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Implementing Smart Contracts in the Syndicated Loan Market: An Issue of Adoption

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Definitions of Terms

Bitcoin	A cryptocurrency where cryptography is used to regulate the creation of currency which is stored in the Blockchain.
ATM	Abbreviation for the term Automated Teller Machine.
Behavioural Intention	The intention of a participant to behave in a certain way.
Blockchain	Blockchain is a type of distributed ledger. The general ledger that consists of a full list of Bitcoin blocks from the time when Bitcoin was first mined.
BTC	Abbreviation for the term Bitcoin.
Cryptocurrency	A currency that is based on mathematics and produced by solving mathematical problems based on cryptography.
Cryptography	The process of using codes and ciphers used to convert information into unintelligible tex.
Distributed Ledger Technology	Peer-to-peer network that allows data to be recorded, shared and synchronised across multiple, distributed data stores.
DLT	Abbreviation for the term Distributed Ledger Technology.
Effort Expectancy	The degree of ease associated with the use of a system.
Facilitating Conditions	The degree to which an individual believes that an organisational and technical infrastructure exists to support use of a system.
Hash	Shorter version, fixed-length output of a larger amount of data.
IS	Abbreviation for the term Information System(s).
IT	Abbreviation for the term Information Technology.
Know Your Customer	The process through which banks obtain information about their customers when opening accounts.
KYC	Abbreviation for the term Know Your Customer.
Mining	The generation of Bitcoin through solving cryptographic problems.
Perceived Functionality	The belief that a specific technology has all the necessary features to perform as expected and does what needs to be done.
Perceived Helpfulness	The belief that a specific technology will provide adequate and responsive help if need be.

Perceived Privacy	Peoples' perception of their ability to monitor and control the collection, use, disclosure and subsequent access of their information.
Perceived Security	Peoples' perception of the degree of protection against threats that create the circumstances, conditions, or events with the potential to cause economic hardship to data or network resources in the form of destruction, disclosure, modification of data, fraud and abuse.
Performance Expectancy	The degree to which an individual believes that using the system will help him or her to attain gains in job performance.
Reliability	The consistent operation of a specific technology.
Social Influence	The degree to which an individual perceives that important others believe he or she should use the new system.
Syndicated Loan(s)	Type of loan where a group of lenders, typically financial institutions, offer funds jointly to a borrower.
TAM	Abbreviation for the term Technology Acceptance Model.
TRA	Abbreviation for the term Theory of Reasoned Action.
UTAUT	Abbreviation for the term Unified Theory of Acceptance and Use of Technology.

Implementing Smart Contracts in the Syndicated Loan Market: An Issue of Adoption

Abstract

Distributed ledger technology, which found its fame through the cryptocurrency Bitcoin, allows for data to be recorded, shared and synchronised across multiple, distributed data stores. In accordance, this brought forth the idea of using this technology to build consensus. During the last few years distributed ledger technology has gained the much needed attraction it deserves, especially within the Syndicated Loan Market that is one of the major use case opportunities that have been identified. Implementing this technology within the Syndicated Loan Market through Smart Contracts allows for reduced manual labour and back-office workloads as well as the removal of reconciliation and corporate actions. As a result counterparty risk and settlement times will be minimised and performance and transparency for regular reporting will increase. Although the Syndicated Loan Market will benefit from Smart Contracts, it has been identified that an individual's embrace of this new technology will determine its successful implementation. To address this issue, this dissertation examines the trust model, the trust in technology drivers and the revised UTAUT model to construct the Trust and Adoption of Technology Model. This qualitative study culminates in guidelines for the implementation of Smart Contracts that are supported by theory and a literature review. Avenues for future work include investigation of a multi-motive Information Systems acceptance model.

Keywords: Distributed Ledger, DLT, Blockchain, Smart Contracts, Syndicated Loan Market, Syndicated Loans, Trust, Acceptance, Adoption.

