *"the first approach was to look at the business value,"* which will then be the main driving factor for crystalising the business case. Where value to the organisation can be understood, building a clear business case will be possible.

> Participant 2: *"And then you get the ability to sell that blockchain itself is a solution for what you're trying to do, because somebody could ask you, why is this any different to what we already have? Just slice it as distributed. So, have multiple servers, have them in different spaces, have them compute differently. So, how's the blockchain one a bit different to that? The ability to articulate why that is the case. That also becomes a challenge. People are used to selling the thing that they already know. But when you bring in blockchain, you want someone to up-skill and be able to sell the values of what blockchain can provide."*

Participant 6 crystalised this by suggesting one ought to ask, *"What will it do? What's the return on investment?",* while Participant 8, an ambassador for blockchain adoption in financial services makes an interesting point that *"the problem is that this technology is not intuitive. It changes your paradigm too dramatically"*, making it

difficult for those to whom it is presented to make a decision accepting its adoption. Another participant makes a distinction of why it might be difficult to sell blockchain on one of the fundamental selling points that have been presented to financial services sector. This is especially a problem when the selling point of blockchain may not be interpreted to bring significant changes that will justify the costs and time spent in the implementation.

> Participant 6: *"And broadly speaking, it's quite hard to make a case for blockchain on an efficiency basis, although you can. But the transformational nature of it is what's really interesting, and that's, that's quite a hard thing to sell. So, it's quite hard to change somebody in what they're doing when you're making an incremental improvement. It's as hard, but in some respects easier when you're saying this is a completely transformational thing, because you're changing the whole world and that's also really difficult, but it's more compelling and scary."*

As a result of the challenge of articulation, Participant 2 suggested what perhaps would arrest the situation of inability to articulate the blockchain business case.

> Participant 2: "*People are focusing on selling what blockchain can do and so on and so on, right? Maybe people don't need to be sold what blockchain is and how it works. Maybe they need to be sold into what are the use cases that it can solve and let's deliver on the use case.*"

Following this, participant 6 also suggests a tactic to best sell the business case for blockchain.

> Participant 6: *"…you need to be quite political and, and, and make sure that you're finding the right way of selling the idea to the right people. So, if you're talking to CEO, it might be that this is, um, this is a big deal for the following reasons. And you need to think strategically in terms of a 10-year plan and so on. If you're selling to a tech guy, you can sell them on its cool and sexy."*

Having shown that business case articulation is a challenge, a need emerges to build

towards construction of the business case for blockchain technology adoption. The first thematic category that appears is that there is usually some problem that would need to be solved through blockchain adoption.

Some of the participants had interacted with blockchain early on in its development and alluded to having adopted the technology prior to identification of any challenges in the organisation for which blockchain was needed. Participant 5 recalls a moment of having forced a blockchain solution onto a problem that was not fitting. Nevertheless, other participants comment on having adopted blockchain for experimental purposes, or to run a Proof-of-Concept, before determining there was economic value to be derived from the technology. An overarching consensus among all the participants is the recognition of the need to have to identify a systemic problem or organisational challenge for which blockchain will be a solution prior to adoption.

5.4.4.2   Blockchain shortcomings

A point that had been highlighted is how in the beginning, blockchain technology was a solution looking for a problem to solve. This may be a temptation for some who become interested in the technology to adopt and then determine where it can best serve in the organisation. Therefore, this consideration becomes important for the thorough decision to be made with regards to adoption of blockchain. Participant 1, having found a considerate number of uses for the technology for the organisation, shares the initial experience.

> Participant 1: *"At the beginning it was like that. We needed to know what blockchain was. So, we needed to do projects with blockchain, and we tried to find where it could fit now. And we saw that payments and trade finance would be the perfect fit for it. By that time, there was no business case because there were not platforms and no ecosystems built."*

Fortunately, the blockchain ecosystem has since grown because of the participation that has taken place in the recent years, and the interest of the Central Banks in CBDCs and stablecoins. This means blockchain is no longer a technology looking

for a problem to solve. However, the perceptions of Participant 1 on where the technology has come from are echoed by other participants. For example, Participant 5 answers the question of whether there was a specific challenge the organisation was facing with, *"no, not really. We were trying to find a blockchain project to do so we just, we put a square peg in a round hole and forced to dumb it."*

Participant 6 commented that, "*Our challenge was to find the right use case and the right application that will get people's attention*," while participant 7 stated, "*So for me, it was a technology looking for a problem to solve, for most of the time.*"

Participant 9 commented on the observation that had been made with regards to what was happening in the ecosystem, and in the financial services sector.

> Participant 9: *"So if we look at those hype years from 2010, related to the technology, it was actually a technology looking for a problem and within the financial world. […]. And I think this is where the world has changed. So blockchain, or DLT, is no more a solution looking for a problem."*

5.4.4.3 Ecosystem growth challenges

Adoption of blockchain technology is dependent on both external (ecosystem) and internal (organisational) factors. Some of the external factors were explored with the participants under research question one where the business case was explored within the technological aspects of the organisation. Internal reasons will mostly be detailed under organisational aspects of this chapter, while external reasons will be clustered majorly under the competition and regulatory influences section in this chapter.

However, an overarching view is that adoption of blockchain is slower than expected. Some participants raised the point to make this a consideration. The first was Participant 1 who stated that *"this is a journey, it's being very slow, even though the technology has been ready, maybe two, three, four years ago to do this, the regulation was not yet there. And it's something that is evolving."* The second was Participant 5, who echoed the same sentiments, highlighting the South African

experience, stating, "*I'm finding here in South Africa, like adoption is very slow. People are not particularly interested or wanting to get anything off the ground.*"

By appreciating the shortcomings of blockchain alongside an inability to articulate the business case for blockchain, the information presents an opportunity to create an initial conceptualisation of the business case for blockchain technology adoption for one's organisation. However, that is only necessary if there is an identified challenge within the organisation for which blockchain could be a solution. The next step in the process is therefore problem identification.

5.4.4.4   Problem identification

While in some instances a business case for blockchain can emanate from an innovation lab where testing shows positive business gains, participants have shown that a good approach would involve identifying a linkage between the blockchain being adopted and a problem to be solved by the technology.

> Participant 2: "*What is the problem we're trying to solve? And what is the value we're going to add? And then once you've tied down the two you then look into, is blockchain really a solution for this? Will it add value? Will it solve the problem we identified? So, once you've got those three, when there's a single layer or a single link between those three key points, then you can say, let's adopt.*"

> Participant 3: "*…the way that I see this is, is that technology comes next. The first thing is, is the product that you're trying to build. You know, the first thing is what is the problem that you're trying to solve?*"

> Participant 8: "*So the main thing is what are the pain points? What's your problem? What is it that you know, you could do better because your competition is already doing this? No. So that's the bottom line, you know?*"

Once an internal problem has been developed, it leads to a search for knowledge on blockchain technology. To understand this technology, its genesis becomes

important, and this is layered on the traditional financial services sector.

For the financial services sector in general, blockchain technology exists because there are some inherent challenges that exist in the legacy financial system. In determining adoption of blockchain, an organisation ought to conduct a situational analysis, or strategy sensing, to understand the technology in general. A place to start in understanding blockchain would be to interrogate the reason the technology exists, which is what challenges exist in the financial services sector. This provides an appreciation of the overall business case blockchain provides for the industry.

5.4.5   Blockchain value proposition

In articulating what they consider to be the value proposition of blockchain over legacy systems in the financial services sector, most of the participants provided the use cases of blockchain technology. The most prolific ones are presented below.

5.4.5.1   Blockchain use cases in financial services

As part of the business case for blockchain in the financial services sector, some use-cases for blockchain have been provided by the participants. The most comprehensive list of blockchain use cases being currently considered and implemented by financial institutions was provided by Participant 1.

The comments of Participant 1 were firstly on Central Bank Digital Currencies (CBDCs) and stablecoins, that the two are some of the *"different lines of business or areas of the bank that could apply a blockchain technology. I would say in our experience that the areas that are more suitable for applying blockchain in the financial industry are two of them."*

The participant then went on to decouple the composition of the applicable areas, highlighting that, "*One is the transactional banking, global transactional banking. And we think global transactional banking. You have payments. So, payments, and in this space of payments, you will have the CBDCs and stablecoins."* Having highlighted that, Participant 1, provided other use cases for blockchain, one being supply chain

finance, which was explained as *"also transactional banking. So, you have payments and supply chain finance. Within supply chain finance, you have different products. You can use it for documentary credits for bank payments undertaking, or management of open accounts for international guarantees."* Detailing further uses of blockchain being considered by the bank provided some interesting exploratory avenues.

> Participant 1: *So, there are different products within the transactional banking space that you could use blockchain. And then the other big area of banking with which blockchain could be used and is being used with the first live solutions now is Capital Markets. So, in the space of capital markets, you have, um, all the part of trade and post-trade of different assets. So, you can use blockchain to issue bonds, for example, to issue syndicated loans, we issue different structured notes. How different types of financial products and assets would be issued and an exchanged via blockchain by generating digital assets. Why do we say digital asset? So, you can represent the asset digitally, or you can even create it natively digital."*

Considering the list provided by Participant 1 alongside those of other participants, the following use-cases for blockchain have been elaborated:

5.4.5.1.1   Central Bank Digital Currencies (CBDCs) and Stablecoins

As already mentioned by Participant 1, there is a focus of the financial services sector on CBDCs and stablecoins currently, echoed by other participants of the study. Both participants 5 and 8 work for organisations that each provide solutions for use of blockchain in the financial services sector.

> Participant 5: *"The biggest projects coming out at the moment are some sort of blockchain projects from central banks around the world. You might've seen it, the bank of international settlement, they issued a report last week saying that 86% of central banks around the world are looking at blockchain technology or actually looking into Central Bank Digital Currencies, a lot of them based on blockchain technology in the countries from both a retail and*

a wholesale perspective."

Participant 8: *"The biggest projects we're working on is with central banks around the world to implement Central Bank Digital Currency at the retail and wholesale level. So, anything to do with the new way that we are re-imagining what money is all about. It's what the biggest, um, demand at this stage."*

5.4.5.1.2 Tokenisation of assets

Blockchain has an ability to record anything of value. Alongside this, the technology presents a considerable secure platform to tokenise assets as needed.

Participant 1: *"So you can use blockchain to issue bonds, for example, to issue syndicated loans. We issue different structured notes. How different types of, of financial products and assets would be issued and exchanged via blockchain by generating digital assets. Why do we say digital asset? So, you can represent the, the asset digitally, or you can even create it natively digital. […] But the perfect use case would be not to represent it, but to generate it natively digitally. And that, that would be supported by the legislation, by the regulation, by the law."*

Participant 5 ventured the possibility of creating much needed liquidity through tokenisation of fiat money, saying that, *"and then also this idea around the tokenisation of money. So as soon as you're able to tokenise cash and make it interoperable with each other, it leads to a far bigger pool of liquidity for a bank."* Building on this idea, Participant 6 considered the role of blockchain in tokenising and managing assets, where *"one example was to create a consortium in asset management, where you would basically have the blockchain working as the transfer agent."* This agent would eliminate the unnecessary middlemen where today in asset management what happens is that "*I buy shares off you and it's about three or four intermediaries. And the transfer agent is one of those. So, I give him my money and you give him your shares. And then he acts as the middleman."* To bring efficiencies to the process, Participant 5 argues that "*you put a blockchain in there, and that goes away because you can do an atomic swap if you tokenise those things."*

Participant 8 agrees with the other participants on tokenisation of assets, where the participant provides views towards tokenisation of illiquid assets, where "*we see in tokenisation of illiquid assets to start with, so starting with real estate, for example, or shares that are traded outside of the stock market that are illiquid. So, private company shares being tokenised.*"

5.4.5.1.3 Digital identity

As a decentralised, secure platform, blockchain can be used to store digital identities of individuals where such individuals would not have to carry around documentation to prove their identity as such information will be available in the cloud. As one of the surprising thematic emergences, a few participants spoke of the ability of blockchain to provide this not only to people but also to organisations. One participant mentioned, *"you can also start introducing digital identity or exchange of data",* while another commented on the use of blockchain saying, *"so the one is identity, that's the biggest one, and that is why we've taken it forward."* Yet another participant's considerations are in alignment with the two, where the participant said, *"so that's one of the kind of projects we're working on, around utilising a DLT to solve a certain use case related to digital identity, which is utilised within financial institutions, but also utilised in your everyday workings."*

5.4.5.1.4 Decentralised finance

One of the newest advents in both blockchain technology ecosystem and the financial technology is introduction of Decentralised Finance, of DeFi, which is financial services provided through smart contracts, also enabled by blockchain technology. Participant 8 spoke passionately about DeFi.

> Participant 8: *"So the most important thing is the concept of decentralised finance. Decentralised finance, you are going into a website, that hasn't got a legal entity that hasn't got a board or shareholders, but it gives you the ability to borrow at a higher yield than you know or lend at a higher yield than if you went to a bank."*

In agreement with participant 8 was Participant 10, who spoke on the changes of the financial services industry.

> Participant 10: *"That's changing now through decentralised finance, collateralised, flash loans. I mean, there's so many things going on in this space now that are, that's why I said, it's quickly evolving now. And in the next year or two it's going to be a really good time in a digital asset space."*

5.4.5.1.5 Real time settlement

A few of the participants have said that blockchain technology can settle transactions in real time, that is almost instantaneously. One such was Participant 2, who commented, *"and you can do delivery versus payment in real time. So, exchanging the asset and the money at the same time, in a smart contract, on the blockchain."* Participant 4 also spoke on the use of blockchain to revolutionise payment, saying that *"blockchain is the ultimate platform for payments. And so, what were we looking for? We were looking for that real time settlements and we needed to be as low cost as possible."* Lastly, Participant 10 agreed with the other participants on real time settlement, with the sentiments that *"[…] you'll begin to be able to transact, communicate, exchange values, in real time and settle instantly."*

5.4.5.1.6 Cross border payments

Some participants highlighted blockchain's potential and use in cross border payments. Participant 2 confirmed interacting with blockchain and that, "*we did this for cross border payments.*" Participant 5 also commented on this, stating that, "So the most common use cases is probably around cross-border payments and the use of blockchain for that." Another participant to have commented on this use case was Participant 10 who confirmed that the is use of blockchain technology for cross border payments as well.

Once all the above thematic categories have been interrogated and understood, a business case can be developed for blockchain adoption. However, the information is based on external factors that have to do with blockchain technology itself and its

existence. Other matters to be considered prior to adoption is compatibility of blockchain technology with already existing systems in the organisation.

5.4.6 Compatibility of blockchain with existing systems

The participants were asked whether there were any challenges and concerns around compatibility of blockchain technology with already existing technology systems within the organisation, and how such challenges were addressed. A common understanding that came up from most of the participants was the ease with which an organisation can integrate blockchain into their existing systems. Participant 1, 3, 5, and 8, commented on the issue of compatibility.

> Participant 1: *"So when you do a blockchain project, blockchain is the base layer, […] where you record the movement of the money of the assets or whatever you are working with. but you need, you need to connect this base layer with, with the rest of the applications. So, in the end, you need the APIs. You need the ways of storing data and managing data, maybe working with artificial intelligence, intelligence to automate processes. So, in the end, you combine it with, with other technologies and, and, and you have the project"*

The ease of implementation was also echoed by Participant 3 who recalled, "*Implementing, this was what was relatively easy*". The sentiment was carried by other participants who noted that of all the steps involved in the process of adopting blockchain technology, the actual part of integrating the technology into the current organisational system, was not the greatest concern. As Participant 5 said, "*And the technology side is actually some of the simplest bits to do it. I mean that relatively, but the technology seems to be easy […]*", while Participant 8 echoed, *"[…] that's why this technology is unbelievable because we use API. So, it's very easy to integrate very easily. We have many different platforms,*" and at another point reiterated by saying, "*anybody can set this up. It's very easy to set up. The technology is very simple. You don't need to be a rocket science to invent this technology. And it's quite inexpensive.*"

The three themes that have been discussed so far, being Systemic Challenges,

Blockchain Ecosystem, and Technology, together contain constructs which build up Phase one of the blockchain adoption framework. This is the blockchain business case development phase. By considering the industry as well as organisational challenges and the value proposition of blockchain towards these challenges, it can be argued that the information lends itself to an understanding of why blockchain technology is relevant to the financial services sector. Phase two will be discussed in the remaining two themes of this study.

5.4.7   Summary of results for question 1

The findings related to question one show that the participants of this study appreciate that the existence of blockchain technology is a result of inefficiencies that exist in the traditional financial system. Resulting from the decentralised nature of the technology, a blockchain ecosystem exists, which gives rise to blockchain technology. The participation and collaboration of enthusiasts in the blockchain ecosystem maintains the blockchain nodes, networks, and the decentralised infrastructure. Developers within the ecosystem create blockchain with characteristics that allow it to be an enabling technology for business. These characteristics are what gives blockchain its advantages.

Participants of this research consider blockchain technology to, first, be a valuable technology in and of itself, and second, to have a strong business case for financial services based on its technological merit. The inherent advantages of blockchain give it some qualities that are of value to financial services, establishing the business case for blockchain. However, a challenge with blockchain business case owes to both the origin of the technology, which is outside of the formal financial institutions, and an inability of the technology's creators and early adopters to articulate its business case. This contributes to slow adoption of the technology in financial services. Nevertheless, there have been many use cases for blockchain adoption that have been identified, with at least two of the top five being actively driven by the formal financial services sector.

The participants of this research further reflected on the qualities of blockchain technology that makes it relevant and advantageous for the financial services sector.

However, a difference perspective has been observed across the various themes that emerged from this research question. One is the fact that blockchain technology is not considered to be the best solution for challenges faced by the financial services sector, but nevertheless is a superior solution when compared to legacy systems.

5.5 Results: Research question 2

Research question 2

How does the organisational strategy of a financial institution affect adoption of blockchain technology?

The intent of this question was to gain an understanding of the challenges and concerns organisations in financial services faced with adoption of blockchain technology because of their corporate strategic setups. The question further probed into how organisations ensured that adoption of blockchain technology aligns with everything about their organisational strategies, answering the main research question since this study is about how organisations in financial services can configure and align themselves for adoption of blockchain technology.

Under research question two, participants were asked to explain what concerns and challenges their organisations faced with adoption of blockchain technology, and how they addressed the identified challenges. Themes that emerged from results of question 2 are displayed in the table below.

Table 5.5: Themes emerging from research question 2 results

Themes		Sub Themes/Categories
4	Organisation	Adoption Considerations
		Organisational Knowledge
		Organisational Culture
		Top Management Support
		Alignment
		Adoption Benefits

While blockchain technology has benefits for the financial services sector, adoption has not happened as quickly as expected, or as widely as one would expect. This theme is centred around internal organisational factors that influence the decision to adopt or not adopt blockchain technology for financial institutions.

After a business case for blockchain has been made through the technological considerations and internal problem identification processes, the next natural step will be to build an adoption case. To do so, two major steps are considered. The first is a configuration of internal organisational factors that would allow for adoption of blockchain, and the second is an alignment of the organisation in accordance with the requirements of blockchain adoption, by considering the business environment. Theme four focused on the major constructs of organisational configuration.

Theme 4: Organisational Considerations

5.5.1 Adoption Considerations

Before adoption of blockchain technology, organisations conduct an internal analysis to determine if they have the requisite internal capabilities to adopt blockchain technology and understand the organisational readiness to adoption. In such an introspection, some elements emerge. While blockchain technology has benefits for the financial services sector, adoption has not occurred at an expected rate, or as widely as the blockchain ecosystem requires to provide financial services with the desired efficiencies. This theme revolves around the factors that lead to the decision to adopt or not adopt blockchain technology for financial institutions.

5.5.1.1   Considerations around cloud computing

One adoption consideration becomes about the modality through which blockchain technology operates. Participants for this study have highlighted the need for cloud computing in adoption and utilisation of blockchain technology.

However, according to some of the participants, running some processes through cloud computing becomes a challenge. To begin with, Participant 1 warned of the

challenges faced with the use of cloud computing, bringing special emphasis on regulatory requirements of some countries, saying, *"Their authorities don't let the banks move the data to the cloud. If you cannot work through the cloud, it's difficult to work in a blockchain solution because normally you build the nodes on the cloud."*

Nevertheless, other participants simply commented on the considerations and need for cloud computing, where one participant stated, *"So we use cloud computing and really simple risk mitigation linked to smart money that allows us to finance SMMEs at scale."* Participant 6 states, *"[…] The way that stuff is set up is you're running it generally on cloud systems."*

Participant 7 provides an interesting perspective that utilising cloud services, among others, allows the organisation to focus on its core business while maintenance of cloud computing is handled by those providing the cloud services.