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1. Introduction

Money has been the backbone of human society since the origins of human civilisation itself. From its earliest form − barter − to the most recent cryptocurrencies, the concept of a medium of exchange has progressed from primitive to modern times (Trautman & Harrell, 2016). The first ever cryptocurrency, Bitcoin, was introduced in 2009 as an obscure piece of code by a hacker operating under the pseudonym Satoshi Nakamoto (Luther, 2016). It has been reported that Satoshi Nakamoto was inspired by Wei Dai's article that was published in 1998 (Trautman & Harrell, 2016). In this article Dai proposes an idea whereby money can be created through the solving of computational puzzles. Furthermore, the article outlines how a decentralised consensus could be implemented where there is no need for a central administration or point of control (Buterin, 2014). This article, however, lacked the details as to how this idea could be implemented (Buterin, 2014).

In Nakamoto's white paper that was published in January 2008, Bitcoin is described as a peer-to-peer electronic cash system that is a semi-anonymous, decentralised network (Nakamoto, 2008). Since the creation of Bitcoin it has received much attention and is recognised by the Bank of America as a serious payment method competitor (Macurak, 2014).

With the introduction of Bitcoin a fundamental and untested concept was introduced simultaneously. The creation of cryptocurrencies, like Bitcoin, brought forth its underlying distributed ledger known as Blockchain technology (Ali, Barrdear, Clews, & Southgate, 2014). Although feelings about the future of Bitcoin as a method of payment are mixed (Luther, 2016), Blockchain seems to have captured the eye of many in the financial market. Blockchain is a digitally managed, public ledger that contains all Bitcoin transactions that have ever taken place (Pedro, 2015). Blockchain is an implementation of distributed ledger technology. Distributed ledger is a consensus of digital data that is replicated, shared and synchronised across multiple locations with no third party intermediaries (Umeh 2016; Van Oerle and Iemmens, 2016).

In recent years the adoption of smartphones and mobile applications has grown from $24.9 Billion in 2016 to a staggering $55 Billion in 2017. These devices enable payments to be made anywhere, anytime through the Internet. It is estimated that payments using

smartphones and mobile applications are to increase to $274.4 Billion by the year 2021. This is an annual growth rate of 62% between 2016 and 2021 (Bohnhoff, 2017). Most of today's financial assets, such as bank deposits, bonds and stocks, have a digital nature, which allows for the possibility of implementing some sort of distributed ledger technology. This can have a disrupting effect on current financial markets (Ali et al., 2014).

There are currently a vast number of use case opportunities for financial institutions and intermediaries where distributed ledger technology can be beneficial (Anderson, 2017). The application of distributed ledger technology will differ, depending on the use case (World Economic Forum, 2016). These financial institutions and intermediaries are shown in Figure 1 (KPMG, 2017).

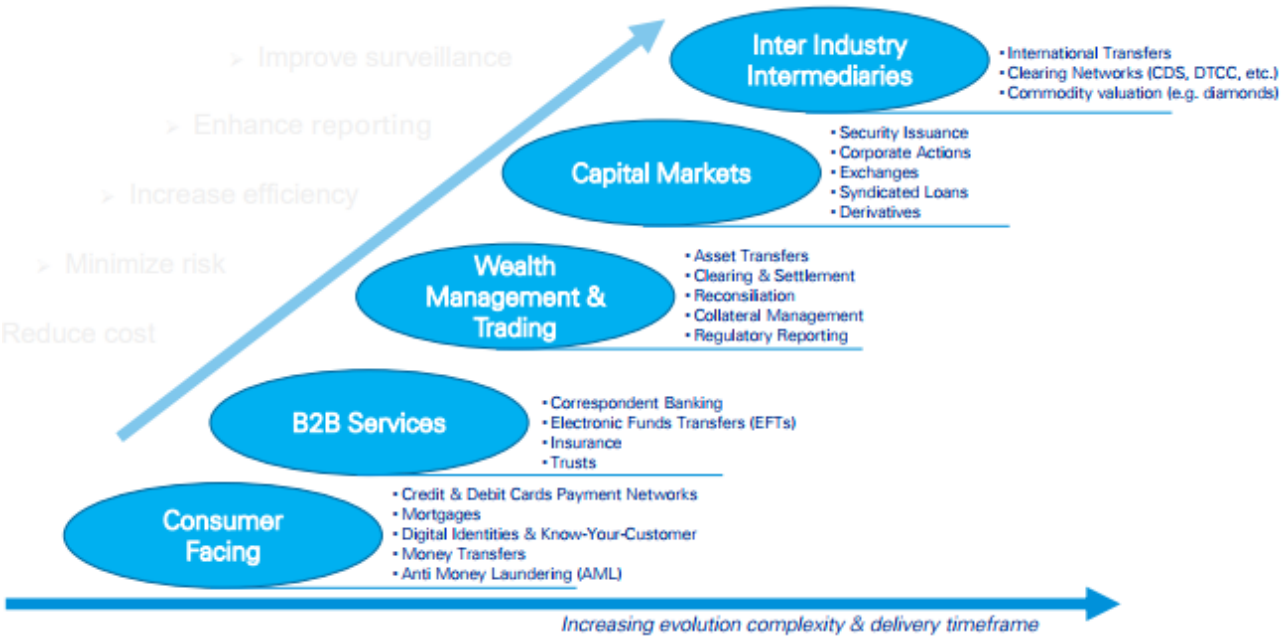


Figure 1: Blockchain Potential for Financial Institutions and Intermediaries (KPMG, 2017)

Based on Figure 1, there are five areas in the Capital Market where a distributed ledger may impact financial institutions and intermediaries. These include Security Issuance, Corporate Actions, Exchanges, Syndicated Loans and Derivatives (KPMG, 2017). After further investigation, five top potential applications for distributed ledger technology were identified. They are cross-border payments, Digital Identity Management, clearing and settlement, letter of credit process and syndication of loans (Anderson, 2017).

This study focuses on the adoption and trust of distributed ledger technology in the Capital Market, specifically in the Syndicated Loan Market. Syndicated loans can be regarded as a type of loan (Norges Bank Investment Management, 2014) where a group of lenders, typically financial institutions, offer funds jointly to a borrower. Syndicated loans, or group loans, are structured, arranged and administered by commercial or investment banks known as arrangers (Chew and Walters 2012; Parker 2016). Syndicated loans are illiquid and are made up jointly by a group of lending banks, also called syndicates (Figure 2) (Darškuvienė 2010, Parker 2016).

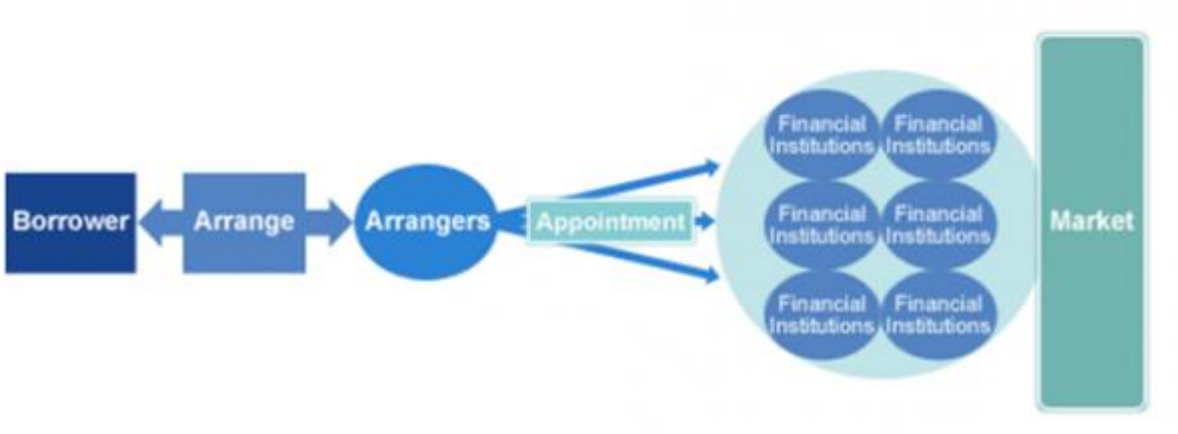


Figure 2: Syndicated Loan Stakeholders (Parker, 2016)