> Participant 7: *"You realise that we have a full customer experience for some things, because things are sitting on premise and you've got some people looking at the servers and things and trying to fix things and make the connections with telecom and who ever work, where is it it's sitting in the cloud, then at least the organisation side of it is monitored and well managed through the cloud providers."*

5.5.1.2 Integration solutions provider

Integration of blockchain with existing systems has been discussed under question two, with a specific emphasis on the ease with which it can be done. However, in situations where it remains a challenge, there are some integration solutions providers who can address such challenges for the organisation. These include traditional firm such as Accenture and IBM, who leverage their knowledge of both blockchain and the financial services sector to provide solutions. Participant 1 commented to this effect, saying, "*So they now are able to do integrations much more smoothly and better, and the new platforms and new solutions that are being brought to the market."*

These firms use their expertise to "*think on how not only banks, but also the traditional corporates need to integrate with the systems,*" learning through the process to make it easier. However, Participant 1 also comments that with it being easier is also a problem because "*you are working in, you know, if you work with traditional systems, normally the companies who are used to working in silos to protecting their data, protecting the information and building walls around all this information.*"

By contrast, an interesting insight on integration solutions providers was provided by Participant 8, who is a blockchain solutions provider. The participant highlighted that financial institutions who are not able to integrate blockchains would usually seek out these firms, to which a difference of opinion was offered.

> Participant 8: "*Or worse, no, really this is really bad what I'm going to tell you: they go and employ [company name withheld] or a company called [name withheld]. None of them are building a real blockchain. They are just modifying what banks are doing so that they can, you know, still that the trauma of change is not that big, but it's not a blockchain. You know? So eventually they're going to get stuck with technology.*"

5.5.1.3   Implementation speed

While participants have highlighted the ease with which an organisation can adopt blockchain technology, evidence suggests that implementing the technology takes time. Most of the participants have commented on the time it takes for implementation as this becomes a determining factor in the decision to adopt.

To begin with, Participant 1 has adopted and implemented blockchain for one of the largest financial institutions in the world and has some experiences to share, starting by saying, "*and this is not something that you can do in one month or two. So, you need time*" This is especially owing to the "*learning curve that you have to start at the beginning and move forward and go through all the curve, in the different departments. And that this is the only way to start working with a new technology.*" Participant 1 further acknowledges the different financial setups in different countries

around the world and continues by adding, *"so we think this will take some time, at least depending on how the payments are established on the different countries."*

In the second place, Participant 2 had recently interacted with blockchain technology in the organisation and while highlighting that it takes time to implement this technology, also advised that organisations should determine the best modality to shorten the implementation period without compromise to the objectives, recommending that *"Rolling out has to be incremental. So, you can't roll out something every six months. You have to find the shortest possible plan and then find something of value that can be rolled out in that particular time."* This was followed by an example of how Participant 2's organisation adopted the agile methodology to address the lengthy implementation process, where the organisation *"went with two weeks to roll out something, and then we can make a decision to go for it or not."* Full implementation would then be guided by the view of the organisation, where according to Participant 2, *"Then you get to start having a point where some would say, you know what, this thing is running like a business of its own […]."*

Moreover, this was echoed by Participant 5 who appears to dread the sluggishness with which implementation of blockchain occurs in organisations, saying, *"it's a long, hard slog. It's the replacement of a core infrastructure system within an organisation. And, and that is very, very difficult to do; a very long project to run; and very difficult to justify for some people."* Participant 5 continues and explains that the sluggishness can at one end be the result of how slow organisations generally are at acting on new technologies.

Additionally, Participant 6 commented with brevity on a key decision-making consideration that an organisation must ask, being, *"How long will it take?"* As if to complicate matters, this usually becomes the question that could deter some organisations from adopting blockchain. This especially becomes an issue where the length of time to implement is shrouded with doubts or lack of understanding about what the technology can bring to the organisation.

Lastly, Participant 10 crystalised this point as made by the other participants, but then appreciates that compromises may be made for the betterment of the organisation. The participant acknowledges that *"and then you have to have people that tell you, no, we can't do that. It's going to take longer or no; we don't have the capacity to do that in an amount of time."* In these instances, it is better for the project and the organisation to *"kind of meet somewhere in the middle of the road and you start working."*

5.5.1.4   Cost considerations

Adoption of blockchain technology comes with associated costs that organisations usually consider. The participants elaborated on three of these costs and the considerations surrounding such costs. The first is implementation costs, the second is switching costs from current technology to new, and the third is legal costs, on account of regulations in both financial services and blockchain.

5.5.1.4.1   Implementation costs

Implementation of blockchain technology has both direct and indirect costs, according to the participants. It also has some costs that are immediate, while some are realised in the long term. As already highlighted through other aspects of consideration for blockchain adoption, costs become a common implication in the implementation stage.

> Participant 1: *"You always need to integrate with the back-office systems of the banks, as you know, if you are a FinTech or a new bank, you have more modern systems, but if you are a traditional bank system, the legacy systems are a problem because they work with old technologies and you have to integrate and adapt to them. And this is why it's one of the highest costs of the blockchain implementations."*

In agreement with the above, Participant 2 commented that *"to implement […], you need to consider the end to end, or you need to consider the lifecycle costs, the cost to introduce something, the cost to roll it out."* The participant continued by offering

wisdom to consider costs of integration, saying, *"If this is new and nothing was done by it, you need to consider the cost of integration. So, the exchange of information between this and what's existing, and then the cost of people using this thing, the training."*

Participant 3, while still commenting on consideration of costs, offered advice for organisations to make a distinction between primary needs of the organisation, where costs ought not be an issue, and circumstances where there may be discussions around costs.

> Participant 3: *"[…] It depends on the type of project. If you're trying to build a soul of the company, the heart of the organisation, then maybe you should not be worried that much about the cost initially, because you want the best of the best to be at the core of all the systems. But if you're making something ancillary, something that you know is only for, let's say two, three, four, five people, then it makes no sense for you to put in a lot of resources."*

Commenting on implementing core technologies, Participant 4 warned that organisations should consider sunk costs, as well as the stickiness of the implemented technology where such costs are going, saying, *"[…] Because once you make a commitment and your business is running on a technology stack to change it, it's not only the cost of replacing the technology, but it's the cost of implementation."*

Participant 7 agreed with Participant 2 on the human resource costs and improvements of organisational capabilities, to which the organisation would have to incur costs. The view is that *"I don't necessarily come with a team of developers as innovation leader, so I need money and people are not going to need money."* Participant 7 continues by commenting on the need to understand aspects of blockchain adoption that would cost the organisation.

> Participant 7: *"So for me, one of the big drivers was how do I know what it's going to cost me to run the solution, right? The operational costs. And lots of that operational cost, is, and I speak to different vendors and the different*

vendors will have a different way of charging."

Participant 9 cautioned on the notion that implementation of blockchain directly correlates to costs reduction, when in fact, there are implementation and sustainability costs incurred. This was crystalised by the participant saying, *"so I wouldn't say you have a major cost reduction from a technology perspective, because I need a server I need to pay for developers, whether they are developing in X or Y you still need that type of cost."*

5.5.1.4.2   Switching costs

Alongside implementation costs are switching costs that are incurred by organisations. To build a blockchain adoption case, it behoves an organisation to understand not only the costs to implement blockchain, but the costs associated with switching from one system to another, in favour of blockchain technology. One participant explains this scenario.

> Participant 2: *"That's another undertaking. In all of these three streams, the adoption, the implementation, and the comparatives that you're going to do before you actually start seeing value, you get either off the shelf, that somebody has done something that is niche, that can offer the advantage or internally, you've got something which is already massive, where if you have to switch it off, it's going to cost you a bit more. So, you end up thinking, let me just do a small improvement on what I already have. Then I keep on running because the cost of bringing something in might be small, but the cost of switching something off that's already existing might be huge."*

Participant 4 advises that, *"[…] Because once you make a commitment your business is running on a technology stack to change it, it's not only the cost of replacing the technology, but it's the cost of implementation."*

In agreement with both participant 2 and Participant 4, another participant made a critical point, recommending that an organisation may have to consider ambidexterity to protect continuity of the organisation when switching to blockchain technology.

Participant 6: *"So how do you get from legacy to blockchain? You probably start rebuilding on the side. You build this parallel technology and that's a really hard sell because it's a whole new set of costs and costs of resources and stuff, but also the time and energy."*

5.5.1.4.3   Legal costs

A few participants alluded to the costs of legal services in adoption of blockchain technology, and they all suggested that these are some of the biggest costs in the ecosystem. This is understandable, considering the developmental stage of regulations versus the speed of technological advancement. As the technology is usually ahead of regulations, organisations that are intent on utilising the technology must consider the regulatory implications of doing so.

Participant 5 comments on both the slow regulations and the costs associated with this occurrence, by stating that, "[…] *The compliance costs and everything that is in the compliance requirements on banks then is what has made the system slow and expensive to use."* The participant also gave a scenario where there were legal costs incurred by the ecosystem to achieve their goals in growing the development of the blockchain ecosystem.

Participant 5: *"So there was a group of 16 banks, and they started something called the utility settlement coin project. […] They wanted to look at if they could use blockchain to move money around the world and essentially disrupt the wholesale correspondent banking relationships around the world. So, they put 15 million US dollars into this project. And a lot of that money was actually spent on the legal framework."*

5.5.1.5   Funding

Adoption of blockchain technology is, for most of the organisations represented by the participants of this study, another technology that the organisation will use to execute its strategy. As such, blockchain leaders in the different organisations must provide the business case of blockchain to top management and finance

departments to obtain the funding required to build internal capabilities and expertise on blockchain. Two of the participants made different, self-explanatory points to this regard. Participant 1 commented on funding required to implement blockchain projects in the organisation.

> Participant 1: *"But it's really hard because the traditional way and the things that were done before is that you had a budget, and you work with that budget. Now, you don't have a budget. You need to compete for every Euro you need for your projects. And you compete with the rest of the bank, with the rest of the employees from the bank."*

Participant 5 commented on the organisation's laissez-faire approach to innovations that are made in their innovation labs.

> Participant 5: *"What we find is that all the start-ups end up speaking to the innovation labs, who've got some money. The motivation from the innovation lab is how many POCs, can I do? And how quickly can I do them? And how fancy can I make them look? There is no incentive for them to implement them into production and the businesspeople don't have any budgets or any incentive to actually adopt any of those."*

5.5.2 Organisational Knowledge

With an organisation, blockchain leaders or initiators usually face challenges regarding adoption of blockchain. These challenges range anywhere from technology awareness to building an internal technological expertise.

5.5.2.1 Technology awareness

Participants commented on the fact that even in the financial services industry, there is a lack of awareness of blockchain technology, becoming a determining factor of whether organisations adopt blockchain or not. An instance was provided by Participant 6 who commented: *"And as I went round to the entire ex-co of PWC and sat down with them and explained blockchain mostly from scratch, because most of*

them had no little to no idea of what it was."

In agreement on the lack of awareness of the technology in financial services is Participant 8, who has presented to Chief Executive Officers (CEOs) of banks, and comments on how the CEOs are encouraged going forward, saying, *"So my last slide is always the way forward. And you know what, the way forward is? […], the way forward is education."* The Participant notes that while executives would prefer to delegate responsibility to individuals who would then assist the organisation with blockchain knowledge, they may rather consider a full organisational education approach where, *"If I was you, I would stop what I'm doing and start educating everybody. Everybody. Even the cleaner should know how to use the digital banking app to send and receive."*

A lack of awareness of the benefits of blockchain technology, or a lack of awareness of the technology altogether, especially by decision makers, becomes an inhibitor to the technology adoption.

5.5.2.2 Scepticism

Scepticism has a characteristic to have an influence from both within and outside of the organisation. Internally, scepticism means initiators of the idea to adopt blockchain are met with challenges of convincing colleagues or management on the business case of blockchain. Externally, where there is a widespread scepticism about the capabilities of blockchain technology, and the blockchain ecosystem suffers, as it does not receive the mass support that it requires.

Participant 4, who owns a blockchain-based financial services conglomerate, comments on this type of scepticism, which could affect one's decision to adopt blockchain technology, saying, *"There was a lot of friction because for the first couple of years there was scepticism, where the people would use their mobile phones to make payments. A large sector of the market felt that would never happen. So yeah, there's been such a lot of technological innovation in the space, smartphones."* The participant also commented on direct scepticism, saying, *"So people just assume that I can't pull this off. There's a natural tendency to like, we read about this stuff,*

but it could never happen to anybody I know."

On being asked to elaborate how such scepticism can be overcome, even from within the organisation, Participant 4 continued by explaining the role of leadership in going steadfast with the decision.

> Participant 4: *"Um, so when you, when you have a leader, technological leadership like that, you have to shut down a lot of naysayers. And sometimes you need to tell people what to do, because they can't see it. And if you can't see it, you can't see it. And then once you see it, you can't unsee it. So, I've had to ignore a lot. And the thing is that with something like this that's as innovative and as new is, you have professors telling you that you're talking rubbish, but they're professors in something else, you may be very clever, but you don't understand this."*

5.5.2.3   No attention to blockchain

Sometimes organisations pay no attention to blockchain technology. Participant 7 comments on this, stating the difficulty of convincing people where there are some reasons they do not have interest, saying, *"The first reason is everybody's busy with their day jobs, right? The second reason is they can't see in the short term how this relates to the work they do in the service they delivering."* The participant continued by stating the reason for lack of attention could also result from the need of networks required by blockchain technology, because *"Like I say, if I get onto the sovereign network and provide everyone with an identity wallet, where are they going to use it, if I'm the only organisation providing it to them?"* This was concluded by finally saying, *"but then organisations also work in silos, right? So, then the one team might say, okay, I'll do it. But then the other one might not. So, you got to also figure that out. It's been very hard to convince the organisation."*

5.5.2.4   Mistrust of blockchain

Two participants alluded to mistrust of blockchain itself as a determining factor in the decision to adopt the technology. Where blockchain benefits from being a

decentralised protocol, this very nature may lead to questions around the lack of familiarity with the people that creators of the protocol. Participant 7 was most able to communicate this mistrust from the point of view of the users of blockchain.

> Participant 7: *"So the problem is that you don't know who rolls the blockchain protocol, or you don't know if they still involved in it. I mean look at Satoshi's gone, right? So, if your money goes missing, if your money gets lost… So, you know, so the reserve banks are cautioning people, but they can't tell you not to invest."*

Participant 10 agrees with Participant 7 on this point, with a caveat being that the distrust emanates from the behaviour of cryptocurrencies as opposed to blockchain technology itself.

> Participant 10: *"I guess initially there's internal pushback. Early on, I saw dev push back and I saw team leader pushback around blockchain and around crypto. And once again, it all kind of percolates from the distrust of the value of coins, right?"*

5.5.2.5 *Misunderstanding*

Most of the respondents mentioned misunderstanding as a determining factor in the decision to adoption blockchain technology.

Participant 4 talks about the misunderstanding that exists within the organisations to be a major challenge, by saying, *"I think the biggest challenge that we faced and maybe what every organisation adopting this faces at the moment is just the lack of understanding. That is actually not; it's the misunderstanding."*

Participant 5 made the clarification that the misunderstanding that exists is because people equate blockchain technology to cryptocurrency. This is a fair assessment since most people gain familiarity to blockchain through cryptocurrencies, especially at times when there is news on cryptocurrencies. Participant 5 comments that people do not necessarily understand blockchain in that "*the minute you say blockchain, it's*

*associated with crypto. And it's not bad to have a crypto strategy. So, I think people
need to separate whether they want to have a crypto strategy or blockchain strategy."*
This is supported by Participant 6 who said, *"So it's a challenge when you go talk to
banks or insurers or whatever, you got a room full of people. and one of them thinks
Bitcoin and blockchain is the same thing."*

Participant 8 understands the lack of understanding of blockchain to be about
questions that seem to never have been asked by those who do not understand or
answered by those who should. The participant alluded to this by saying, *"They're
worried about a privacy, which is also rubbish because we created a private
permission ecosystem. The ecosystem for Ethereum, we have the enterprise private
permission or the mainnet that is permissionless and public."* Continuing, the
participant also added, *"So, you have a choice, but the technology that we use is
interchangeable. So, you can start private, and you can move to the main net
whenever you want to".*

Participant 9 supports the comments of Participant 5 by saying: *"If you were in
organisations and people were saying, no, we're looking at blockchain
implementations, people were under the impression you're implementing a Bitcoin
or cryptocurrency type solution. And that's where that scariness actually crept in,
especially into financial institutions."*

Some of the participants have cited a lack of understanding of the technology as an
impediment to adoption. A distinction is made between misunderstanding and lack
of understanding in that a misunderstanding implies there is knowledge, but it may
be applied incorrectly, such as confusing cryptocurrencies with blockchain, and
thinking blockchain means Bitcoin. Lack of understanding implies the individual is
aware there is such a technology, but they have not synthesised what the technology
does, or can do.

> Participant 6: *"Um, and if you take a new idea to an insurance company, they
> view it either as a new channel or as a new product, that's the only way they
> can interpret something. And that's because they interpreted through the lens
> of their current business model. And a bank is exactly the same way. So, if*

you take something to a bank, they look at it and they go, well, why is this interesting to us? And then you say, well, blockchain enables you to do things in a different way. And they go, well, the current way we do it actually works fine for us."

Participant 7 further comments on the lack of understanding.

Participant 7: *"But I'm not sure where the organisations would just throw what they have and replace it with a blockchain solution. And it's like I say, it's 'do we clearly understand this thing? What happens with the cryptocurrencies within this? What are the customer needs?'"*

Participant 7 continues by commenting on the unfortunate conundrum that the lack of understanding of the technology fuels a misunderstanding, by saying, *"but because again, because people don't understand it, they're not going to ask the deeper questions of how the organisation structure and model can change so that this is affordable."*

Speaking from a recollection of a frustrating experience, Participant 8 recounts a situation that led to a resignation from a financial services company to join a blockchain focused solutions provider.

Participant 8: *"I went to my board, which is made up of all the banks in South Africa and the Stock Exchange, And I said, guys, the company I created and I ran for 20 years, won't exist in the future because there won't be a need for a central securities depository, but we have an opportunity to change this paradigm now, before we are disrupted, of course, they didn't believe what I said. They didn't believe in, in crypto or blockchain or nothing."*

5.5.2.6   Internal Expertise

After an organisation's knowledge on blockchain has been assessed, it may be necessary to build some internal expertise so there are individuals within the organisation who will ensure that the organisation benefits from its capabilities. There

is a general lack of expertise on blockchain technology, mostly since it is a new technology. Organisations can rely on building internal expertise or rely on the blockchain ecosystem to provide the relevant technical expertise when needed. Lack of expertise, therefore, is one of the considerations organisations make in the decision to adopt blockchain.

Internal expertise will serve an important role in availing the requisite technical knowledge to the organisation in development of blockchain. In talking about the blockchain strategy for the bank, Participant 1 detailed the requirements of one of the elements of the organisation's blockchain strategy.

> Participant 1: *"And the last E would be Expertise. And expertise is trying to spread the knowledge of blockchain within the bank. And we have been able to do this with training, which is the normal way of doing it, but also by involving different areas of the bank, in the projects that we have been doing with blockchain technology. And once we have defined this strategy and we have the discipline formed, every time we need to decide what we are going to do for the next year. We meet in this discipline and we see what is, where is the market going? Where is everyone moving towards? And that helps us decide what are the projects that we are going to attack the next quarter or the next month or the next year."*

Participant 2 detailed the considerations around a lack of targeted expertise on blockchain technology.

> Participant 2: *"Many people do a serialised solution. So, they do something which happens in sequence, right? Whereas blockchain, it's a different tech altogether. It happens in blocks. Within the block you couldn't have many sequences inside one block. The blocks themselves would be in sequence, right? That's where people understand. People understand the sequence. But the blocks within the blocks, what happens, that's where you are finding a challenge. If you're just going to bring somebody because they are a Java developer or any software developer, of some sort. Then you get it as a scenario where someone's going to maintain the solution, right? That in itself*

> *becomes also a challenge because many people that support or that troubleshoot support and diagnose user problems, they haven't also worked on supporting the distributed ledgers or the distributed computing to an extent."*

A caution was made to organisations to determine the most optimum and sustainable scenario for their situation with regards to expertise on blockchain.