On exploring the literature, the researcher found no key factors influencing the adoption and trust of distributed ledger technology in the Syndicated Loan Market. Thus, this study further focuses on critical elements that shape the financial market to adopt and trust distributed ledger technology specifically within the Syndicated Loan Market.

The aim of this chapter is to provide an overview of the study. The problem statement and research questions is discussed.

1.1. Problem Statement

The reason for the creation of Bitcoin was to establish a sustainable alternative currency that would take the form of an open-sourced cryptocurrency, providing an unconventional substitute for the current banking system (Francis, 2015). Nakamoto (2008) describes Bitcoin as “an electronic payment system based on cryptographic proof instead of trust,

allowing any two willing parties to transact directly with each other without the need for a trusted third party".

From the initial design of Bitcoin much focus has been given to this new cryptocurrency and its volatility in the market with no real interest in the real jewel, the underlying distributed ledger technology Blockchain (Ali et al., 2014). The reason for this is that Bitcoin was the first functioning cryptocurrency and payment system that did not require third party intermediaries, thus being a potential threat to the current banking industry (Ali *et al.,* 2014, Guo and Liang, 2016).

Although technology platforms, such as the Internet, have radically altered front-office functions in financial markets over the past 20 years, not much has changed in the middle- and back-office functions. These functions have remained overly complex, dealing with manual processes (Accenture, 2016). Capital Markets, specifically the Syndicated Loan Market, is facing many challenges among these middle- and back-office functions. (Chew & Walters, 2012). This is due to the process- and resource-intensive nature of the Syndicated Loan Market as it is still verified manually across multiple parties, involving various counterparties and third party service providers. Small companies are being underserved due to the fact that the loan syndication process is resource-intensive and expensive (Accenture, 2016).

During the past few years distributed ledger technology has gained the much needed attraction it deserves, especially in the Capital Market industry (Accenture, 2016). Through implementing distributed ledger technology in general and Smart Contracts in particular, back-office functions are able to leverage the data collected across multiple parties as well as facilitate the exchange, signatures and authentication of notary documents that is triggered by certain arrangement conditions (Dennis, 2000). This provides a level of security and trust concerning arrangement conditions and their execution.

While financial institutions gain much profit through syndicated loans, they are not without problems. One of the major problems for syndicated loans is settlement times (Parker, 2016). Currently it takes up to 20 days for a syndicated loan to be settled. This is due to heavily paper-based, manually driven spreadsheets and phone calls (Hughes, 2016). These

long settlement times increase liquidity risk that forces financial institutions to look at alternative techniques to manage the liquidity of their portfolios effectively (Parker, 2016).

One technique that has been considered, is implementing Smart Contacts, a distributed ledger technology application. This does not only reduce manual labour; it removes the need for reconciliation and corporate actions, reducing back-office workloads (Hughes, 2016).

To assist with the issues relating to loan syndication, this study investigates the current syndicated loan environment. Only by doing so can one understand how the implementation of Smart Contracts combined with the underlying distributed ledger technology can impact the financial market. The focus of this study underscores contributing factors relating to the successful adoption and trust of distributed ledger technology, specifically in the Syndicated Loan Market.

Current literature focuses primarily on Bitcoin as a cryptocurrency. An exploration of current literature on the topic researched shows that not much has been written on the implementation of distributed ledger technologies in the financial market. In theory the implementation of Smart Contracts within the Syndicated Loan Market has been discussed by FinTech companies, but no actual academic research was found regarding the actual implementation thereof. At first glance it may seem that distributed ledger technology may be the solution to numerous, if not all, issues associated with loan syndication, but it is evident that this technology is still relatively new.

It is essential for any financial institution to examine a number of factors and identify risks and challenges before adopting and implementing a new technology. This raises yet another question about the intention of distributed ledger technology in the financial market and how the role of trust in the technology and Smart Contracts will impact its adoption in financial markets.

Based on the aforementioned, it is evident that the core concern of this study is whether distributed ledger technology in general and Smart Contracts in particular are trustworthy technologies to adopt and implement in the financial market, specifically in the Syndicated Loan Market.

1.2. Purpose of this Study

The purpose of this study is to examine the adoption of distributed ledger technology when implementing of Smart Contracts in financial markets in South Africa between 2017 and 2018. Furthermore an analysis is done on the impact of trust on the adoption of distributed ledger technology and Smart Contracts in financial markets.

1.3. Research Questions and Research Objectives

To achieve the goal of this study, the main research question that this study addresses is:

What are the guidelines for the successful implementation of Smart Contracts in the Syndicated Loan Market?

This research is divided into the following three research objectives:

1. What implications does the implementation of Smart Contracts have for loan syndication?
2. What factors are relevant when Smart Contracts are implemented in the Syndicated Loan Market?
3. What factors should the Capital Market consider when implementing Smart Contracts in general and in the Syndicated Loan Market in particular?

1.4. General Research Design

The research design for this study is an interpretive survey conducted through qualitative methods. The data was gathered through interviews to investigate and gain insight into participants' behavioural intention and overall acceptance and adoption of Smart Contracts. The data collected was analysed by following a thematic analysis method. The justification of each of the steps of the research process, set out in the research onion, is discussed (Saunders, Lewis, & Thornhill, 2009). This helped to classify the key factors necessary for the successful implementation of Smart Contracts based on how willing participants are to trust and adopt distributed ledger technology.

1.5. Structure of the Dissertation

This study follows a three phase strategy as can be seen in the adopted schematic outline by Bhattacherjee (2012) depicted in Figure 3.