> Participant 7: *"And then I think the other one is, for me in particular, I'm seeing when I started with blockchain, you must know. Now, if you only have a handful of people that know how to develop on this, then what is the sustainability going to be like? How, if on the flip side, if you don't start using the technology, then how is the skill going to increase, right? So, it's a double edge sword."*

When recalling a communication made to bank CEOs on blockchain adoption, Participant 8 highlighted an important point usually made to these CEOs: *"Make sure that you allow your staff to spend time reading and learning and educating and give lectures. Listen to podcasts, listen, receive all the newsletters."* Through learning from all available means, an organisation can generate adequate internal knowledge that could lead to internal expertise that would inform decisions made on adoption of blockchain.

Participant 10 simply talked to the need for human expertise even around blockchain technology, which is purported to be able to eliminate the need for processes that require human participation.

> Participant 10: *"And how that works and how you can begin to automate it, because AI and blockchain, these are great technologies and they're great automations, but they still need humans, believe it or not, to do it. So, so that's kind of a misconception. I hear a lot of people say too. So, with all that understood, you need to have a tech team that kind of understands what languages, what tools to use, how to set up their environments."*

5.5.2.7   System integration

Participants have already shared their views compatibility of blockchain with already existing systems. That was part of the business case building for blockchain adoption and was referring to the ability of blockchain to be used with other systems. Once an understanding has been made to the fact that there are almost challenges on the technology's ability to integrate, a focus is made on the considerations around interoperability of the systems, and whether there are usually any internal organisational worries around this occurrence.

> Participant 1: *"So, you always need to integrate with the back-office systems of the banks, as you know, they're old. If you are a FinTech or a new bank, you have more modern systems, but if you are a traditional bank, systems are the legacy systems and are a problem because they work with old technologies and yeah, you have to integrate and adapt to them."*

This was supported by another participant who stressed on the ability of the systems to exchange data.

> Participant 2*: "because every implementation that comes to into an existing organisation must at some point exchange data with the existing systems, that's the first point of contact. So, there must be an exchange of data, whether you're getting customer information, payment information of some level, there must be an exchange of data. So, there must be integration"*.

5.5.2.8   System Security

Some of the participants talked about concerns around system security when adopting blockchain. Participant 1 commented on the effect of adopting blockchain on the overall information technology architecture of the organisation.

> Participant 1: *"If you want to work with a blockchain, you have to start opening your doors and opening your security systems and your architecture. You have to think in a different way. And this has an impact on, on your traditional*

> *IT teams on your traditional security teams, et cetera, et cetera, and adapting to this is really complex."*

This was supported by Participant 2, who voiced possible concerns around accesses into the organisation's systems.

> Participant 2: *"That means you need to do it within the boundaries of a secured network or a secured organisational domain. So, somebody outside the organisation should not be able to login it into this blockchain and do any of that transaction. So, you've got one layer exchange of data. A second layer, it plugs into a domain, which is already secured or network which already secured."*

Going more specific from Participant 1 and Participant 2, Participant 4 spoke of the need to have a secure network in financial service, such security that can be offered by blockchain technology.

> Participant 4: *"When you're talking about creating a new payment standard, one of your main issues is trust. […]. You don't want to see a retailer that can't trade because their system is down. So, we're designed to be resilient, and it is outside of the banking sector, but it's even more important in a banking scenario."*

Participant 5 echoed the sentiments shared by Participant 1 and Participant 2 by commenting, "*you know, where was this technology going to touch and what were the security implications of that touching into other core systems that the company had running?*".

Participant 9, on the other hand, spoke of challenges organisations are likely to face with adoption of blockchain technology, especially at the implementation stage.

> Participant 9: *"So when it comes to the concept of your security certificates within the blockchain world it is totally different to in your normal, non-DLT type technologies. The ecosystem does handle it differently. So, you need to*

get a blend between the two. The way you query things on a DLT does differ slightly to in the normal world."

5.5.3 Organisational culture

After adoption considerations have been made, and organisational knowledge has been developed, the information can be used to influence development of an organisational culture that is supportive of blockchain technology. The results of the study indicate clear evidence that organisational culture becomes a determining factor in adoption of blockchain technology. Institutions with an innovation culture do not face as much of an obstacle as those that are not so innovative. Naturally, organisations that have an innovation culture are more amenable to accepting adoption or consideration of blockchain, as opposed to organisations without much innovation.

5.5.3.1 Strategic sensing

An important consideration made by organisations is to understand the blockchain happenstance. In one of the comments, Participant 1 made a connection to the need to be aware of what goes on in the industry, by claiming, *"so we are following very closely the different developments all around the world regarding CBDCs and stablecoins […], we are also following very closely the trade finance space."*

Participant 10 painted an easy-to-understand picture of the engagement in the blockchain ecosystem that organisations ought to make. This strategic approach then allows organisations to make informed decisions about adoption of blockchain, or at the least, develop an internal knowledge about the technology. The comment is broken down into a few points.

In the first instance, the Participant clarified that in the first instance, *"There's always going to be that supply demand issue, which makes it difficult for companies to get into the space and makes it difficult to compete."* Considering the competitive nature of the financial services sector, organisations then have to consider the second point, being that "*the best strategy is to really look at your business domain, what you do,*

first of all," to determine whether *"blockchain and crypto, is it even something that can help you, right? Because that's the first thing you kind of have to answer. And that takes some due diligence on whoever's doing that."* Once such a determination has been made, the next step can be considered. This is where an organisation has to attempt to understand if blockchain is a technology that really works for them or not, *"but after that, if you've determined it is - and I think in most cases it is, then you have to begin to look at how other people in your space are now using it."*

Consideration of the competition and how they are using the technology provides for an understanding of the avenues that can be pursued by the organisation with the technology as the technology is being adopted in a manner that in *"almost every market sector, there are some key leadership involved in the space. Cloud vendors are big time into this now, and they've kind of led the way with a lot of this adoption. Also supply chain data, finance, […]."*

In closing, Participant 10 recommends that an organisation has to understand *"what you want your blockchain to do for you, in an initial early phase and then a roadmap for three or five years on how you can start to integrate it into your existing business processes, right".*

5.5.3.2   *Agile Methodology*

The second facet of organisational culture that becomes important to building an adoption case is how the organisation approaches technology implementation. A few of the participants have shown that in their instances, the agile methodology works best in adoption of blockchain.

> Participant 1: *"Then apart from this process, what we have in [the bank] now is that we are working with agile methodology. And we have what we call the single development agenda. So, all the developments of [the bank] goes through this process, and this process is quarterly. So, every quarter, the different areas of the bank present, all the projects that they want to do, and they come, they compete in this process for the funding."*

Agile methodology allows organisations to innovate faster. This is beneficial as there must be careful consideration at the resources engaged in projects.

> Participant 2: *"[…] it's quite a lengthy process. So, you do a little bit, and I remember we were running this almost every two weeks using the agile approach. […]. We were running like that for the executives so that every two weeks we can go back and say, this is how much value we have covered so far. And you need to fund us to run another two weeks. So, you have to go back every point in time. And the decisions were made almost every week to go ahead or leave it. So, there was never a point where you're going to go away for six months and do your thing. And only six months later, and then to come back."*

Agreeing with the other two participants, Participant 4 also added, *"we run, I would say, six-week sprints and then we innovate and redesign our systems regularly."* This process allows for development and testing and redevelopment of processes and prototypes in a manner that makes them ready for organisational use in the shortest time possible. Both Participant 4 and Participant 8 made an emphasis of this point.

> Participant 4: *"You know, but by doing these six-week scrums where I think we've maybe redone our website seven times, we've re done our wallet 12 times. Every part of this we just iterate and iterate and iterate and just, short cycles, fail forward, fail fast, fail forward, see what works, see what doesn't, and then you take what works and then you work on that. And it's just been that process."*

> Participant 8: *"Then we have this method called agile. So, we meet with you every second week and we hear. 'Okay, tell me your experience. Tell me what works. Tell me what doesn't work.' Whatever you tell me, I go and fix it. And I give you the next version. And the next version, by the time two, three months have gone, your pilot is ready to go into production."*

5.5.3.3 Desire to change

Eleven quotations were generated from five participants on the view that some organisations would not consider adoption of blockchain technology because their organisational culture drives towards no desire to change. These organisations are content with the way things are, as long as they derive success from the current modalities and technologies through which they conduct business. In other instances, the costs associated with change become a factor, leading to the organisation not bothering with attempts to change.

Participant 5 made this point by saying, *"So on one side you'll find that banks don't actually want to change, or people don't want change because of the cost and that, but then on the other side, we are chipping away at some of the use cases."*

Another consideration is highlighted by Participant 6 where organisations focus on that which is already in place and brings the most rewards. To that effect, the participant mentions that in organisations: *"there's innovation going on around the fringes."* The challenge then becomes that in a big organisation when one wants to introduce a new innovation *"somebody else will look at you and go, we're making 10 billion a year doing this, and you want to spend a couple of million over there well, that's fine just play, but it's not going to move the needle."* This occurrence then leads to the conclusion that *"it's really hard to innovate in a big company. And so, bringing something completely new to a bank and most of them are [big companies], then it's really hard to get the sort of corporate attention to that."*

Some organisations show signs of no desire to change because the people that should lead change are rather engaged in other matters in the organisation. From these organisations, Participant 6 observes, *"there's a very strong, bias to current life. So, to get people to change, is really, really difficult."* In agreement is Participant 7 who commented that *"And everybody's like, oh current stuff works fine. Like, you know, we don't have time for this."* This is also owing to the dynamics of the organisation itself where *"having said that the senior people are excited about it, but then when you get to the business analyst layer of the organisation and they like, oh, we so busy, we don't have time for this."* This occurrence requires an innovative

approach to engage the entire organisation into the blockchain adoption strategy.

These sentiments are understandable to Participant 10, who has worked with financial institutions both large and small, old, and new.

> Participant 10: *"But, you know, I can understand it. It's one of those situations where people were comfortable in their roles, they're comfortable with the way they're doing things. The status quo. Some of this was mission critical data in the early days. No one wanted fines and HIPAA, FINRA, you know, everyone would kind of run the other way from that. So, I guess in the early stages, it was more dev and tech and then it just kind of grew up the ladder."*

However, an interesting point was raised by Participant 5 who asserts that the financial services sector operates in a way in which it was meant by those in control. Delays in settlements, for example, which have been identified in this paper as a challenge of the financial services sector, happen by design. Participant 5 claims that *"Some people think that the current system is not great, but it works. Even now SWIFT has actually speeded up their processing times."* Continuing on, the participant provided a practical example: *"Where now we used to send money from the UK to South Africa once a month and it used to take about three, four days to clear, we are finding that within 36 hours at the moment the money has cleared."*

The participant asserts that the banking industry and SWIFT are able to process transaction with speeds that undermine some of the benefits that blockchain was supposed to bring to financial services. Furthermore, it was found that *"the other thing is people think that people want instant settlement. They actually don't, you know, stock exchanges are driven by people who are trading in securities they don't have. You know, short sellers, derivatives trading, things like that."* This essentially means that those in the highlighted financial markets "*actually don't want instant settlement because then they would have to come up with the cash in the securities that they don't actually have instantly*".

This point was echoed by Participant 6, who opines that there is a cost associated with the requirements of change. Also, there is effort required in implementing

change, such as that brought by adoption of blockchain technology, but organisations have an unwillingness to do so due to the effort required.

> Participant 6: *if you talk to SWIFT or you talk to a CSD, like in South Africa, you've got the JSE and Strate and so on. They say, yeah, we could settle equities in T plus zero. We could settle on the same day with current technology. And they're probably right. And part of the reason they don't is because the business processes in the banks and the brokers and everything don't need it. They don't want to. Because for them to settle T plus Zero, they'd have to change their stuff in the backend. And so, you've got a legacy business process that doesn't want to be changed because it just makes life difficult so that the technology could do it, but actually not interested that that's the one thing is the sort of stickiness of a current process that actually resists the application of new technology."*

5.5.4 Top management support

One of the key determinants of the decision to adopt blockchain technology within the organisation is top management support. A support of the top management in the organisation does not only ensure that the technology is adopted but provides the requisite credibility to the adoption plan that will enhance the full organisational support. The Top Management category is comprised of codes on:

- Top management support
- Strategy development
- Creation of a dedicated team
- Credibility of the initiator

5.5.4.1 Top Management Support

As already mentioned, the support of top management is vital to the adoption decision of blockchain. Participant 1 provides an elegant discussion of the need for support of top management. The first point of the discussion was that *"[…] this started on the innovation department. And as top management saw that this technology*

could be really transformative, that's when we had the mandate to generate the discipline." Establishment of the Blockchain Discipline in the bank allows for a focused approach to adoption of blockchain technology that is based on knowledge and expertise that serves the organisation better. To this, the Participant continued: "*And this discipline is based on the client solution and strategy team. So, it's the team that is defining the strategy for the clients in the future or the client's solutions of the bank."* Because the Discipline is aligned with a specific strategic objective of the organisation, "*it was placed at a very top-level corporate strategy area of the bank. And from there, we had the support of the top management, and this has allowed us to move the rest of the areas."*

The importance of top management support is because new innovations and ideas are met with other departments in the bank such as legal, compliance, risk, and traditional IT departments and "*if you don't have the support of the organisation; if you don't have the weight of the organisation behind you it's really difficult to move."* In concluding, the Participant clarified, "*So, you need the support of the, of the top management to, to, to, to make this high priority in the strategy, to have funding and to have support, to move it forward."*

5.5.4.2   *Organisational capabilities*

When adopting blockchain technology, emphasis must be made on the ability of the organisation to support the technology. This support is in terms of capabilities, that is equipment, people, processes, and other assets that will make adoption of the technology possible. A few of the participants recognised the need to build organisational capabilities in consideration of adopting blockchain.

> Participant 1: *"So we have the innovation team, obviously, because they were the ones that had the knowledge at that time. But also, we included traditional IT teams, traditional risk department, traditional legal department, traditional compliance department, and the normal business of the bank. We generated this discipline with this multidisciplinary team with different experts, from different parts of the bank."*

Participant 1 continued to comment on the importance of knowledge in building organisational capabilities. Intuitively, a comprehensive understanding of the requirements of blockchain adoption and implementation would allow for the organisation to have a capable environment for the adoption of this technology. The account provides a comprehensive need for building organisational capabilities to ensure the success of blockchain.

Firstly, *"You need to start building all the knowledge about blockchain in the bank, not only in the IT systems or around the IT areas, but also in the legal compliance, the data, the business areas of the bank."* This is so that the entire bank can gain an understanding of what blockchain is, and how they each can contribute.

Secondly, the organisation has to "*have the different frameworks for the different blockchain technologies; you need to have all these structured and built and prepared so that you can have a better way of doing all the development and implementations at the same time.*" Within and around this framework will be a need for the legal team has to understand the regulatory situation with regards to blockchain technology, around "*what we can do and what we cannot do. And this is really important because sometimes we want it to do things but which we couldn't, because legally it was not authorised at the time.*"

Finally, the compliance department as well as risk have to understand "*how blockchain risks are managed and how to mitigate them. The compliance department needs to know how a blockchain works on how they can comply with the regulation in this space.*"

Therefore, the importance of the above comment from Participant 1 cannot be understated. It is important to understand that *"all the different areas of the bank need to go out to prepare and to adapt and to be ready for implementing these types of projects."* Essentially, an organisation needs to develop a proper blockchain strategy to ensure project implementation and sustainability. This sustainability can only be achieved if there is a wider organisational support, and a shared goal on the need for blockchain.

Participant 1 was supported by Participant 2 on the need to build organisational capabilities. Participant 2 recommends that organisations should introspect: "*now you get into a phase where you say, do I have the skillsets or the capabilities, the individuals, the systems themselves to be running this blockchain or to implement this blockchain and run it.*" This allows the organisation to acquire the needed capabilities to ensure adoption of the technology. Participant 2 continues by noting that *"there isn't a lot of blockchain skillsets out there, or an understanding deep domain knowledge. When we say blockchain is a domain, there isn't much of that deep domain knowledge in that respect."* The Participant recommends that an organisation could consider "*to just pick a software developer out there or someone with a good understanding of software development principles, because there's a couple of things which are very much aligned.*" However, the Participant continued, *"then there's a flaw in that because it's not just about software development, but it's a way of reorganising your solution."*

Further, Participant 10 also supported the views of both Participant 1 and Participant 2 on the knowledge and skills requirement of blockchain technology. The Participant notes that there is a need to *"put the people and pieces in place to start to build out a concept and proof of concept for you."* However, where there is no experience and expertise, it becomes "*a slow and arduous process sometimes. It can be quick, but it can be done.*" The participant commented, nonetheless, that *"you don't have to have somebody who's already worked in blockchain or in distributed ledger."*

5.5.4.3   Strategy Development

To ensure sustainability of blockchain adoption, a strategy detailing the long-term plan needs to be developed. This strategy can then be used to build an adoption case for the organisation. Strategy development ensures that the matter receives the priority it requires within the organisation. Participant 1 mentions that, *"and we decided and defined a strategy for blockchain in [the bank]. This strategy is very simple."*

It is optional for an organisation to develop a blockchain strategy. This usually happens if the organisation is intent on making blockchain adoption a strategic

priority. What some of the participants argued, however, is that as an enabling technology, blockchain allows for other processes within the organisation to occur in a certain way. As such, strategies are developed around areas that the organisation deems important, and adoption of blockchain by any of the business lines, or a combination thereof, becomes a tactic through which fulfilment of the corporate strategy occurs, whatever strategy that may be.

> Participant 6: *"In as much as blockchain is not really on there, so you can do two things. You can try and attach it to a current strategic priority and say, okay, one of our strategic priorities is innovation. And usually, it is in a big organisation because they do recognise the possibility of being disrupted. And so, an innovation is a way of saving costs and things."*

Participant 2 took the labour to elaborate the role of strategy in blockchain adoption, explaining that *"organisations have at the very high level that we wanna serve our clients. That's our strategy, in a nutshell. We want to serve our clients as, as best as we can, ethically, right?"* This corporate strategy is then followed by tactics, which *"then on the tech side, the strategy is we wanna move into platform models, right? The platform being the tech, the product, and the people."* After the definition of the tactic, then blockchain is considered, where Participant 2 says, *"So, when you bring the blockchain in itself, the blockchain then must be solving one of those two, at the high level, serving the clients at one level down, facilitating the platform model."* In concluding, the participant highlighted that *"blockchain itself, how it comes in, [is] how you solve your strategy."*

Echoing Participant 2 was Participant 9 who clarified the interplay between blockchain technology adoption and the corporate strategy.

> Participant 9: *"Your organisational strategy consists of two things, not of one. So you have a business strategy and then you have a technology strategy that enables the business strategy. It's not one strategy. So at the highest level, for example, if you had a strategy of seamless frictionless transacting for your customer base, that would be your business strategy at a high level, you would then look for technology that would enable that business."*

5.5.4.4   Creation of a dedicated team

To create a focal team or point person around adoption of blockchain technology is to ensure that there is a responsible individuals or group that will deliver on the blockchain requirements of the organisation. Some of the participants have indicated that some designated teams or departments have been created to ensure there is a drive on blockchain for the organisation. Establishment and composition of the team is based on the strategic objectives of the organisation and the reason for which blockchain is being adopted.

Participant 1 commented on the organisation recognising the need for a dedicated blockchain department: *"We generated this discipline with this multidisciplinary team with different experts, from different parts of the bank, and we decided and defined a strategy for blockchain in the bank."* This is supported by participant 2, who stated that "*at the beginning, we've set up a substructure. So, we'll say, who are the people influencing this conversation of adopting blockchain?"* The exercise led to the identification of *"the key funders or the key sponsors. Then those become the sort of the forum to go back to make those decisions to go ahead or not to go ahead."*

In conjunction with the other participants, Participant 7 also highlighted the establishment of a team in the beginning to be able to generate knowledge and momentum in the organisation. This establishment, noted the Participant, was preceded by its definition, considering the need to build knowledge in the organisation around blockchain technology. Participant 7 then commented, "*So, I built an interest group of people in [the company] who were speculating and buying cryptocurrency, who were mining cryptocurrency as well at the time. Some of them were just interested in researching and trying to understand this world."*

5.5.4.5   Credibility of initiator

Credibility is an important currency in the organisational structure, especially in initiation of ideas and leadership of projects. In the blockchain ecosystem, this credibility need not refer to an individual within an organisation because developments on blockchain can be led by unit of analysis. Participant 6 commented

from the instance of a blockchain project in South Africa, that "*to get a group to work together, you need one powerful party to bring them together.*" This comment alluded to the fact that the South African Reserve Bank leads development of Central bank Digital Currencies in the country, they have brought together industry players to contribute to the success of the project and the development of the blockchain ecosystem in the country.