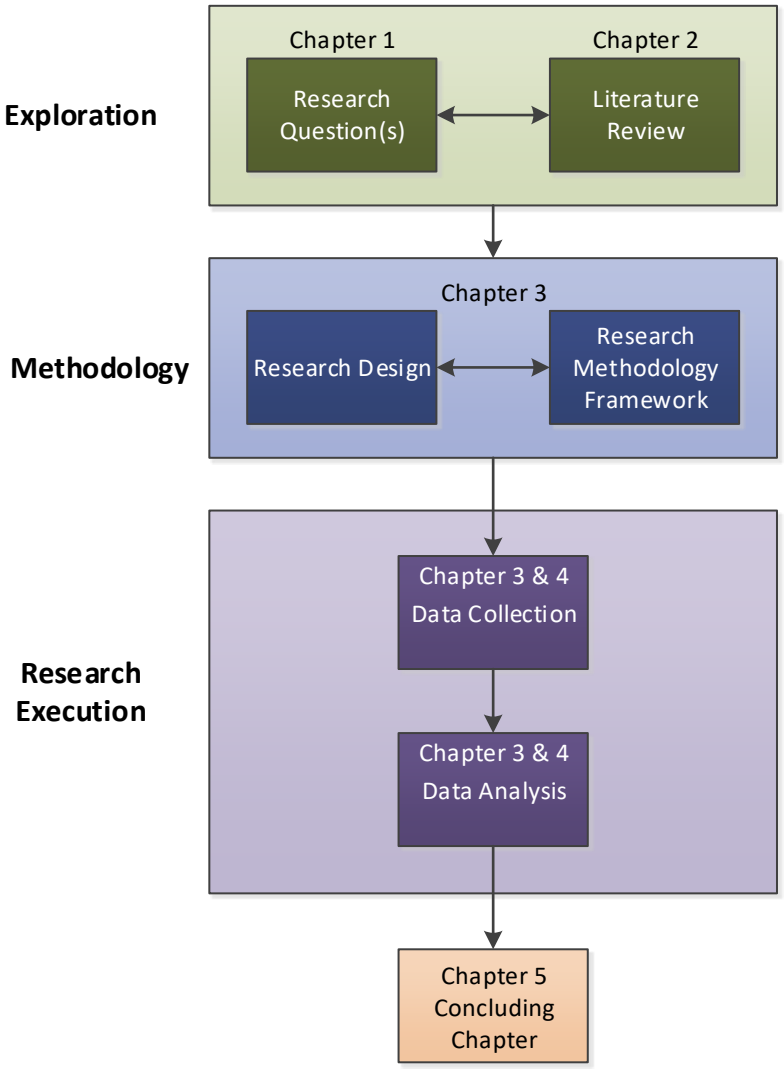


Figure 3: Structure of the Dissertation (Bhattacherjee, 2012)

The three phases of this study, as set out in Figure 3 above, are Exploration, Methodology and Research Execution.

1.5.1. Exploration

The Exploration phase enables the researcher to present a gap or problem in the form of a research question and objectives. Key theories and context are introduced for the benefit of

the reader. This phase includes a brief study of current literature on the topic researched. Chapter 1 and 2 manifest the Exploration phase.

Chapter 1 provides the reader with an overview of currencies and how these have evolved into cryptocurrencies. Furthermore, information regarding distributed ledger is provided that leads to the problem statement and motivation for conducting this study.

The research topic and research questions that are set out in Chapter 1 guide the line of thought in Chapter 2 in understanding how Smart Contracts impact the financial markets, specifically in the Syndicated Loan Market. Chapter 2 identifies common trust criteria used to develop a trust guideline for the adoption of Smart Contracts.

1.5.2. Methodology

The Methodology phase considers relevant methodologies and presents the methodology together with the research process used in the study. The methodology phase is outlined in Chapter 3.

Chapter 3 outlines how the method chosen in Chapter 2 was used to gather data. It provides the reason for choosing the specific method and describes the data gathering pool and the data collection instrument. The data analysis technique that was used for this study is discussed, after which the findings are outlined. These findings hope to answer the research question and objectives set out in Chapter 1.

1.5.3. Research Execution

The Research Execution phase outlines how the research was conducted; it describes the gathering of the data, the data analysis and the documentation of the findings. This phase in set out in Chapter 4 and 5.

Chapter 5 presents a summary of the findings and results obtained that are discussed in Chapter 4. The contribution of this study as well as the limitations faced and opportunities for future research regarding distributed ledger technologies and their application is outlined.

1.6. Conclusion

This chapter provides a synopsis of the layout this study follows. Through investigating current literature on the Syndicated Loan Market and distributed ledger technology, it provides evidence that there is a gap in understanding the personal aspect of adopting distributed ledger technology in the Syndicated Loan Market. The chapter briefly indicates the implications of implementing distributed ledger technology in the Syndicated Loan Market. The study should contribute to the broader body of knowledge on distributed ledger technology; it investigates its trustworthiness and provides guidelines for its implementation.

2. Literature Review

2.1. Introduction

The aim of this chapter is to provide an orientation to and background information on the research topic. Relevant and existing theories and key aspects are reviewed with a view to determining whether Smart Contracts are a trustworthy technology to adopt in the financial market. The literature review forms part of the Exploration phase as indicated in Figure 4.