Moreover, Participant 6 continued to provide insights on the role of credibility in blockchain adoption.

> Participant 6: "*And so how do you get the bank's attention onto something like blockchain? […]. There's a number of ways that can happen. One is you have an internal enthusiast who, who has a built-up asset in terms of their credibility and their position in the business. So, if I'm a manager in a small branch in a bank, and I think blockchain is the next big thing, and I go and try and talk to the CEO, he's not going to let me in the door. If I'm somebody who sits on the ex-co and the CEO has been working with me 15 years, then he knows me and he trusts my judgment. And if I say, I think this is interesting, even if he thinks it's nuts, he's going to listen.*"

5.5.5 Alignment

Participants were also asked to explain how they ensured that adoption of the technology aligned with everything about the organisational strategy. Leading from experience, one participant advised on the importance of alignment of organisational strategy and departments, recommending that all areas of the organisation need to be aligned "*because what we suffered at the beginning is that you might have an innovation team that knows a lot about blockchain or about the new technology, but the rest of the bank has no idea of what this is about.*"

The lack of alignment is a challenge because "*by the time [the innovation team] have the great idea, the great business solution based on blockchain, they want to implement it, it's impossible because the rest of the bank is not aligned.*" Ensuring that there is alignment will help the organisation avoid situations where when faced

with innovation, *"They don't know how to do it. They don't know how to implement it. They don't know if they can do it or not."* Participant 1 advises strongly on the importance of alignment, saying, *"And this is really important, to not have the innovation in a silo to try and bring the innovation to the bank and to share it within all the banks so that you can move these projects forward."*

The prevalence of silo mentalities and organisations is not lost with Participant 2, who also commented on the role of organisational alignment.

> Participant 2: *"We still organised in silos or in functions. Functions I mean, we've got guys doing networks, guys doing servers, guys, doing the application guys doing the middle tier layer. So, we still are very much organised in functions. And whereas when you're implementing blockchain, the technology itself allows you to slice your functional, your support function, almost horizontally, right?"*

Moreover, to ensure alignment of adoption of blockchain with everything about the organisational strategy, Participant 8 encourages to, *"first of all, commit that change to strategy to say, 'guys, we don't have an option. Number one priority. Let's go and resolve the pain points we have with this new technology.' That's number one."*

5.5.6 Results of adoption

On the last aspect of research question two, the participants were asked to detail the organisational experiences that resulted from adoption of blockchain technology. The emergence of this sub-theme was based on two code groups that epitomised the efficiencies accorded to business by utilisation of blockchain. These are process efficiencies, and cost benefits of using blockchain technology. The benefits of blockchain to financial services are aligned to the characteristics of blockchain technology highlighted earlier.

5.5.6.1 Process Efficiency

All Participants have agreed that one of the key benefits to adopting blockchain

technology is around the efficiencies that the technology provides to processes and operations of the organisation. Alongside the nuanced benefits and advantages that blockchain offers organisations, efficiency becomes an overarching subject. The creation of blockchain technology was centred around efficient execution of transactions. It therefore is not surprising to find that all participants will recognise the efficiency that blockchain brings to organisations.

To begin with, Participant 1 recognised that while there is a lot that could be built on top of blockchain, it can also be used as *"an auditing system or a registry that can act as a notary and be sure that everything that is being exchanged there is real is true and can be legally enforceable you know, in case of a dispute."* The immutability of the blockchain ledger provides the ability to use the technology as an auditing system.

In the same tone as the above, Participant 2 alluded to the potential of blockchain technology accorded by the technology's ecosystem. There is generally the ease and rapid response when a technical challenge occurs. According to Participant 2, blockchain technology provides an environment for "*testing, development and for production"* Within the blockchain enabled environment, *"it seems quicker to create, or they say to spin up as compared to the legacy system, because legacy you have to consider the firewall rules; you have to consider the hardware availability, the database."*

Moreover, owing to its ability as an enabler, blockchain technology was described by Participant 3 as having "*enabled employees to work at more work more efficiently."* Furthermore, as Participant 4 emphasises, adoption of the technology has allowed for organisational work at scale not possible with traditional setups. This enables the efficient use of resources and systems.

Furthermore, when asked about the experiences of having adopted blockchain, Participant 4 displayed the most respect for the technology, while saying, *"We did a little promotion in Vietnam and we onboarded like 40,000 people in two days."* This was followed by illustrative instances of the efficiencies of blockchain technology. One such on the ability of the Participant's blockchain based business to operate at

ten times the efficiency of a traditional financial services institution, with significantly less resource investment.

> Participant 4 "I can run an operation with a hundred million customers with 50 people. You know, standard bank have 10 million customers and 50,000 people, I'm going to be able to run an organisation 10 times their size with no one, One, one-hundredth of the staff compliment. And I don't own one computer, and they've got billions invested in infrastructure."

Additionally, Participant 5 also provided useful instances where blockchain technology demonstrates its superiority over legacy systems. This is appreciated for financial services sector where payment settlements have been an issue.

> Participant 5: "You've also got in terms of speed-right now there's many examples of how long it takes to move money around the world. Whereas using blockchain, you should be able to do these types of things instantly. You also are not prone to having any sort of corruption by a central authority."

Although the above comment is on the efficiencies of the technology, Participant 5 provided a qualifier to the claims concerning blockchain efficiencies with regards to payments processing and settlement. The participant alluded to the fact that since the technology has not been widely adopted in the formal financial services sector, the records and claims of its efficiencies in this regard are not universal but rather special cases of low volume transactions.

> Participant 5: "And there's some papers published around the efficiencies […], there's just these proofs of concepts or very low volume transactions where people can say a process that used to take four days is now taking 30 minutes […]. The problem is we're not seeing big volumes yet coming through in those use cases in financial services. I think it will come, but it's not quite there yet."

Nevertheless, Participant 6 offers a different opinion, providing a case where blockchain technology surpasses legacy financial systems, although this was not in payment processing and settlement.

Participant 6: *"From a corporate perspective, the process of issuing a bond on a blockchain is much cleaner and involves far fewer intermediaries. Issuing bonds is a mess with banks and agents and all sorts of things. So, we've got, that process is simpler and cleaner and it's all completely transparent and so on. And the contracts are audited and whatever."*

All the same, Participant 7 provided an argument from a practical industry example in South Africa where blockchain technology has been shown to have the required efficiencies at the Reserve Bank level.

Participant 7: *"So if I look at financial services and I think of the public paper on project Khokha […], that the reserve bank did. […] One of their major concerns was that the throughput of transactions, was not sufficient. And so, they worked with ConsenSys. ConsenSys created a different algorithm […] where, you know, the transactions self-group […]. And that enabled the throughput rate of transactions that the Reserve Bank needed."*

As well as the other participants, Participant 8, who had been the most adamant about on the need for blockchain adoption in financial services, had a lot to say on the efficiencies of the technology. Blockchain reengineers the ledger and breaks down barriers created by siloed institutions that currently make the financial services sector. As such, the technology allows for some efficiencies to be realised on processes and operations. Participant 8 commented on the value proposition of blockchain.

Participant 8: *"So it's just freedom. And it's freedom to use money in new ways that have never been allowed before. You're going to have an app that you'll be able to swap your crypto against stablecoins against Central Bank Digital Currencies, against whatever, against tokens of anything. [Inaudible] able to have a portfolio that is completely different to the concept of today that you know. Normally investments are very limited as to what you can invest on to create wealth and store of value. Your store of value is going to be much more flexible."*

In addition, Participant 9 also had a lot to say on efficiencies of blockchain technology, echoing what most of their colleagues have emphasised, while offering targeted examples and instances to the conversation.

> Participant 9: *"In South Africa, we've got our 36 financial institutions and they all kind of need to talk to each other, duplicate, reconcile all the transactions across the industry. A DLT would simplify that type of process."*

Finally, Participant 10 also echoed the positive views of the other participants on the efficiency of the technology. One instance mentioned was that *"if you don't have to reconcile you don't have to wait for larger settlement times if you can automate business logic, right. Which was one of the early reasons why people would be looking at blockchain."* The participant continued to mention that, *"Then as you start to be able to use code to run your business more and more, you begin to use machine learning to understand your competitors more, to understand your own operations more, to understand the industry that you're in more."* Through this understanding, the participant argued, *"you'll begin to, through technology, create a way to really control your margins or reduce them; a way to train existing staff or new staff; and give them the tools they need to manage this new technology."*

5.5.6.2   Cost benefits

Alongside the operational and process efficiencies of blockchain, some of the participants commented on the cost benefits of adopting the technology. These range from operational costs to efficiencies outlined above, as well as the benefit of being part of the ecosystem. Participants were able to draw from their knowledge to conclude that costs of implementing blockchain will lead to benefits that outweigh such costs.

On the first instance is Participant 2 who provided an interesting view of the cost benefits of blockchain, saying, *"So in itself, the technology provides you with ample cost benefits: it's cheaper, it's easier. So, the lifecycle cost is cheaper to introduce and is cheaper to maintain. That's one big factor."* Providing a second illustration of the cost benefits, the Participant continued by saying, *"A second factor is it's*

managed by the community. So, it's community projects and community contributions. So, it comes back again to cost."

Following that was Participant 4 drawing from the costs that result from inefficiencies of the legacy financial system, with specific reference to the banking industry.

> Participant 4: "*So I came up with all sorts of ways to find, pay the interest, the fees back at the end of the month and all of these things. And then you know blockchain solves that. Why, because you don't need a full bank system, so you don't need a float. So, you don't have settlement group registry, you don't need to insure against that. So, all of those costs now disappear. So blockchain for payments is completely disruptive. And then what it does is it eliminates the biggest cost in banking."*

Lastly, Participant 5 connected the cost benefits of blockchain with the interoperability characteristic of blockchain. The argument is that as blockchains become interoperable, processes will occur with speed and efficiency that will inevitably lead to lower costs.

5.5.7 Summary of results for question 2

The theme that emerged from the results of question 2 is Organisation. The sub themes include adoption considerations, organisational knowledge, organisational culture, top management support, strategic alignment, and adoption benefits. The findings related to this question display that as organisations consider adoption of blockchain, their decisions are subject to, in a lot of ways, the organisational setup. Some of the considerations on the decision to adopt blockchain have to do with requisite infrastructure requirements; the implementation speed of blockchain, which is often slow; the funding is required to implement blockchain, where the blockchain projects compete for organisational funds; as well as cost considerations. Participants have stated some of the costs of consideration include implementation costs, switching costs, and legal costs, which have been extremely high.

Organisational knowledge is another area of consideration, according to the

participants. Such knowledge allows the organisation to gain technology awareness which can accelerate the decision to adopt. For some of the participants, there were some adoption challenges faced internally. These included scepticism within the organisation; no attention to blockchain by the organisation; mistrust of blockchain which is prevalent in organisations; and misunderstanding caused especially by conflating blockchain with cryptocurrencies. In addressing these challenges, participants commented on the importance of building internal expertise through the blockchain ecosystem. This expertise will be relevant to the organisation where the organisational culture is an impediment to blockchain adoption.

Some of the participants have credited their success in adoption and implementation of blockchain to agile methodology. These participants also have had top management support; their respective organisations have technology capabilities; there is support of corporate strategy; usually presence of a blockchain designated department or team; and have found that credibility of the initiator has a positive effect to influence within the organisation.

Finally, the participants commented on the importance of strategic and organisational alignment, to ensure successful adoption of the technology. Within this theme, a right combination of the factors will lead to successful organisational adoption of blockchain technology. This adoption, according to the experiences of the participants, would bring about process efficiencies, and costs benefits for the adopting entity.

Notwithstanding the above, a surprising finding on the performance of the financial services sector is that the legacy system can settle transactions at speeds and efficiencies promised by blockchain technology. However, this does not happen and therefore renders he system "inefficient". This inefficiency of the sector is intentional for two main reasons. One is that there are benefits for some parties from the operations and processes that define the legacy system the way it is today. The other reason is that there are some costs associated with switching from the current system to a new, blockchain-based system, including resources and time, two elements into which financial institutions are not willing to invest.

5.6 Results: Research question 3

Research question 3

> *What environmental factors in the financial services sector influence an organisation's decision to adopt blockchain technology?*

The purpose of research question three was to identify whether industry competition and regulations are a determining factor in the decision to adopt blockchain technology. This question asked the participants to elaborate on what considerations were made around the business environment with regards to blockchain adoption. The following table displays the themes that emerged from the results to question 3.

Table 5.6: Themes emerging from research question 3 results

Themes		Sub Themes/Categories
5	Environment	Role of Competition Role of Regulations

The second step in building an adoption case for blockchain is a review the business environment, comprising of competition, and regulations. This completes phase two of the blockchain adoption framework, by aligning the organisation to the requirements of adoption of blockchain.

Theme 5: Environmental Considerations

5.6.1 The role of Competition

The findings on the blockchain ecosystem provided evidence that blockchain as a decentralised technology requires a network of collaborators for optimum performance. In the financial services sectors, these collaborators are essentially natural competitors in other regards. Therefore, blockchain technology compels competitors to create collaborative opportunities for the benefit of the financial

services sector. To simplify, in adoption of blockchain technology, it has been found that organisations in the financial services sector need to work together to develop the blockchain ecosystem that will then enable them to compete.

The role of competition in the decision to adopt blockchain was evidenced by several participants wherein some organisations prefer not to lag behind in adoption of a technology they deem will accord their competitors some competitive advantage. In the first instance of elaborating this argument, Participant 1 provided the instances where collaboration with competitors is beneficial to all parties. The first approach is awareness of the movements of the competition. As Participant 1 says, *"[…] we have, this is the second E of the strategy. So, this is Ecosystem, and this is having a very clear view of what everyone is doing and, you always take it into account."* The participant continues by saying that *"if you see your peers moving towards a place, you always look into it. [inaudible], you don't get out of the space or, or lag behind now."*

The second approach to collaborative efforts following observing competitive behaviours is engaging such competitors in conversation. Participant 1 comments on this by saying, "*So, of course, we always talk with your peers; this is a very collaborative space. So, we need to do, or at least it would be better if we could build the solutions together."* Engaging in conversations with other financial institutions allows for identification of collaborative opportunities: *"So, we are also in conversations in lots of the projects that we have been working with other financial institutions. […] And then in the end, the problems are always the same."* For instance, regulatory challenges faced by one institution could impact all the other institutions in the financial services sector. Participant 1 calls back to a point made earlier in the conversation, saying, *"You know, the GDPR problem is the same for all of us. So, we need to be together and to lobby together and to try to move laws and to change things in a way that is better for financial institutions."*

In the second instance, the role of competition has been shown to extend beyond observing competitors and engaging in game theory around blockchain. Rather, Participant 5 agrees with Participant 1 that the blockchain ecosystem requires that competitors work together, in collaborative efforts to develop the ecosystem. A

distinction in the point made by Participant 5, however, is on the difficulty of achieving such collaborative efforts.

> Participant 5: *"So I think that it's a good idea, particularly in the blockchain space that companies actually work together instead of competing with each other to build industry-wide initiatives. And the problem is that, we've got, for example, the South African Financial Blockchain Consortium, but there's never, ever been buy-in from the top within the banks to actually work together on anything serious from a blockchain perspective. The banks are so bogged down with other projects that they working on collectively. Here in South Africa, it's called BankServ, or the Banking Association of South Africa. They're so busy working on other stuff like that. And other projects that right now there hasn't been a driver for them to work together on anything blockchain related."*

In the third instance is Participant 6 who agrees with both participant 1 and especially participant 5 on the difficulty of achieving the collaborative efforts. Despite the need to work together, it appears to be difficult undertaking, due to the mere fact that the organisations involved are naturally competitors. Participant provides a viewpoint by saying, *"And, and it's like, you're trying to get a bunch of competitors to work together. And it's really, really hard to. When it did work was the first, the first project Khokha."* The participant continued by providing a reason for why the one collaborative effort was a success, owing to the credibility of the initiator.

> Participant 5: *"They called the banks and said, we're doing this thing with blockchain. It's going to be looking at how we could do what's currently our retail real time gross settlement, RTGS, real-time gross settlement system called SAMOS." We're looking at a version of that on blockchain. Please come and play in the party kind of thing. And if the reserve bank calls you and your bank, you come to the party. So that in terms of getting a consortium together that worked because you had a single party who brought them in."*

Finally, Participant 9 echoes the views of the other participants, detailing that perspective changes once competitors are called to collaborate. That is because "*it*

also brings a different level of cooperation you need within the industry. So, you kind of have this great idea, but the idea needs the other 30 players in the market." It is the realisation that the other players in the market are needed that "*for you to evolve your idea, you now need to start talking to those individuals, those other 30. And by virtue of doing that, you kind of flatten that view of competition."* In so doing, Participant 9 clarifies, competition occurs on other levels than usual. In that collaborative effort, "*The advantage, to the individuals for participating is how they take that through to their consumers. What's the uniqueness to the consumers? That's where the competition part comes in. Nothing within the DLT itself."*

5.6.2 The role of regulations

On the last part of question 3, most of the participants highlighted that regulations play a role in organisations' consideration of adoption of blockchain technology. Regulations are relevant in various areas of the blockchain ecosystem. Where financial transactions are conducted across borders, for example, governments would usually have to be aware. However, utilisation of blockchain allows for cross border financial transacting where the government may not be involved. In the case of organisational transactions, though, there is a risk involved in not following the regulations of the transacting parties.

5.6.2.1 Regulatory challenges

Some participants commented on the general regulatory challenges with adoption of blockchain technology. One highlighted data protection law, where storage of information in the cloud, as is the operation of the blockchain ecosystem, is not allowed. This presents challenges where data transfer must occur through a blockchain network to jurisdictions where such laws apply. Another refers to occurrences around personal data.

> Participant 1: *"And in some of the cases, we have had problems. For example, with data. In Europe, we have GDPR, which is a very, very complex data protection policies, regulation. And for example, in the blockchain and the blockchain, you cannot remove the data."* So, there is for example, uh, the

right to be forgotten in Europe […]. But if your data is recorded on a blockchain, you cannot remove it because in a blockchain, you cannot remove the information."

Similarly, Participant 8 comments on the fears that result from regulations being unclear.

Participant 8: "*So, regulation is essential because that's another key limiting factor. A lot of people don't want to come in because they're scared that this is illegal or there's uncertainty that they don't know. So, it's essential that the regulators actually in this uncertainty are very clear as to how they're going to regulate it, how they're going to tax it, how they're going to monitor it."*

5.6.2.1.1   Role of legislation

Two participants highlighted the role of legislation in determining whether people use blockchain or not. Organisations have blockchain use case on which they are not able to execute until regulations allow. Regulation therefore plays an important role in determining the modalities through which organisations conduct business.

Participant 1: "*And that would be supported by the regulation, by the law. And that's in the pathway that we are working in. So, now there are starting to be new laws in the States, in Europe, in Asia that are starting to support these new ways of exchanging assets and exchanging value."*

Commenting on the organisation's avoidance of doubt, Participant 5 said, "*So, there was a big analysis of whether what we wanted to do was legal or not. From that perspective, looking at all different pieces of legislation."*

5.6.2.1.2   Regulatory support

Following on the above. Regulatory support has been highlighted as the key factor in conducting business as it has a role not only in guiding business, but in enabling it. For instance, Participant 5 opines that "*if it is a financial use case around the use*

of cash or money, is there a regulatory framework in place to support what you want to do?"

Participant 6 agreed with Participant 5 that regulations can enable or discourage the adoption of blockchain.

> Participant 6: *"And so the second way of doing the regulation is not to say we'll issue guidance as to how you can do stuff in the world, sort of modify the current rules. The second way is to say actually this is a whole new class of actors and assets here. And actually, we need to amend rules for these things. So, we've got crypto exchanges that they're different in some important ways from stock exchanges. We've got crypto assets, you've got tokenisation of assets that requires a whole new set of laws, a new way of thinking about things, because you've got smart contracts and Ricardian contracts and those kinds of things. And how do you deal with that? Actually, that requires a whole new set of laws. And if you look at something like Switzerland or Lichtenstein, they they're small, smaller jurisdictions that can move faster."*

5.6.2.1.3   Lack of regulatory clarity

Some participants expressed their views on lack of regulatory clarity and its impact on adoption of blockchain technology. The first was Participant 1, who said, *"Now that has changed how we can start doing it. But if we are still having a very grey area in regulation space, and we don't know very well what to do and how to do."* Participant 6 made suggestions on the approaches that can be taken by regulators.

> Participant 6: *"If you look at how people are regulating blockchain in financial systems, there's two ways of doing it. One is to say, we've got regulations, so we'll apply those to this new world. So, the Howey Test in the States, you take a 70- or 80-year-old piece of case law that relates to an orange farm and you apply it to ICO's and tokens and, and yeah, that'll work, won't it?"*

Participant 8 noted that it is essential for regulations to be clear, because *"until*

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regulatory clarity is not resolved it's going to stop progress."

Further comments were made by the participants where Participant 10 commented on the belief that the technology has advanced enough for regulations to catch up. However, this is not happening as there is still lack of clarity on what can be done and what should not be done with regards to blockchain technology.

> Participant 10: *"Well, I think compliancy now is, and regulation is at the top. You know, we're making great strides on the tech side. So now we kind of have to understand the regulatory environments and the global adoption of these digital assets and how they're perceived."*

5.6.2.1.4   Fear of regulatory risk

Finally, perceptions of some of the participants have been recorded over the fear associated with regulatory risk. Generally, this fear deters people from adopting and utilising blockchain technology. Participant 7 commented on this that *"when it comes to regulatory risk, people shy away from the tech. For example, blockchain that's normally linked to a cryptocurrency will make people shy away from it because we don't understand this."* This was followed by Participant 8 who commented that *"a lot of people don't want to come in because they're scared that this is illegal or there's uncertainty that they don't know."*

A completion of the work on this Theme concludes Phase 2 of the blockchain adoption strategy-adoption case, and essentially completes the framework on organisational adoption of blockchain technology in financial services. The constructs of which will be discussed in Chapter 6 and Chapter 7.

5.7 Summary of results for question 3

The results of this question have two major sub-themes. These are competition, and regulations, together creating the Environment theme. Participants have commented on the role that competition plays in two aspects. The first is that organisations pay

attention to what their competitors are doing; and where the competition is known to be considering blockchain adoption, then this influences their peers in the industry to do the same. The second aspect is that those organisations that are adopting blockchain should recognise the need to collaborate with competition to benefit from the blockchain ecosystem, and the networks that blockchain technology requires to function.

On the regulatory aspect, it has been found that regulations play a role in whether organisations adopt and utilise blockchain technology or not. The participants opine that regulatory support is needed by the blockchain ecosystem, to both shape the technology, and encourage its development and utilisation in financial services. A lack of regulatory clarity discourages adoption of blockchain technology. Also, where there are no regulations, organisations avoid utilising the technology for fear of regulatory risk.

5.8 Conclusion of Chapter 5

Chapter five presented the findings of this study based on the research questions detailed in Chapter three. The results show that blockchain technology does indeed lead to organisational efficiencies in financial services. However, a detailed look into the results display an interesting combination of factors that all play a role in the decision to adopt blockchain for an organisation. These factors take the major constructs of technology, organisation, and environment.

It was found from the participants of this study that to configure and align an organisation for adoption of blockchain all the three elements of technology, organisation, and environment must be taken into careful consideration. Research question one covered three themes which were systemic challenges, blockchain ecosystem, and technology; research question two covered one theme – internal organisational considerations; while research question three covered one theme - the environment. Together, these questions and their relevant themes have 20 categories which cover the entire spectrum believed to be comprehensive enough for adoption of blockchain for organisational efficiency.

The findings of this research start with identification of efficiency challenges both in the financial services sector and within the organisation, and end on a complete picture that would bring efficiency to the organisation through adoption of blockchain technology. These findings are both comprehensive and encompassing, therefore rendering themselves important to business.

Research question one brought findings such as that the typical efficiency challenges of financial services include process efficiency and high costs. More findings for the question include the existence of a blockchain ecosystem which is a major requirement for all organisations considering adoption of blockchain technology. Such organisations may participate in the ecosystem, influencing not only the development of blockchains for targeted solutions, but also shaping the industry. Such organisations may also collaborate with others on blockchain projects for mutual benefit, knowledge gain, and development of expertise. Through the ecosystem, one would either learn of, or co-create blockchain with beneficial characteristics for business.

Research question two focused on the organisational consideration of blockchain adoption. The findings are majorly about how best an organisation can configure itself internally, such that it has the requisite capabilities to adopt blockchain technology. Research question three provided insights on the role of both competition and regulation, where competitors are advised to cooperate for the development of the blockchain ecosystem. This question provides insights on how the organisation can align itself with the requirements of adoption of blockchain technology.

A move through all these steps is likely to result in an organisation that is fully prepared to adopt, implement, maintain, and sustain blockchain technology, for long-term efficiencies and cost reductions. The following chapter discusses the results presented in Chapter 5.

CHAPTER 6: DISCUSSION OF RESULTS

6.1 Introduction

Chapter five presented the results of each of the research questions for this study. This chapter discusses the findings from chapter five, in accordance with the literature review presented in chapter two, as well as the research questions from chapter three. This is done to determine whether the findings of this study support or contradict the literature. This chapter will follow each of the three research questions with their accompanying themes from Chapter five.

6.2 Statement of major findings

This study sought to identify how organisations configure and align themselves for organisational adoption of blockchain technology. Five themes emerged that highlight the decision-making considerations of organisations with regards to blockchain adoption. These themes are Systemic Challenges, Blockchain Ecosystem, Technological considerations, Organisational considerations, and Environmental considerations.

The first theme is systemic challenges. This means identification of efficiency challenges in financial services in two ways. In the first instance, efficiency challenges are the leading factor for the existence of blockchain technology. Therefore, this theme refers to identification of efficiency challenges of the financial services sector for which blockchain was created. In the second instance, efficiency challenges are the first point of introspection for an organisation considering adoption of blockchain technology. The participants of this study have shown that there must be a direct link between an existing problem, or efficiency challenge, within the organisation, and the need for blockchain adoption. Common efficiency challenges within financial institutions include operations, processes, and costs, caused by lengthy and opaque processes, as well as the use for human intervention in such processes.

The second theme that emerged from the findings is blockchain ecosystem. This refers to the availability and interrelationships of people, computers, organisations, knowledge, networks, and other resources that all connect to shape and create blockchain technologies. The blockchain ecosystem exists because of the technology being a decentralised invention. Furthermore, blockchain is a technology that requires availability of networks to function, especially in the financial services sector where it allows for recording, processing, and relaying of value. The participants have provided insights into the value of the blockchain ecosystem, where there is participation of different individuals and entities across industries, collaboration of parties for the development of the technology for identified challenges, as well as the ecosystem knowledge, from which organisations can develop organisational capabilities and expertise.

The third theme is technology. Simply, all technologies that become relevant to the adoption of blockchain technology. At the core, this theme is about blockchain technology itself, how it enables efficiency in the organisation; the technological characteristics that give blockchain its inherent advantages to financial services; the value proposition, or business case of blockchain; as well as compatibility of blockchain with already existing systems. In this theme and its categories, it has been found that while blockchain has inherent advantages for business, this information usually is not apparent within organisations for which blockchain was developed, because of one challenge: business case articulation. The reason for this challenge is that blockchain was, especially in the beginning, developed outside the formal financial services sector, and there was no knowledge within the financial sector, of the link between the challenges faced by financial institutions, and the solutions availed by blockchain.

The fourth theme that emerged in Chapter five is organisational considerations. This can best be explained as the factors within an organisation that influence the decision to adopt blockchain technology. Having alluded to a lack of direct link between the inherent advantages of blockchain and organisational knowledge, the major categories of this theme revolve around this knowledge, among a few others. What the participants discussed in this theme includes technological considerations of adoption, the organisational culture, top management support, organisational

knowledge, role of internal capabilities, internal expertise, implementation costs, and the benefits of adoption.

The fifth, and final, theme from Chapter five is environment. This refers to the external influencers of the organisation's decision to adopt blockchain. The two main categories under this theme are competition, and regulations. The participants have shown that competition plays a role in influencing whether organisations consider adoption of blockchain. However, this understanding was quickly overcome by the advice that with regards to blockchain adoption, it is more important for organisations to collaborate, than compete, at least at the level of development and utilisation of the technology. This, it has been found, would lead to the growth of the much-needed networks that will allow blockchain to serve as it was meant. The second category of this theme is regulations, wherein the participants have shown that the decision to adopt blockchain technology is usually affected by lack of regulatory clarity, fear of regulatory risk, the role of legislation in the ecosystem, and the need for regulatory support in blockchain.

6.3 The TOE Framework

To discuss the questions of this study, the theoretical framework discussed in Chapter two is used for reference. The Technology-Organisation-Environment Framework (Tornatzky & Fleischer, 1990) is recalled to frame the questions as they were formulated on the basis of this Framework. The TOE Framework is shown in Figure 4.

Figure 4: The TOE Framework
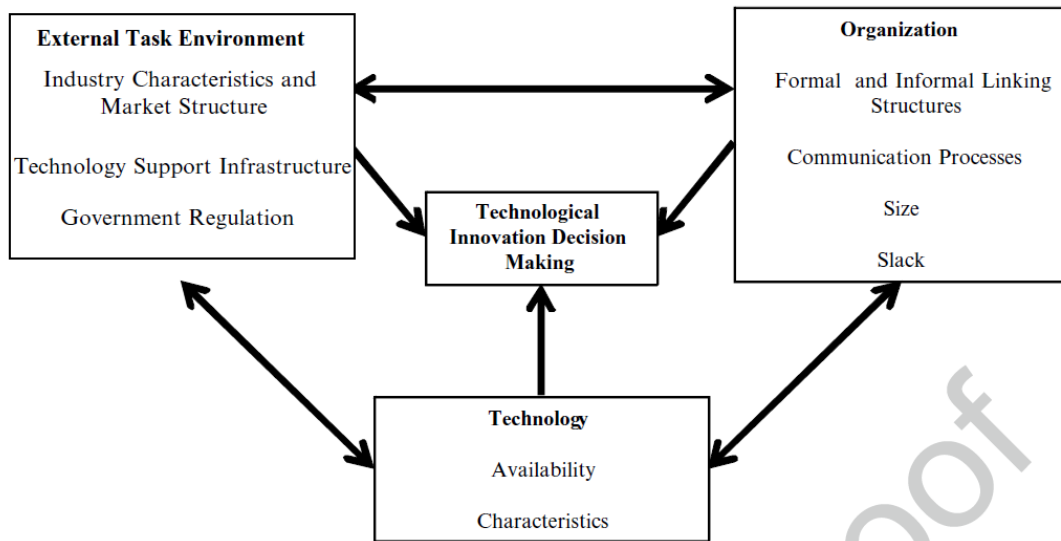
Source: (Baker, 2012)

Accordingly, question 1 of this research is based on the Technology element of the TOE Framework; question 2 is based on the Organisational element, while question 3 is based on the Environmental element. In accordance with the interview guide (Appendix 1), the following table shows each of the questions broken according to the constructs of the Framework:

Table 6.2a Research questions according to TOE Framework

Element	Research Questions
T	**Research Question 1** What are the major qualities of blockchain technology that are considered to provide organisational efficiencies?
O	**Research Question 2** How does the organisational strategy of a financial institution affect adoption of blockchain technology?

	Research Question 3
E	**Research Question 3** What environmental factors in the financial services sector influence an organisation's decision to adopt blockchain technology?

Chapter five discussed the findings from the ten in-depth interviews conducted in that regard, and the themes that emerged from the analysis were as follows:

Table 6.2b Emerging themes from research findings

Framework Element	Themes	Sub Themes/Categories
TO	Systemic Challenges	Operational Processes Costs
TE	Blockchain Ecosystem	Ecosystem Participation Ecosystem Collaboration Ecosystem Knowledge
T	Technology	Blockchain Characteristics Blockchain as an Enabler Inherent Blockchain Advantages Business Case for Blockchain Value Proposition of Blockchain Compatibility with Existing Systems
O	Organisation	Adoption Considerations Organisational Knowledge Organisational Culture Top Management Support Alignment Adoption Benefits

| **E** | Environment | Role of Competition |
| | | Role of Regulations |

As a result of the interconnectedness of the technological aspects of blockchain and its use in business, some interrelationships were identified especially with the first two constructs. However, it was found that the constructs of the framework aligned effortlessly with the major themes that emerged from the study in general. The more nuanced introspection becomes relevant through a discussion of each of the themes.

6.4 Discussion of research question 1

Research question 1

> ***What are the major qualities of blockchain technology that are considered to provide organisational efficiencies?***

6.4.1 Purpose

Question one sought to establish what business need financial institutions had for blockchain technology. Within this aspect was the need to explore the business challenges the organisation was facing. Once a business need had been identified, it was important to establish whether other technologies aside from blockchain were considered for the business need. This established whether, and how, blockchain was considered the best solution for the challenge faced by the organisation. The following themes and major categories emerged from question one.

Theme 1: Systemic Challenges

6.4.2 Efficiency challenges

Most of the participants agree that there are inefficiencies that exist in the traditional financial services sector. It was found that the major challenges faced by

organisations in financial services include operational inefficiencies, process inefficiencies, as well as high costs. However, of importance is the fact that all participants in this study are individuals who have interacted with, or adopted, blockchain technology through their various organisations. It would come as no surprise that the information found in the literature aligns with their view of traditional financial systems.

Nevertheless, the participants highlighted, for the most part, three challenges of the financial services sector include, among others, operational challenges, process inefficiencies, and costs associated with the use of legacy systems. A few of the participants confirmed that there is duplication in financial services; a need for cumbersome infrastructure in various locations for cross border payments; traceability problems; an opaque payment process; as well as hidden records that affect both communication and transaction speed. There was also a concern from one of the participants on the need to reduce costs, especially during the global Covid pandemic.

Chapter two discussed three independent pieces of research of Badunenko and Kumbhakar (2017), Bostandzic and Weiß (2018), and Bryce et al. (2019), who all found that financial institutions have systemic inefficiencies that cause them to consistently fail at a fundamental level. These consistent failures identified by Bryce et al. (2019) emanate from failures in risk identification and mitigation; inability to properly identify asset owners and retrace ownership, especially in the long chain of different buys in global transactions (Nofer et al., 2017). This literature confirms the findings of the study on efficiency challenges faced by financial institutions.

Moreover, Zhou et al. (2020) make a discussion regarding the cost efficiencies in the financial services sector. Financial institutions have been found to have high costs across the board: from foreign exchange transfers and remittances (Gomber et al., 2018), to search costs, to verification costs. The high costs of financial institution as highlighted by Hatzakis et al. (2010), Qiu et al. (2019), Thakor (2020) and Zhou et al. (2020), are usually passed on to the customer through services offered by the institutions. Cross-border transfer costs are as high as 6.8% on average (Bech & Hancock, 2020; The World Bank Group, 2020). This also confirms the findings of the

study where participants prefer blockchain over legacy systems because of the benefits that result from the adoption and use of the new technology.

Theme 2: The Role of the Blockchain Ecosystem

6.4.3 Blockchain Ecosystem

Most participants have commented on the importance of the existence of the blockchain ecosystem from which adopters of the technology can benefit in various ways. The discussion is made especially around the ecosystem knowledge, participation, and competitor collaboration. However, the literature discussed in this paper makes little, if any, reference to the need for a blockchain ecosystem where collaboration of especially competing financial institutions could occur. While the literature does refer to the need for networks through which blockchain works (Peters & Panayi, 2015), it does not imply a need for collaboration among competitors for such networks. Therefore, it can be concluded that the findings of this study have a distinct difference with the literature on, first, the existence of the blockchain ecosystem, and second, the operational requirements of such an ecosystem.

Theme 3: Technological Considerations

6.4.4 Blockchain Characteristics

Blockchain has been explained by some of the participants as an enabling technology for products and processes of financial services. Participants view blockchain as a technology that can provide transparency; act as a single source of truth; provide network security; data security; an agent of disintermediation; and can provide trust in platforms.

Various authors discussed in chapter two present the characteristics and advantages of blockchain as being able to offer transparency and pseudonymity (Clohessy et al., 2019; Iansiti & Lakhani, 2017b; Zheng et al., 2018), irreversibility of records (Iansiti & Lakhani, 2017b; Zheng et al., 2018), transparency (Zheng et al., 2018), enhanced security (Peters & Panayi, 2015) among others. All these claims in literature are

concurrent with the findings of this study.

6.4.5 Business case for blockchain

Participants have explained that one of the reasons blockchain adoption has been slow was because of the challenges in articulating the business case for blockchain technology to relevant parties. Participant 2 explained that where the value to the organisation can be understood, building a clear business case will be possible, while Participant 6 suggested that an organisation must clarify what need it has for blockchain technology before adoption. Participant 8 commented on the fact that the technology is not intuitive, and needs crystallisation in communication, while another participant made a distinction of why it might be difficult to sell blockchain-based on some of its characteristics as such characteristics exist in other technologies.

Moreover, some participants had interacted with blockchain technology early in its development and alluded to having adopted the technology before identification of organisational challenges for which it was needed. Participant 5 recalls a moment of having forced a blockchain solution onto a problem that was not fitting. Nevertheless, other participants commented on having adopted blockchain for experimental purposes, or to run a Proof-of-Concept, before determining there was economic value to be derived from the technology. All the participants recognise the need to have to identify a problem for which blockchain will be a solution before adoption.

Chapter 1 of this research summarises the challenge of adoption of blockchain and alludes to the slow or lack of adoption to limited availability of information on blockchain. According to the literature, because the technology is still new, not much is yet known on what features of blockchain have relevance for which industries, and how such industries should be organised (Risius, 2018). It remains especially unclear to financial institutions how management can configure the organisations to prepare them for adoption of the new technology. Since financial institutions are complex (Bazot, 2017), and blockchain technology is relatively new (Holotiuk & Moormann, 2018), and therefore likely to introduce further complexity (Benbya et al., 2020), it presents potential challenges and dilemmas for managers attempting to align conventional organisational structures to the digital technology, (Svahn et al., 2017).

While both the participants and the literature discuss a challenge of adoption in the simplest sense, there seems to be a general idea in the literature for why the technology is not being adopted. There are other factors that affect adoption and will be discussed later, but to the knowledge of the researcher, the literature discussed in this paper does not place a lot of weight on the inability to articulate the blockchain business case as the problem. Rather, the literature implies a cautionary approach from financial institutions that cannot adopt technology that is not yet understood by the industry.

6.4.6   Blockchain value proposition

The use cases of blockchain that are considered the most prevalent, according to the research participants, are Central Bank Digital Currencies (CBDCs) and Stablecoins. These are followed by other uses such as tokenisation of assets, digital identity, decentralised finance (DeFi), real-time settlement of transactions, as well as cross border payments. According to the literature in Chapter 2, the most anticipated blockchain disruptions for financial services (Gomber et al., 2018) include transition to branchless banking, real-time transaction and credit monitoring, credit scoring, customer acquisition and retention, faster settlements and payments, financial inclusion, cost reductions, and improved efficiencies.

While there is a differing of terminologies to describe the blockchain use cases between the literature and the participants for this research, an introspection into the qualities and characteristics that go into developing each of the items listed are identical. The difference between the priorities of the uses of blockchain to financial services is a factor of time. While the literature review has not caught up yet, there has been rapid development in the blockchain ecosystem, switching the attention of the industry to CBDCs and Stablecoins, as well as decentralised finance, three items which are not yet prevalent in academic literature.

Nevertheless, a surprising finding from the study is that the legacy financial system can settle transactions at speeds promised by blockchain technology. However, this does not occur because, first, there are some parties in the system that benefit from the slow settlement times and shortage of liquidity, and second, for the system to do

so, some improvements have to be made on the back end, and financial institutions are not interested in investing on the technical as well as time requirements for such improvements. This finding is not supported by literature, as the literature on efficiency of the traditional financial system is adamant on the system being incapable of settling transactions as quickly as customers would prefer.

For this reason, it can be concluded that the differences in literature and the findings of this study is one of relevance. The developments in blockchain technology occur at speeds with which academic literature is not at par. The findings, therefore, provide insights to development in blockchain that have, to the knowledge of the researcher, not yet been discussed in scholarly articles.

6.4.7   Compatibility of blockchain with existing systems

The findings show that compatibility of blockchain with existing systems is the least of any of the challenges that adoption of blockchain encompasses. The participants have provided clarity that all that is required to install blockchain is APIs, or Application Programming Interfaces, which will allow blockchain to work with the existing systems in the organisation.

The literature on the TOE framework posits that the three main issues of consideration for technology adoption with the framework include, first, technology use, second, the relative advantage of the technology, and third, compatibility of the new technology with existing systems. On the third element, Benbya et al. (2020) warn that a new technology could bring challenges for the organisation's existing information systems, especially since the organisation's existing technologies determine the scope adoption rate of the new technology. This is a relevant factor for financial institutions in adoption of blockchain technology which is unique in the sense that it originates from outside of the major financial institutions (Goldstein et al., 2019).