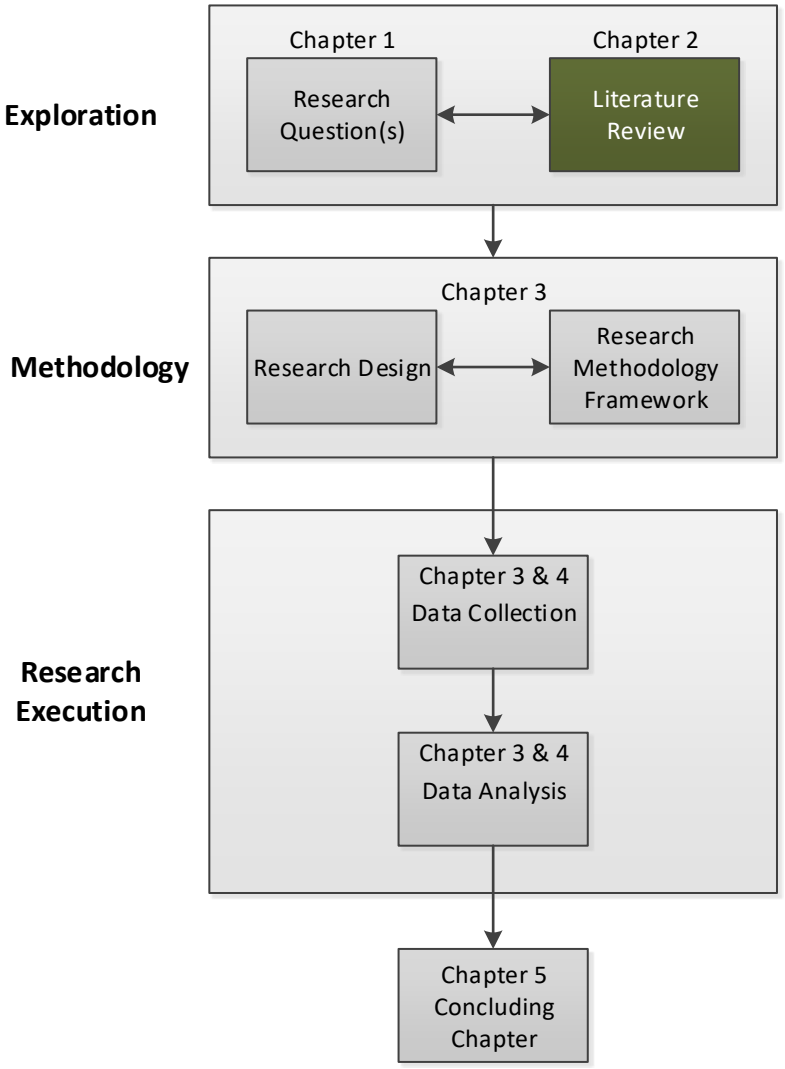


Figure 4: Dissertation Layout focussing on the Literature Review (Bhattacherjee, 2012)

To achieve its aim, this chapter consists of six themes: Financial System, Bitcoin and Blockchain, Distributed Ledger Technology, Syndicated Loans, Unified Theory of Adoption,

and Trust in Technology and Matter of Trust. These core areas are investigated and put into context to explain the nature of the financial market; distributed ledger technology, and how these two concepts combined, in the form of Smart Contracts, can have a disruptive impact on financial markets in general and the Syndicated Loan Market in particular.

To evaluate the existing body of knowledge, this study followed an analytical review scheme. Although existing literature primarily focuses on Bitcoin with no real interest in the underlying distributed ledger technology, the study underscores the impact of distributed ledger technology on the Syndicated Loan Market. It is clear that distributed ledger technology has the potential to effect the infrastructure of financial markets.

2.2. Financial System

Firstly an in-depth description and overview of the financial system and the components that are necessary for an economy to function properly is provided. To gain insight into the potential impact of distributed ledger technology on the financial markets of an economy, one has to understand where financial markets fit into the bigger picture of the economy. This chapter provides the reader with a holistic view of financial markets in general and of the Syndicated Loan Market in particular.

The financial system plays an integral role in stimulating growth and performance of the economy, which in turn affects economic welfare. This is because the financial system ensures the efficiency of transferring funds through overcoming the information-asymmetry problem (Darškuvienė, 2010). It ensures a balance between areas of surplus and areas of deficit. Information asymmetry refers to an instance where one party involved in an economic transaction possesses more or better information than the other party/parties involved (Tumay, 2009).