While the literature warns on compatibility of legacy systems with blockchain technology, the participants of this research are not in agreement, some being blockchain solutions providers for financial services. Compatibility of blockchain with

existing systems is therefore seen by the participants as an issue that needs not exist. In essence, there is a difference between the warnings in the literature and the claims of the research participants.

6.4.8 Summary of discussion of research question 1

Research question one focused on the technological aspect of blockchain and in accordance with the TOE Framework, considered availability of blockchain, the characteristics of blockchain, and the business case of the technology. The findings brought about three themes for this question, one being systemic challenges, where efficiency challenges have given rise to the characteristics of the technology; the other theme is blockchain ecosystem, which speaks to availability of the technology; and the third theme is technology, detailing the characteristic of blockchain which gives it the value it requires to address the efficiency challenges identified in theme one.

Some of the findings on this research question have been confirmed by literature, where both literature and participants have a similar understanding and expectation of blockchain technology. The differences that have been identified are on the prevalence of "blockchain ecosystem" as a concept, and the transaction settlement capabilities of the legacy system, both of which emerged from this study and was not part of the literature discussed. The thematic categories of question one are displayed in the table below.

Table 6.4: Thematic categories from research question 1

RQ	Themes		Sub Themes/Categories
1	1	Systemic Challenges	Operations Processes Costs
	2	Blockchain Ecosystem	Ecosystem Participation Ecosystem Collaboration Ecosystem Knowledge

	3	Technology	Blockchain Characteristics
			Blockchain as an Enabler
			Inherent Blockchain Advantages
			Business Case for Blockchain
			Value Proposition of Blockchain
			Compatibility with Existing Systems

6.5 Discussion of research question 2

Research question 2

> ***How does the organisational strategy of a financial institution affect adoption of blockchain technology?***

6.5.1 Purpose

This question sought to gain an understanding of the challenges and concerns organisations in financial services faced with adoption of blockchain technology because of their corporate strategic setups. The question further probed into how organisations ensured that adoption of blockchain technology aligned with everything about the organisational strategies, providing key information for the main research question since this study is about how organisations in financial services can configure and align themselves for adoption of blockchain technology. Under research question two, participants were asked to explain what concerns and challenges their organisations faced with adoption of blockchain technology, and how they addressed the identified challenges. Furthermore, this question also explored what experiences organisations had with adoption of blockchain technology, with highlights in terms of operational efficiencies and costs.

Theme 4: Organisational Considerations

6.5.2   Adoption Considerations

Adoption considerations are the factors that organisations consider in the decision to adopt blockchain technology. The findings in Chapter 5 show that of importance in this decision are considerations around cloud computing; use of an integration solutions provider; implementation speed; cost considerations; and obtaining funding.

Participants have stated that blockchain use requires cloud computing and therefore those considering adoption of the technology would have to acquire cloud computing services. However, some participants have also brought it to attention that this presents a challenge in that there is certain sensitive information that legal authorities do not allow to be stored on the cloud. Moreover, while most participants have clarified there should be no issues with integration of blockchain, they have nevertheless spoken of availability of integration solutions providers who assist organisations ensure proper integration of blockchain into the company systems. Participants have also made a distinction between the ease of compatibility of blockchain and the speed of integration, warning that the integration process is a long process that deters some organisations from adopting blockchain.

Moreover, participants commented on the cost requirement of adopting blockchain which includes implementation costs, switching costs, and legal costs. Finally, attention was brought to the request for funding within the organisation for blockchain adoption purposes, funding of which usually becomes a challenge.

The findings are in line with especially the TOE framework literature by Tornatzky and Fleischer (1990), who explain the process of technological innovation. In the technological context, the literature explains the need for organisational technologies required for innovation. In this regard, the use of cloud computing to enable blockchain is something organisations ought to consider. Furthermore, the organisational element (Baker, 2012), discusses the characteristics and resources of the firm and how they affect innovation.

Participants credit the agile method as the best approach to implementation of blockchain as it shortens the time it would take to implement the technology. However, the literature reviewed in this paper makes no specific reference to either implementation speed, or the agile methodology.

6.5.3 Organisational Knowledge

Participants in this study opined that organisational knowledge of blockchain plays an important role in the ability of the organisation to adopt blockchain. This knowledge, according to the participants, brings about technological awareness within the organisation; removes scepticism which could impede adoption; provides the requisite organisational attention to blockchain technology; reduces the mistrust of blockchain that was mentioned as prevalent in organisations; clears the misunderstanding people usually have about blockchain and the confusion with cryptocurrencies; and leads to the development on internal expertise that will ensure a sustainable blockchain project through system integration and resolution of system security issues.

Unfortunately, available literature argues that, because blockchain technology is still new, not much is yet known on what features of blockchain have relevance for which industries, and how such industries should be organised (Risius, 2018). It remains especially unclear to financial institutions how management can configure the organisations to prepare them for adoption of the new technology. This claim is in alignment with the findings on 5.5.2 on organisational knowledge, where most participants opine that there is a general lack of knowledge on blockchain, leading to the slow adoption of the technology in financial services.

It can then be concluded that the findings of the study are aligned with the literature in that availability of organisational knowledge would answer the questions raised by the literature on how organisations and industries can be configured for adoption of blockchain.

6.5.4 Organisational culture

Participants perceive that an innovation culture that encourages strategic sensing, implementation of agile methodology, and shows a desire to change, will likely accelerate adoption of blockchain technology, as opposed to organisations that are more content with the status quo. This is especially problematic for the financial services sector where regulation, competition and risk are decision driving factors. Since financial institutions are complex (Bazot, 2017), and blockchain technology is relatively new (Holotiuk & Moormann, 2018), and therefore likely to introduce further complexity (Benbya et al., 2020), it presents potential challenges and dilemmas for managers attempting to align conventional organisational structures to the digital technology, (Svahn et al., 2017).

The findings of the study highlight the importance of an organisational culture that supports innovation. However, literature presents a point that in financial services, regulations and competition determine a lot of decisions being made. For a lot of financial institutions, the consequence of error through adoption of a technology that would fail the institution could be high. This creates a nuanced difference between the findings of the study and the suggestions of literature.

6.5.5 Top management support

Section 5.5.4 presents findings on top management support. The participants have stated the importance of top management support to adoption of blockchain technology. This support achieves a few things. The first is that the support gives credibility to the idea and the initiator. When such credibility is evident, there is likely to be support from the entire organisation. Second, the support of top management will allow for adoption of blockchain to be a strategic objective. Developing a strategy for blockchain adoption in support of the corporate strategy allows for organisational resources to be availed. Third, top management support will allow for the creation of a dedicated blockchain department or team, which then creates internal expertise and develops organisational knowledge.

In Chapter 2, literature by Harker and Zenios' (2000) *Performance of Financial Institutions* discuss drivers of performance of financial institutions by identifying three broad categories of performance drivers. These are strategy, strategy execution, and environment. Moreover, a study by Kopalle, Kumar, and Subramaniam (2020) in determining how legacy firms can embrace digital technologies found that large legacy firms can propel themselves towards new digital technologies by leveraging their vast resources. Verganti, Vendraminelli, and Iansiti (2020) found that organisational strategy is a determining factor in organisations adopting digital technologies. A "learning organisation", for instance, would find it easier to adapt its strategy to the disruptive technology that is blockchain as opposed to an organisation with a rigid setup. This literature is in alignment with the findings presented in chapter 5 on top management support.

6.5.6 Alignment

The findings of this study are that alignment of the organisation, organisational strategy, adoption of blockchain must happen for successful adoption. According to the literature in Chapter 2, organisational form, human resource management, and product design and alignment of everything (Harker & Zenios, 2000) are determinant factors in the execution of organisational strategies. The findings of the study therefore confirm the literature in this aspect.

6.5.7 Adoption experience

The findings presented in chapter 5 confirm that adoption of blockchain technology brings about two things. The first is process efficiency, and the second is cost benefits. All Participants have unanimously agreed that one of the key benefits to adopting blockchain technology is around the efficiencies that the technology brings to processes and operations within the organisation. As blockchain was created to bring efficiencies to the financial services sector, there are some benefits in that regards that organisations are experiencing. Alongside that, participants have confirmed that there are also some costs benefits as the technology allows for organisations to work at scales and speeds not possible with traditional setups. These range from operational costs to efficiencies outlined above, as well as the

benefit of being part of the ecosystem. Participants were able to draw from their knowledge to conclude that the costs of implementing blockchain will lead to benefits that outweigh such costs.

A study by Deloitte (2016) found that blockchain technology reduces costs by up to 80%; settles payments almost instantaneously; ensures security of transactions; and provides verifiable transaction records. Furthermore, the literature argues that blockchain technology is disruptive as it can perform complex transactions without a third party, making such transactions cheaper and traceable (Borrás & Edler, 2020). Chiu and Koeppl (2019) find that in asset trading and settlement, blockchain technology increases the speed of transactions and at the same time lowers costs, a juxtaposition against the legacy financial system, which is slow and costly (Bech & Hancock, 2020; Qiu et al., 2019; Zhou et al., 2020).

Cong and He (2019) explore blockchain disruption and smart contracts, where they find that blockchain-based smart contracts are a solution of informational asymmetry, and lead to improved consumer surplus by enhancing market entry and competition. Payments with smart contracts are tamper-proof. In comparison with traditional contracting, blockchain technology accords institutions a consensus that reflects the most optimum outcome, an occurrence that is not only relevant to business operations but enhances efficiency (Goldstein et al., 2019).

The findings of the study are aligned with the literature presented in chapter 2. There are more instances of the benefits of blockchain in the literature as it presents a wider source of information than the ten participants that were interviewed for this research.

6.5.8 Summary of discussion of research question 2

Research question two focused on the organisational context. Categories that are discussed include internal adoption considerations, organisational knowledge, organisational culture, top management support, alignment, and adoption benefits. The literature discussed in Chapter two has some differences with the findings for this question. First, the literature in this paper makes no mention of agile methodology in adoption of blockchain; second, the literature claims financial

services cannot make some decisions because of the complexities of the environment within which they operate, with special emphasis on regulation and competition. The findings of this study on the other hand encourage that an innovation culture will accelerate adoption of blockchain technology. Besides those, the findings of this question confirm the literature. The following table presents the thematic categories for this question:

Table 6.5: Thematic categories for research question 2

RQ	Themes		Sub Themes/Categories
2	4	Organisation	Adoption Considerations Organisational Knowledge Organisational Culture Top Management Support Alignment Adoption Benefits

6.6 Discussion of research question 3

Research question3

What environmental factors in the financial services sector influence an organisation's decision to adopt blockchain technology?

6.6.1 Purpose

Question three helped identify whether industry competition and regulations were a determining factor in the decision to adopt blockchain technology. This question asked the participants to elaborate on what considerations were made around the business environment with regards to blockchain adoption.

6.6.2   The role of Competition

From literature, a study by Huang, Dyerson, Wu, and Harindranath (2015) explored the determinants of competitive advantage and found that to maintain sustainable competitive superiority, an institution has to possess technological resources that are not surpassed by the competition. Blockchain technologies are varied in nature, and each is dependent on networks. An entity that invests human and capital resources into understanding and mastering blockchain technologies can leverage the efficiencies of such technology, staying ahead of the competition. This is in line with the claims of Kopalle, Kumar, and Subramaniam (2020) who find that large organisations can stay ahead of the competition by leveraging their resources and scope.

The findings of this research are finding that competition is one of the leading factors for organisations considering adoption of blockchain technology. Some participants have mentioned having to know what the competitors are doing around the blockchain ecosystem. However, what comes up more clearly is the fact that the role of competition has been shown to extend beyond observing competitors and engaging in game theory around blockchain. Rather, the blockchain ecosystem requires that competitors work together, in collaborative efforts to develop the ecosystem. This collaboration will then allow competitors to compete at product and customer satisfaction level, as blockchain can level the playing field.

The literature and the findings agree on the need to remain competitive in financial services. The findings also confirm the literature on organisations investing in blockchain so they can remain competitive. However, there are differences where the findings of the study emphasise collaboration among competitors. The literature presented in this paper goes as far as to acknowledge the need for networks in blockchain but does not imply such networks need to be among competitors or be created through collaborative efforts of competitors.

6.6.3 The role of regulations

According to the literature, a question that legacy financial institutions must consider is what the regulatory implications are of adopting and operationalising blockchain technology. As blockchain technology is new (Holotiuk & Moormann, 2018), it has attracted attention in the areas of law (Sun Yin et al., 2019). However, few, if any, regulatory frameworks exist for blockchain technologies (Finck, 2018). The financial sector is a heavily regulated sector (Adams, 2017), and financial institutions may not be keen to adopt a technology that has not yet had regulatory clarity.

Findings confirm the literature on the role of regulations where participants have commented on the need for regulatory clarity, for example, to use certain blockchains, or to execute certain functions on blockchain. Furthermore, participants have displayed a concern on the fear of regulatory risk that deters organisations from experimenting with, and experience blockchain technology. The role of legislation, as well as regulatory support, are seen by the participants as some more important factors determining blockchain adoption in financial services.

These instances provided by the study participants confirm the literature. There have not been differences observed by the researcher on the role of regulations as discussed in literature and that highlighted by the study participants.

6.6.4 Summary of discussion of research question 3

Research question three discussed the environment element of the TOE Framework. The findings on the role and relevance of regulations confirm the literature discussed in this paper. The same applies to the role of competition. However, a distinction appears where the findings point to a need for collaboration among competitors, something which does not appear in the literature. The following table represents the thematic categories from question three:

Table 6.6: Thematic categories for research question 3

RQ	Themes		Sub Themes/Categories
3	5	Environment	Role of Competition Role of Regulations

6.7 Discussion of findings in creation of a conceptual framework

6.7.1 Overview

The findings of this study display five major themes, with twenty sub-themes or categories that have been discussed. The five themes that emerged from the findings communicate a clear message regarding the main research question. This research aimed to find out how organisations can best configure and align themselves for organisational adoption of blockchain technology, by interrogating the technological, organisational, and environmental elements of the organisation. These three elements are informed by Tornatzky and Fleischer's (1990) Technology-Organisation-Environment Framework, or the TOE Framework. By considering both internal and external factors, the findings of the study prove insights on how organisations can configure themselves internally, such that they are aligned with the requirements of blockchain technology adoption.

The technological element produced three themes. The first is Systemic Challenges, the second is the Blockchain Ecosystem, and the third is Technology. The Organisation element produced one theme, appropriately named Organisational Considerations. The third element, also owing to its name, produced the Environment theme. These themes and their relevant categories are elaborated below, leading to the development of a recommended framework for organisational adoption of blockchain technology.

The five themes that emerged from the findings can be grouped into two foundational phases of the framework. On the first phase is that systemic challenges, blockchain

ecosystem, and technology considerations contribute to the business case for blockchain technology. The second is that the organisational consideration and environmental themes contributed to the adoption case of blockchain technology. Accordingly, in consideration of blockchain technology, initiators within the organisation build first, the business case of blockchain technology, emphasising the need for blockchain as well as the technological merits of the technology. Second, they build the adoption case, where an assessment and introspection of the organisation is conducted to develop the internal capabilities that will allow for adoption of blockchain. This second aspect is done alongside considerations of both competition and regulations, as these two are not only important for financial services but determine the use of blockchain technology.

6.7.2   The Business Case Development

To build a business case for blockchain, the technology must be understood. The participants of this study have pointed to the inability of people to articulate the business case for blockchain as one of the factors leading to a low adoption rate. However, this is understandable for two reasons. The first is that, especially in the beginning, the technology was developed by individuals or groups whose expertise lay in the ability to develop the technology than it did in the ability to market a product for business. The second reason is that those that can market the technology do not understand it as well as they should.

To solve both these challenges, both interested parties from the technological side and the business side can learn the elements that make up the technology and those that make it a good business solution. To then build a business case, one needs to first, determine what challenges exist in the organisation, or the industry; second, take part in the blockchain ecosystem; and third, understanding the technological characteristics of blockchain that makes it relevant for business.

6.7.2.1   Systemic Challenges

The first step in understanding the need for blockchain technology lies in identifying the challenges that are faced by the organisation, or the financial services industry.

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Since this technology was created to solve efficiency issues, and for this paper, the challenges interrogated will have to be inefficiencies that exist in the system. The results of this study have identified three such inefficiencies that can be solved by blockchain. The first is process inefficiencies, the second is operational inefficiencies, the second is process inefficiencies, while the third is cost inefficiencies. It is important to note the interconnectedness of processes and operations. These two can be interpreted as one item. Once the challenges of the financial services sector have been identified, one would then move onto the next step of the process – learning about blockchain.

The participants of the study have provided efficiency challenges from both the industry scale and from within the organisation. While the industry information becomes relevant to understanding blockchain technology innately, this framework pays due respect to the unit of analysis for this study, which is the organisation. Therefore, the existing systems and processes in the organisations are also reviewed in this step of the process, alongside industry challenges. The constructs of the framework include systemic challenges, owing to the efficiency challenges, and introspection into the current organisational context. The constructs shown below are as explained here.

Figure 5: Systemic Challenges
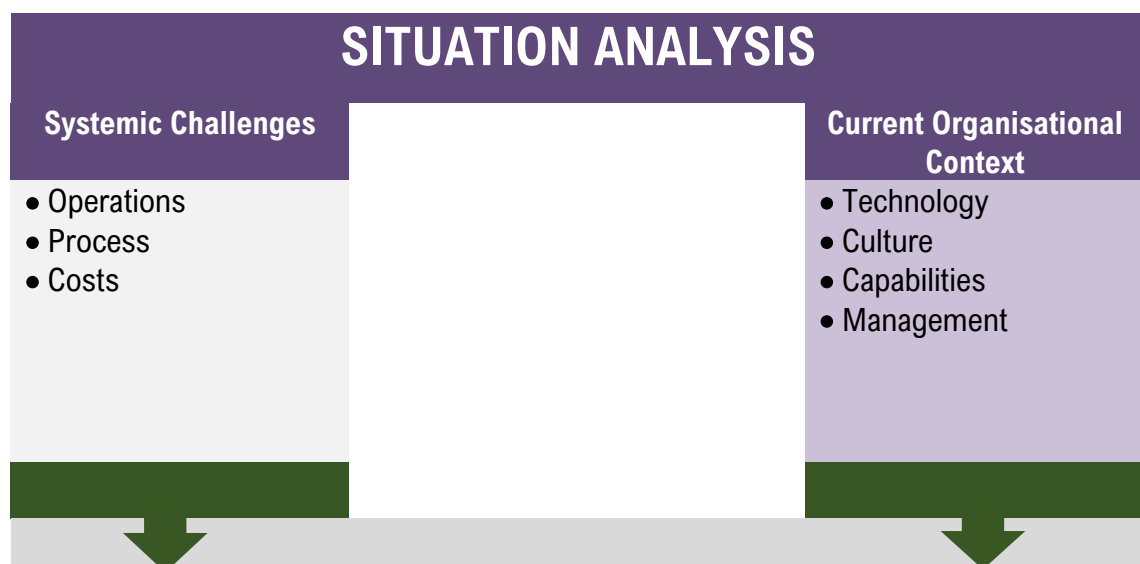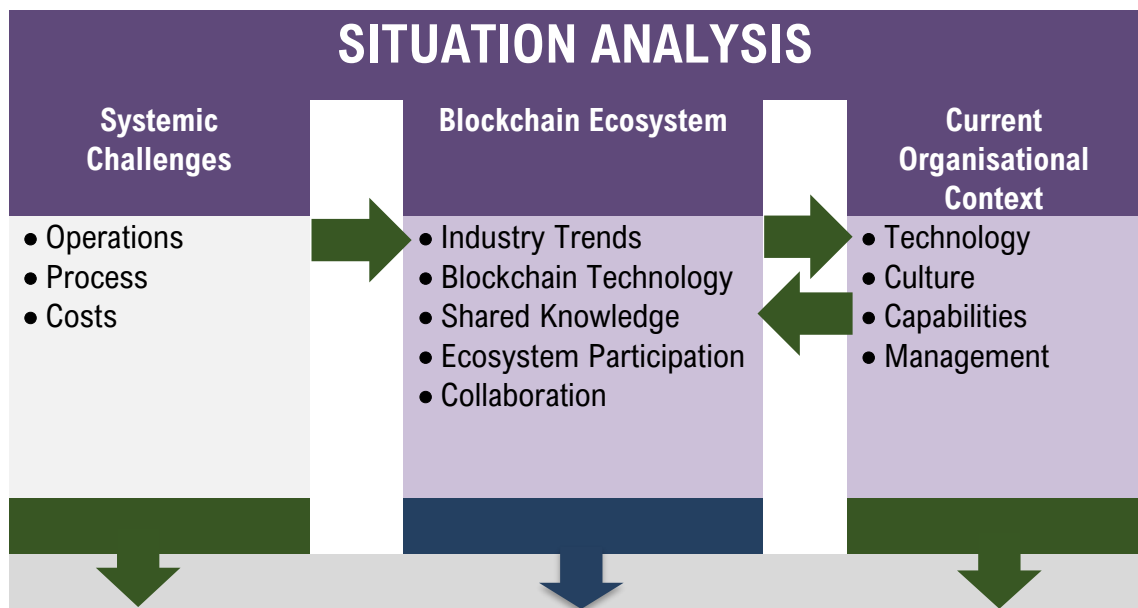

Source: Author's own

6.7.2.2 The role of the blockchain ecosystem

The second step towards building a business case for blockchain involves learning about how the technology solves the identified organisational or industry challenges. This is done by taking part in the blockchain ecosystem, which is a network of individuals, processes, networks, and relationships that are all working towards the creation of business value through blockchain technology. The findings of this study have shown that there is value to be gained in first, participating in the ecosystem, second, collaborating with others in the ecosystem, both of which lead to the development of practical knowledge on the value of blockchain.

Participating in the ecosystem implies one takes part in what is happening within the ecosystem. This could be through observation or active sharing of knowledge. This participation is vital as it does not only impart knowledge to the participant but allows them to shape the trajectory of the ecosystem and the industry by contributing to the actual development of blockchain technologies. Collaborating is self-explanatory, and it is where individuals, groups, or entities work together towards a common goal within the blockchain ecosystem. This collaboration has been shown by the participants as the methodology through which the Intergovernmental Fintech Working Group (IFWG) (IFWG, 2020) in South Africa can lead the development of blockchain for business in the country.

Participation in the blockchain ecosystem allows business experts to learn about, and shape blockchain technology, and at the same time allows technology developers to create a blockchain that solves actual business problems, closing the knowledge gap that once existed between blockchain creators and financial services. Once in the blockchain ecosystem, one would learn about the technological characteristics of blockchain that makes it relevant to the wider financial services sector. And that is the third step towards building a business case for blockchain.

Figure 6: blockchain ecosystem elements for business case development

SITUATION ANALYSIS

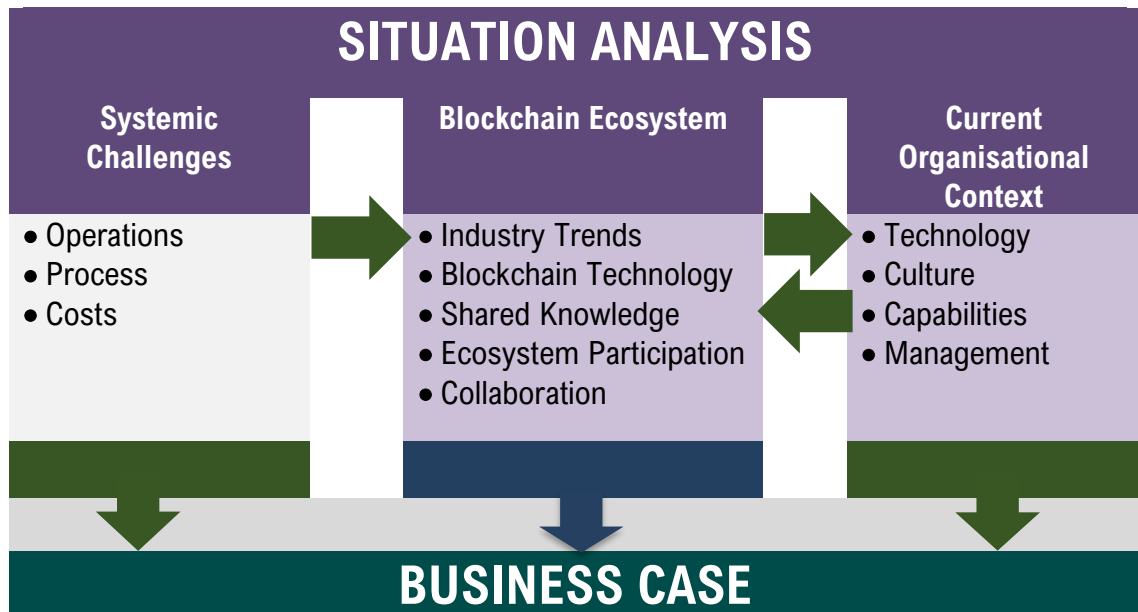| Systemic Challenges	Blockchain Ecosystem	Current Organisational Context
• Operations • Process • Costs	• Industry Trends • Blockchain Technology • Shared Knowledge • Ecosystem Participation • Collaboration	• Technology • Culture • Capabilities • Management

Source: Author's own

6.7.2.3   Technological Considerations of blockchain

The findings of this study include the fact that blockchain is an enabling technology, which has advantages such as that it is a transparency mechanism; it's an immutable ledger providing a single source of truth in transactions; can provide enhanced network security as well as data security; brings about disintermediation leading to process efficiencies; and it enables trust in a business where there may not be trust among the parties. The literature in this research provides an even longer list of advantages of blockchain. Furthermore, the findings have shown that blockchain technology can be compatible with already existing systems in financial institutions with ease. This is achieved through the use of APIs, or application programming interfaces, which allows technologies to talk to each other.

An understanding of the inherent technological characteristics of blockchain allows for one to identify how such characteristics can be relevant to efficiency challenges identified in the first step of the process. Then, utilising the resources available in the blockchain ecosystem, develop a proof of concept to demonstrate the feasibility of blockchain for business. The knowledge gained through the process would allow for the initiator to be able to articulate the business case for this blockchain as they have

an innate understanding of the challenge, the blockchain, and the value that it brings. This then completes the business case development aspect of organisational adoption. However, the internal organisational circumstances are the ones that determine whether the proof of concept will be implemented or not. This is where the second phase of the framework comes in - the adoption case development.

Figure 7: Blockchain business case development

SITUATION ANALYSIS

Systemic Challenges	Blockchain Ecosystem	Current Organisational Context
• Operations • Process • Costs	• Industry Trends • Blockchain Technology • Shared Knowledge • Ecosystem Participation • Collaboration	• Technology • Culture • Capabilities • Management

BUSINESS CASE

Source: Author's own

6.7.3 The Adoption Case Development

The adoption case development is comprised of three constructs. The first two are internally focused and assess the organisation's ability and capability to adopt blockchain technology. The second is externally focused and looks at the business environment in terms of competition and the role of regulations.

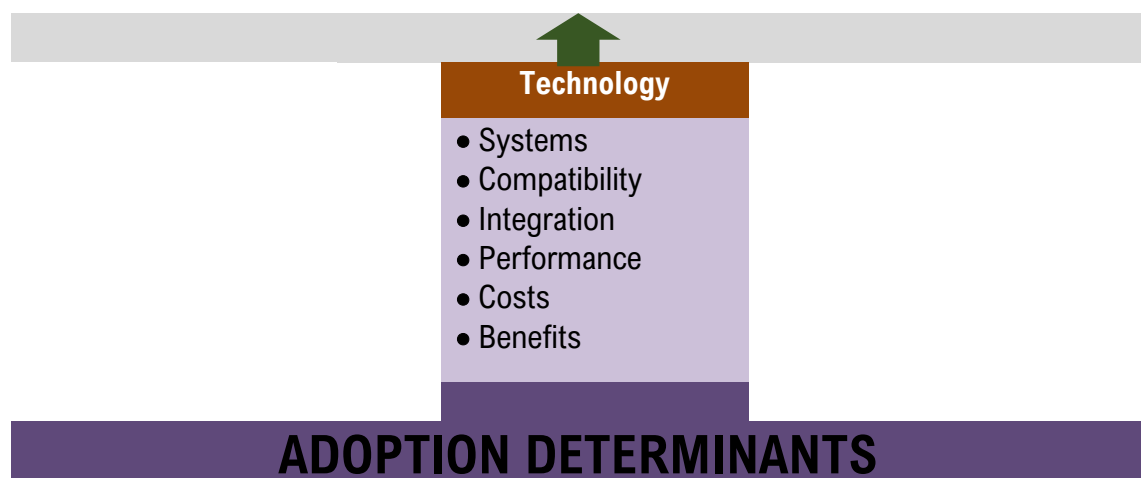#### *6.7.3.1   Organisational considerations*

The first step in building the adoption case contains within itself a series of steps that are intended to determine, and develop, the organisational readiness to adopt blockchain. These are highlighted.

6.7.3.1.1 Technological framework requirements

The first consideration then becomes a review of the technological needs for blockchain adoption. This review considers the ability to use cloud computing, which is the modality through which blockchain operates. Another area of review is the implementation speed of blockchain or the time that will be invested before the organisation can operate through blockchain. The third area is the cost considerations. The findings of this study have shown that some costs incurred in adoption of blockchain would include implementation costs, switching costs, and legal costs. The final area of consideration in this step of the process the funding required, and how it will be obtained from the organisation, owing to the budgetary requirements of the entire organisation.

The importance of this step is that it considers the entire technological framework that will be the internal blockchain management centre.

Figure 8: Technological considerations for blockchain adoption

Technology
- Systems
- Compatibility
- Integration
- Performance
- Costs
- Benefits

ADOPTION DETERMINANTS

Source: Author's own

6.7.3.1.2 *Organisational Knowledge*

The second area of introspection within the organisation involves organisational knowledge about blockchain. Where there is no knowledge, or there is no understanding, or misunderstanding of blockchain, proper knowledge needs to be imparted. Participants of this study have found that challenges in this area include

lack of technological awareness, scepticism, no attention to blockchain within the organisation, mistrust of blockchain, misunderstanding of blockchain, and a lack of internal expertise, issues around system integration and system security.

6.7.3.1.3 Organisational Culture

According to the findings of this study, organisational culture becomes a challenge when such culture shows no desire to change, is comfortable with the status quo, lacks agility, and does not conduct strategic sensing.

6.7.3.1.4 Top Management Support

Where there is support from the top management in the organisation, adoption of blockchain becomes relatively easier than where such support is non-existent. This is because top management support gives credibility to the idea and the initiator, allows for strategy development in favour of blockchain, and provides for the creation of a dedicated blockchain department.
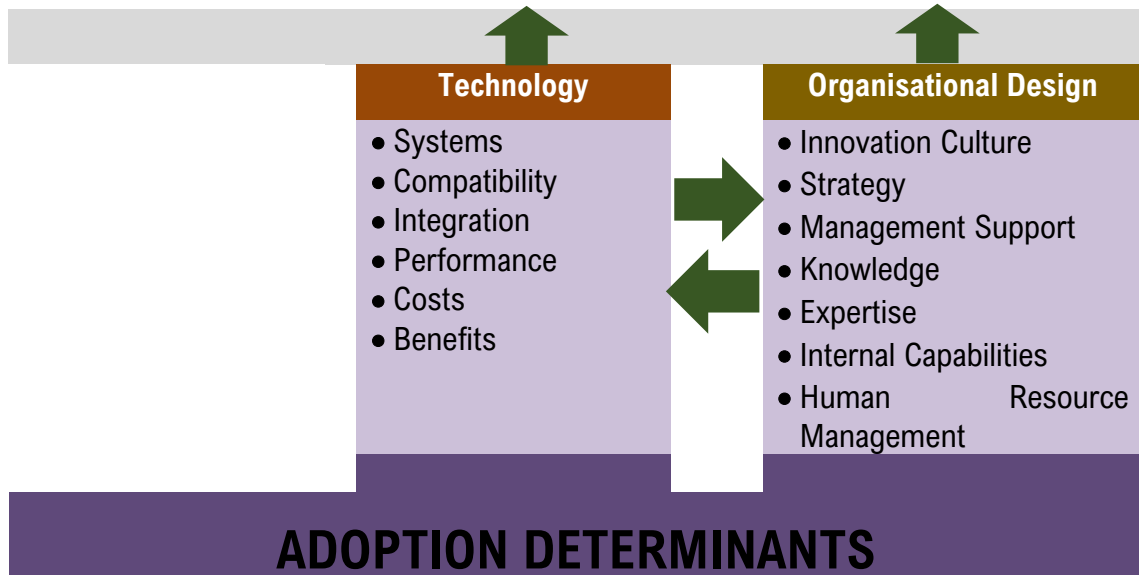
6.7.3.1.5 Alignment

Participants shared advice on how alignment of the strategy to blockchain adoption and alignment of internal departments is necessary. This is because blockchain naturally requires that there be no silos in the organisation as it operates horizontally across different setups within the organisation.

Once all these areas of the organisation have been reviewed, where there are barriers to adoption, they need to be broken down. Resources will then need to be availed for the technological requirements of blockchain; knowledge needs to be disseminated through the organisation, either through the initiator within the organisation, or allowing for the creation of the blockchain department to participate in the blockchain ecosystem; the organisational culture that does not support innovation needs to change to an innovative culture, as the developments of blockchain will need frequent update of skillset within the organisation; top management needs to be engaged to provide the required credibility to the project

and avail organisational resources; and lastly, there has to be alignment in the organisation. Once this is achieved; the organisation will be ready to adopt blockchain. However, the adoption case will not be complete as there are competitive and legal requirements that are critical to the use of blockchain.

Figure 9: Organisational considerations for blockchain adoption

| Technology	Organisational Design
• Systems • Compatibility • Integration • Performance • Costs • Benefits	• Innovation Culture • Strategy • Management Support • Knowledge • Expertise • Internal Capabilities • Human Resource Management

ADOPTION DETERMINANTS

6.7.3.2 *Environmental considerations*

The final step in adoption of blockchain becomes a thorough consideration of the competitive landscape and the regulations around blockchain. First, regulations must be confirmed to be in favour of the use cases for which the blockchain is being adopted by the organisation. The findings of this study have shown that participants in their experiences were not able to execute certain blockchain projects because of a lack of regulatory clarity, fear of regulatory risk, and the role of legislation as well as the support of regulations. Second, competitors in financial services must be considered first to understand the competitive landscape, and second and most important, for collaborative purposes. This is because blockchain is a technology that requires networks to operate optimally, and these networks are created with natural competitors within the financial services sector.

The second step of blockchain adoption is complete when the adoption case has been built. All these steps as detailed in Chapter five and this Chapter are believed

to provide a comprehensive guide to adoption of blockchain technology.

Figure 10: Determinants of blockchain adoption
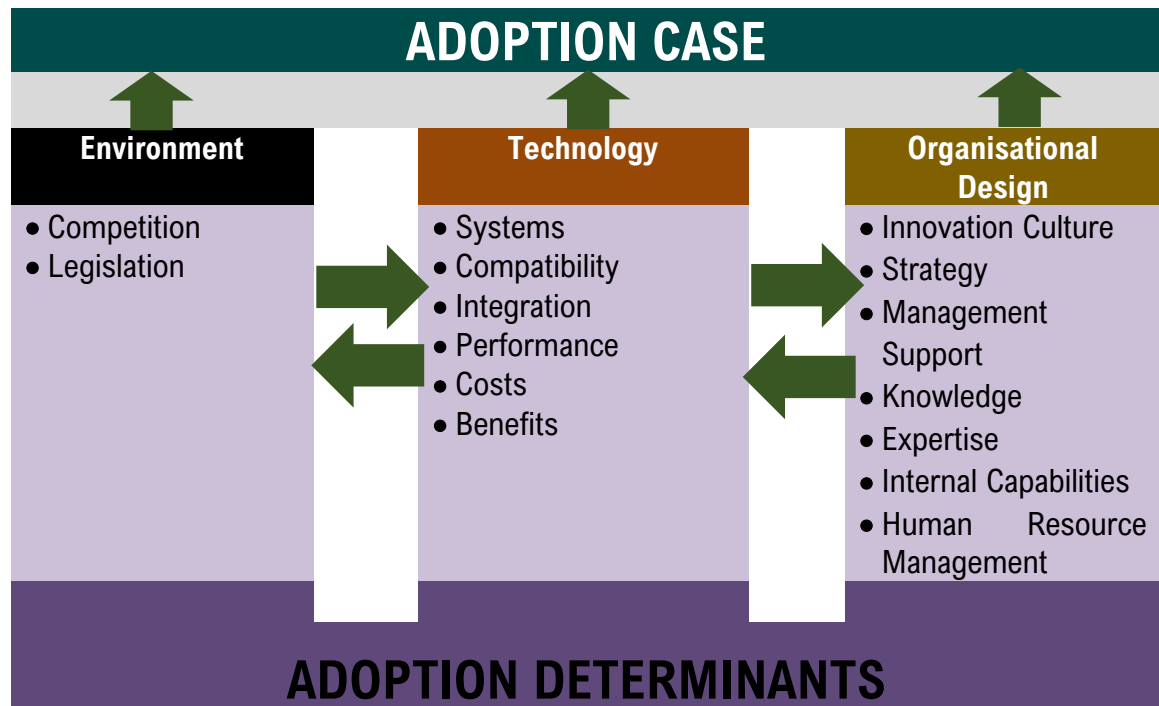
Source: Author's own

6.8 Conclusion of Chapter 6

This chapter provided a discussion of the findings of the study presented in Chapter five, by providing a comparative analysis of the results with the literature review covered in Chapter two.

Research question one focused on the technological aspect of blockchain, and in accordance with the TOE Framework considered availability of blockchain, the characteristics of blockchain, and business case of the technology. The findings brought about three themes for this question, one being systemic challenges, focused on efficiency challenges that give rise to the characteristics of the technology; the other theme is blockchain ecosystem, which speaks to availability of the technology; and the third theme is technology, detailing the characteristic of blockchain which gives it the value it requires to address the efficiency challenges identified in theme one. The findings on research question one have been confirmed

by literature, where both literature and participants have a similar understanding and expectation of blockchain technology. However, there is a difference in that there is the prevalence of "blockchain ecosystem" as a concept from the findings of this research, something which does not happen with the literature discussed.

Research question two focused on the organisational context. The literature discussed in chapter two has some differences from the findings for this question. First, the literature in this paper makes no mention of agile methodology in adoption of blockchain; second, the literature claims financial services institutions are not able to make certain business decisions with liberty because of the complexities of the environment within which they operate, with special emphasis on regulation and competition. The findings of this study on the other hand encourage that an innovation culture should exist, allowing an organisation to make decisions that will accelerate adoption of blockchain technology. Besides those, the findings of this question confirm the literature.

Research question three discussed the environment element of the TOE Framework. The findings on the role and relevance of regulations confirm the literature discussed in this paper. The same applies to the role of competition. However, a distinction appears where the findings point to a need for collaboration among competitors, something which does not appear in the literature.

CHAPTER 7: CONCLUSION

7.1 Introduction

This research sought to gain an in-depth understanding of how organisations configure and align themselves in consideration of adoption of blockchain technology. This organisational alignment and configuration were guided by the TOE Framework (Tornatzky & Fleischer, 1990), by considering the technological, organisational, and environmental elements of the organisation. The study sought to explore the perceptions of experts in the financial services sector on the decision considerations of blockchain technology. In so doing, the study aimed to find out the business case for blockchain, the organisational alignment that ensures adoption, and the environmental considerations of adoption of the technology.

Blockchain is still a new topic, and it is not yet known what features of the technology have the most relevance for the financial services sector, and how organisations in the sector can configure themselves in consideration of adoption of the new technology. The literature establishes that the primary target industry for blockchain technology is financial services (Nofer et al., 2017), where strong impacts of the technology have been expected (Holotiuk & Moormann, 2018). Considering that every major financial institution is considering application of blockchain in different areas of their business (Beck & Müller-Bloch, 2017), it was only fitting to identify what those considerations were.

This chapter concludes this study through a summary of the research findings, followed by a presentation of the proposed framework for organisational adoption of blockchain technology. This will be followed by an overview of the implications of the study for management and other relevant stakeholders. The researcher will also attempt to highlight the limitations of the study, after which suggestions for future research will be made.

7.2 Principal findings

This research implemented in-depth interviews to explore how organisations in financial services configure and align themselves for adoption of blockchain technology. The results have shown that organisations configure themselves through identification of challenges, organisational introspection and design, and align themselves through considerations of the industry, the blockchain ecosystem, and the environment. Accordingly, in the attempt of this research to identify how organisations configure and align themselves for blockchain adoption, five themes emerged that explain the decision-making considerations.

Theme one from the findings is Systemic Challenges. In this theme, the results confirm the literature that three of the main challenges of the financial services sector include, among others, operational inefficiencies, process inefficiencies, and high costs from the use of legacy systems. A few of the participants confirmed that there is duplication in financial services, traceability problems, an opaque payment process, and hidden records that affect both communication and transaction speed.

Theme two was on blockchain ecosystem. Most participants have provided insights into the value of the blockchain ecosystem, where there is participation of different entities across industries, collaboration of parties for the development of the technology for identified challenges, as well as the ecosystem knowledge, into which organisations can tap to develop organisational capabilities and expertise. However, the literature discussed in this paper makes little, if any, reference to the need for a blockchain ecosystem where collaboration of especially competing financial institutions could collaborate.

The third theme from the findings is technology. The study participants see blockchain as a technology that can provide transparency; act as a single source of truth; provide network security; data security; an agent of disintermediation; and can provide trust in platforms. In this theme and its categories, it has been found that while blockchain has inherent advantages for business, this information does not exist within organisations for which blockchain was developed because of one

challenge: business case articulation. The reason for this challenge is that blockchain was, especially in the beginning, developed outside of the financial system and there was no knowledge within the finance sector, of the link between the challenges faced by financial services, and the solutions availed by blockchain.

Theme four emerged from the findings of research question two, which focused on the organisational context. The participants have highlighted the importance of the organisational context in the decision to adopt blockchain technology. Therefore, some factors that have been found to affect the decision to adopt blockchain technology include technological framework setup factors; the role of organisational knowledge where the lack of it is a challenge for adoption, and misunderstandings of blockchain are also impediments. The importance of organisational culture is such that some organisations are not adopting blockchain technology because they do not have an innovation culture, or have no desire to change, having a bias to the status quo. Top management support is another factor that was found to play a major role in adoption. The findings show that there is a need for top management support as this gives credibility to the idea and would provide requisite resources for adoption.

The fifth and final theme is Environment, from research question three. This question focused on the environment element of the TOE Framework. The findings on this theme indicate that competition plays a role in influencing whether organisations consider adoption of blockchain. However, this understanding was quickly overcome by the emphasis of a need for collaboration of competitors toward the development of blockchain in the financial services sector. The results indicate that with regards to blockchain adoption, it is more beneficial for organisations to collaborate, than compete, at least at the level of development and utilisation of the technology. This, it has been found, would lead to the growth of the much-needed networks that will allow blockchain to serve as it was meant.

7.3 Proposed Framework

The framework explained here is designed on the assumption that organisations adopt blockchain technology to enhance performance and benefit from
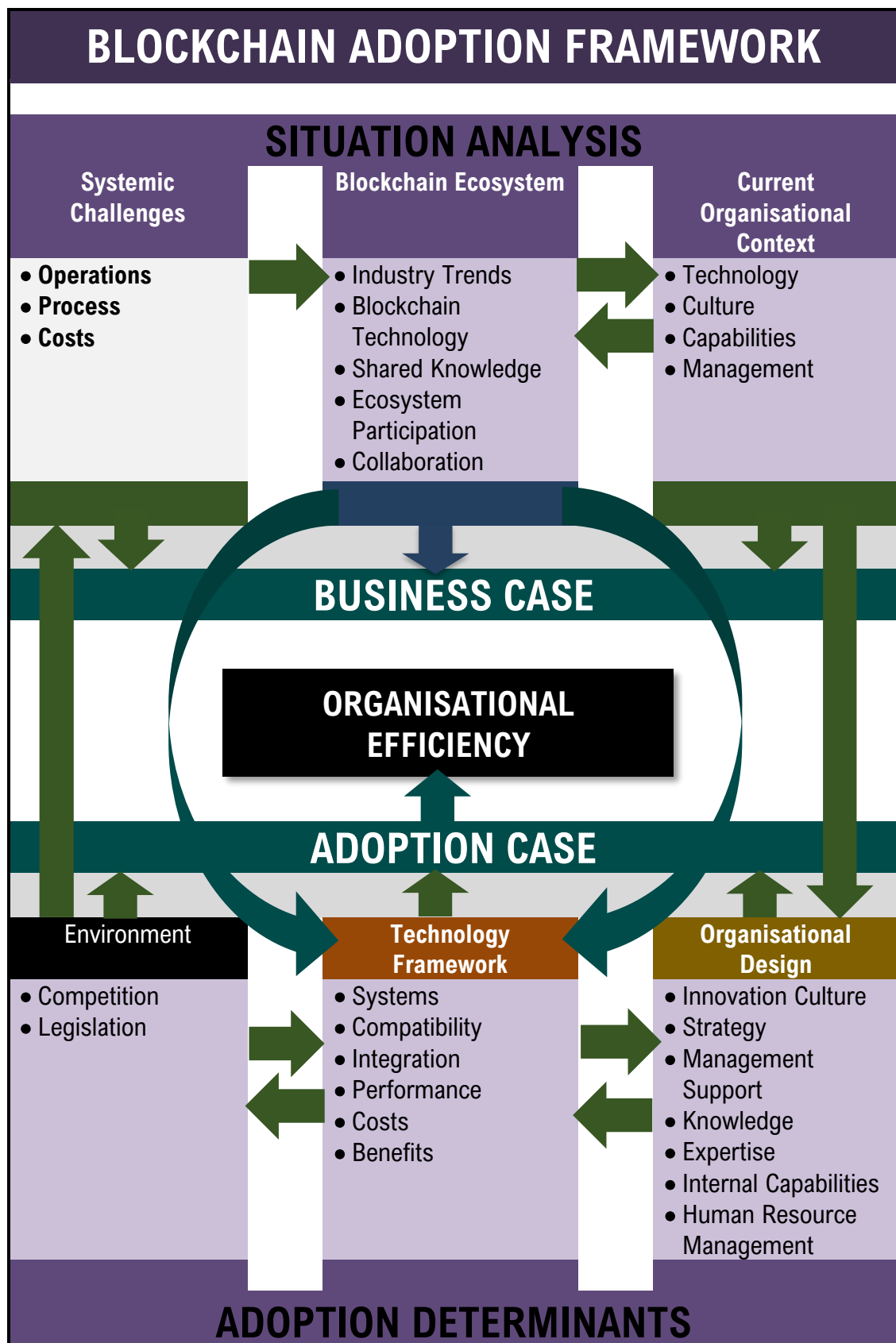
organisational efficiencies. (Crittenden and Crittenden, 2008), rather than to beat competition (Harreld et al., 2007). The framework considers the organisational adoption of blockchain to occur in two phases. The first one being a business case development for blockchain, while the second is adoption case development. Together, these will lead to adoption of blockchain technology and consequential organisational efficiencies. The constructs of the framework are based on the findings of the study and have been borrowed with some liberty from Harker and Zenios' (2000), where three broad categories of performance drivers are identified as strategy, strategy execution, and environment.

The first phase of the framework starts with a situational analysis of the industry, the technology, and the organisation itself, and ends in development of a business case for blockchain adoption. The reason all these three constructs are relevant is that the financial services industry informs the blockchain ecosystem; the ecosystem knowledge is key to organisational analysis and configuration. A combination of the three then contributes to an organisational configuration that aligns the organisation with the requirements of adoption of the technology. Therefore, there is a direct link between the current organisation and the reconfigured organisation in phase two.

The second phase, which contains the reconfigured organisation and a blockchain ready technological framework, is comprised of constructs that are determinants of adoption of blockchain technology. These constructs determine whether the organisation adopts blockchain or not. The redesigned organisation which now has knowledge and expertise of blockchain technology can develop and maintain the technological framework which will allow for implementation of blockchain. This framework has a direct link with the blockchain ecosystem from phase one because the ecosystem knowledge similarly contributes to the development of the new technology framework. Participation in the ecosystem occurs throughout the organisation's life as and when deemed necessary. Alongside building this framework are considerations of both competition and regulations, both of which have a bearing on adoption, and on the industry challenges in phase one of the framework. This emphasises the interconnectedness of the constructs of the proposed framework.

Once the adoption case has been built, the organisation will be reconfigured and be fully aligned to the requirements of adopting blockchain technology, leading to organisational efficiency. This is the main question this research aimed to explore. The full framework is displayed below.

Figure 11: Organisational Blockchain Adoption Framework

BLOCKCHAIN ADOPTION FRAMEWORK

SITUATION ANALYSIS

Systemic Challenges

- **Operations**
- **Process**
- **Costs**

Blockchain Ecosystem

- Industry Trends
- Blockchain Technology
- Shared Knowledge
- Ecosystem Participation
- Collaboration

Current Organisational Context

- Technology
- Culture
- Capabilities
- Management

BUSINESS CASE

ORGANISATIONAL EFFICIENCY

ADOPTION CASE

Environment

- Competition
- Legislation

Technology Framework

- Systems
- Compatibility
- Integration
- Performance
- Costs
- Benefits

Organisational Design

- Innovation Culture
- Strategy
- Management Support
- Knowledge
- Expertise
- Internal Capabilities
- Human Resource Management

ADOPTION DETERMINANTS

Source: Author's own

7.4 Implications for management and other relevant stakeholders

This research has provided insights into the considerations of organisational adoption of blockchain technology. This comes because of the realisation that as financial institutions consider adoption of blockchain technology, there does not seem to be literature on these institutions can configure and align themselves for adoption of blockchain technology.

To address this gap, the author proposes a framework for organisational adoption of blockchain. Through this framework, an organisation can both reconfigure and align itself for adoption of blockchain technology. The factors that become impediments to adoption of blockchain technology are internal as well as external.

To be able to adopt blockchain technology, the first step should be an *identification of efficiency challenges* exercise aimed at unearthing operational, process, and cost efficiency challenges that exist within the organisation. The second step involves *engaging with the blockchain ecosystem.* This step allows for gaining insight into the topic of blockchain and determine if blockchain can solve the problems that the organisation is facing. The third step is utilising the knowledge and resources available in the blockchain ecosystem, to *reconfigure the organisation* such that the internal systems, structures, and processes will be accepting to blockchain technology. Once the organisation is accepting to blockchain, the fourth step is to *align* the organisation with the technological requirements of adoption of blockchain technology. The fifth and final step is *implementation of the blockchain*.

Participating in the blockchain ecosystem offers opportunities for knowledge gaining on the inherent technological characteristics of blockchain, where one will determine whether and how such characteristics can be relevant to efficiency challenges their organisation is facing. Furthermore, participating in the ecosystem accords one an opportunity to influence the development of blockchain technology as well as influence developments in the industry.

Of importance in adoption of blockchain is the engagement of top management. Organisational leaders are encouraged to lend credibility to blockchain evangelists within their organisations, avail resources at their disposal, and where possible, establish a dedicated blockchain team or department.

7.5 Limitations of the research

The following limitations apply to this research:

- The focus of this research was to draw from insights of experts from the financial services sector who have adopted blockchain technology. Therefore, questions and comments of organisations that are considering adoption of blockchain do not form part of the study sample as they were not included. Moreover, only ten participants were interviewed for this study, limiting the amount and breadth of insights that could be gained with a larger number of participants.
- The interviewer for this research has no professional interviewing training and this could have impacted the data collected.
- The theoretical framework of choice for the study is not a perfect fit for the research question.
- The sample population is not representative of the entire financial services sector, but rather a dominant section of the industry. For example, most of the perspectives from the units of observations were related to banking institutions while non-banking financial institutions, regulators, and remittance companies are under/not represented.

7.6 Suggestions for future research

The limitations of this study present opportunities for improvements in future research. The focus of this study was on organisations that have already adopted blockchain technology. This presents an interesting opportunity to investigate why organisations that are aware of the value proposition of blockchain technology are not adopting the technology.

Another opportunity for research emanating from this study would be to test the applicability of the theoretical framework presented in this study.

The findings of this study have emphasised the need for collaboration of financial institutions for the development of blockchain technology. An interesting area of research would be to find out modalities of competitor collaboration of organisational innovations, or blockchain specifically.

Lastly, the findings also imply that decentralised finance (DeFi) is becoming a more important use of blockchain technology. An opportunity for future research exists in identifying how DeFi is going to disrupt the traditional finance industry.

7.7 Conclusion

Literature exists on the benefits of blockchain technology to financial services. What had not been prevalent in literature was how financial services organisations can reconfigure them for adoption of blockchain technology and align themselves to the requirements of adoption of this technology. This exploratory study sought to find out how organisations prepare for adoption of blockchain in that regards. Ten in-depth semi-structured interviews were conducted with experts in the financial services sector to explore their perspectives on adoption of blockchain in financial services.

The findings yielded interesting themes which the researcher was able to adapt into constructs of a framework for organisational adoption of blockchain technology in financial services. It was found that both external and internal factors of the organisation have a bearing in the decision to adopt blockchain, according to the participants. It was also found that to be able to adopt blockchain technology, a business case for blockchain need not only be developed but be articulated well.

The framework proposed for this study suggests the development of a business case for blockchain, and coupling that with the adoption case, the organisation will be reconfigured and fully aligned to the requirements of adopting blockchain technology, leading to organisational efficiency. This answers the main question of this study.

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9 APPENDICES

9.1 Appendix 1: The Interview Guide

Research Questions	*Interview Questions*
Research Question 1 *What are the major qualities of blockchain technology that are considered to provide organisational efficiencies?*	1. Tell me about your latest experience with adopting a technology within your organisation. 2. Tell me about the business need that your organisation had for blockchain technology. 3. What made blockchain technology the best solution for this business need? 4. What were the challenges and concerns around compatibility with existing systems? 5. In the financial services sector, what do you consider to be the value proposition of blockchain technology over legacy systems?
Research Question 2 *How does the organisational strategy of a financial institution affect adoption of blockchain technology?*	6. What challenges and concerns did your organisation face with the adoption of blockchain technology? How did you address them? 7. What strategy changes did you implement to accommodate adoption of blockchain for the organisation? 8. Tell me about the effect of the decision to adopt blockchain on your organisational structure.

	9. How did you ensure that adoption of this technology aligns with everything about the organisation strategy?
	10. What has been the organisation's experience with blockchain since adoption of the technology?

Research Question 3
 	
What environmental factors in the financial services sector influence an organisation's decision to adopt blockchain technology?
	11. What were the considerations around the business environment with regards to blockchain adoption?
	
	12. How did any of the following affect the decision to adopt technology?
	   • Consumer tastes and preferences.
	   • Competition.
	   • Regulations.

Extra *General*	13. Do you have any additional information you would like to provide regarding adoption of blockchain technology and the financial services sector?

9.2 Appendix 2: Informed Consent Letter

INFORMED CONSENT LETTER

A FRAMEWORK FOR ORGANISATIONAL ADOPTION OF BLOCKCHAIN TECHNOLOGY IN THE FINANCIAL SERVICES SECTOR

Researcher: Omphile Mononga, MBA Student at University of Pretoria's Gordon Institute of Business Science (GIBS)

I am conducting research on organisational adoption of blockchain technology. To gain an understanding of the topic I am conducting in-depth, semi-structured interviews with select organisations in the financial sector.

The interview, which will be conducted virtually through a video call, is expected to take about an hour. It will be conversational and exploratory in nature, with the hope that the insights gained will help me understand how and what decisions organisations make in consideration of adoption of blockchain technology. The insights gathered will hopefully provide value into how organisations considering adoption of blockchain technology can prepare themselves.

Your participation is voluntary, and you can withdraw at any time without penalty. All data will be reported without identifiers. I will be recording the session so that I do not miss any key information or misinterpret what you say. The recording is also voluntary, and you may choose to not be recorded. If you have any concerns, please contact my supervisor or me. Our details are provided below:

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9.3 Appendix 3: The Consistency Matrix

TITLE: A FRAMEWORK FOR ORGANISATIONAL ADOPTION OF BLOCKCHAIN TECHNOLOGY IN THE FINANCIAL SERVICES SECTOR			
RESEARCH QUESTIONS	**LITERATURE REVIEW**	**DATA COLLECTION TOOL**	**ANALYSIS**
Research Question 1 What are the major qualities of blockchain technology that are considered to provide organisational efficiencies?	Section 2.4 (Fanning & Centers, 2016; Peters & Panayi, 2015)	Section 4.6.1 & Appendix 1: Interview Guide	*Section 5.3 Coding Process* All interviews were, with the knowledge and permission of the interviewees, recorded. The recordings were then transcribed and analysed with Atlas.ti, a recommended data analysis tool.
Research Question 2 How does the organisational strategy of a financial institution affect adoption of blockchain technology?	Section 2.7.2 (Gomber et al., 2018; Harker & Zenios, 2000; Hatzakis et al., 2010; Park & Mithas, 2020)		
Research Question 3 What environmental factors in the financial services sector influence an organisation's decision to adopt blockchain technology?	Section 2.7.3 (Harker & Zenios, 2000; Huang et al., 2015; Kopalle et al., 2020)		

9.4 Appendix 4: List of Codes

Code Group	Code
Adoption Benefits	Easy Implementation Ecosystem Efficiency Impact on the bank Impact on the national financial system Increases Staff Motivation Lower Organisational Costs Privacy Process Design Revenue Contribution Seamless Integration Single Source of Truth Transaction Speed
Adoption Challenges	Comparison with Current Systems Integration Strategy Internal Pushback Organisational Integration Scepticism Security Certificates Challenge Slow adoption Strategy Objective Alignment System Integration System Security
Adoption Considerations	Funding Integration Solutions Provider Internal Processes Long time for implementation Other Better Solutions Product Type Determination Risk Assessment Scaling Security Implications The Need for Cloud Computing
Adoption Motivation	Best Workable Solution Consumer Requirements Disruption to Legacy Systems Frustration Split Risk Technology Agnostic Strategy
Apathetic Culture	Bias to Status Quo No Attention to Blockchain No Desire to Change

Assertiveness	Remaining Resolute Trust
Blockchain Characteristics	Base Technology Blockchain as an enabler Blockchain has Limitations Counter-Intuitive Technology Different blockchains Distributed Nature
Build Internal Capabilities	Culture Change Execution Exploring for use cases Find route to Market Finding new use cases for blockchain technology Internal coordination Internal System Interoperability Organisational Capabilities Research and Development Sensing New Opportunities Time Investment Trust
Business Case	Business Case Business Case Articulation Business Case Development Client Focus Economic Imperative Problem Identification Proof of Concept Running proof of concept Serve Customers Better Targeted Articulation
Cost Benefits	Cost Benefits
Ecosystem Participation	Ecosystem Ecosystem Collaboration Ecosystem Knowledge Ecosystem Participation
Implementation Costs	Cost Consideration Cost of implementation Cost of Integration Costly Legal Framework High Switching Costs

Inherent Advantages	Blockchain-Enabled Trust Control Correspondent Banking Disruption Current Market Efficiency Data Security Disintermediation Interoperability Lower Barriers to Entry Network Effects Network Security Removes Duplication Sensitive Markets Streamline Commerce Transparency zero-knowledge proof
Inherent Blockchain Shortcomings	no more a solution looking for a problem Solution Before Problem
Innovation Culture	Agile Methodology Ambidextrous Strategy Strategic Development Strategic Sensing
Internal Expertise	Acquire Internal Expertise Education Internal Expertise Lack of Expertise Organisational Experience Technology Awareness
Misunderstanding	Lack of Understanding Mistrust of Blockchain Misunderstanding
Performance Benefits	Operational Efficiency Process Efficiency
Role of Competition	Competition Competitive Race Industry influence on adoption New Markets
Role of Regulations	Compliance Assessment Fear of Regulatory Risk Lack of Regulatory Clarity Legal Assessment Regulatory Challenges Regulatory Permission Regulatory Support Role of Legislation

Top Management Support	Ambidextrous Strategy Creation of Blockchain Discipline Team Credibility of Initiator Forward Thinking Organisation Management Support Top Management Support
Traditional Challenges	Banking Inefficiencies Compounding Challenges Efficiency Industry Entrants Lack of Payment Traceability Lack of Transparency Settlement Risk Traceability
Use Cases	Auditing System Blockchain use cases Brings Individual Freedom Capital Markets Carbon Credit Markets CBDCs Central Bank Digital Currencies Creation of Liquidity Cross Border Payments Currency Interoperability Decentralised Finance Digital Data Exchange Digital Identity Documentary Credits Exchange of Data Financial Inclusion Green Bonds Interbank Payments International Guarantees Personal Data Protection Real-Time Settlement Self-Sovereign Identity Smart Contracts stablecoins Supply Chain Finance Tokenisation of Assets Trade Finance

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