Financial systems consist of the following three components (Darškuvienė, 2010):

- Financial Markets
- Financial Institutions
- Financial Regulators

As mentioned above, the financial system of an economy makes the transfer of funds more effective (Darškuvienė, 2010); it facilitates the flow of funds. The flow of these funds from one participant to the next is determined by financial institutions and is thus seen as a key player in financial markets. To ensure that the transfer of these funds happens legally, financial regulations are set in place to monitor and regulate all participants involved (Darškuvienė, 2010).

To achieve the proposed aim set out for this study the researcher compiled the following figure to provide a holistic view of this section. The highlighted concepts set out in Figure 5 form the main focus of this section as they indicate wherein the financial system loan syndication plays a role.

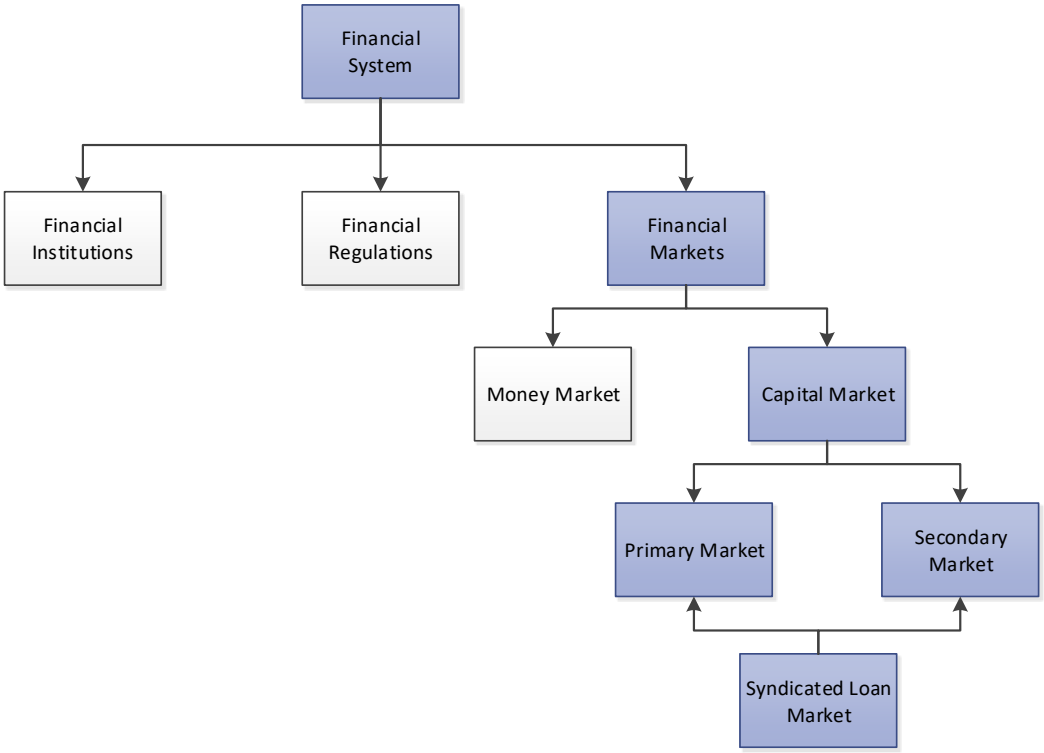


Figure 5: Financial System Structure (Kaushik, n.d.))

2.2.1. Financial Markets

From an economic perspective the term *market* can be defined as a state in which voluntary agreements are reached among participants through a set of arrangements agreed upon

(Bailey, 2005). From this, financial markets can be defined as a state where all relevant participants enter into an agreement to transfer financial instruments (Darškuvienė, 2010).

Although this study does not focus on financial institutions, the latter have grown to such an extent that they are regarded as key players in the development of the economy of the world (Bailey, 2005). Financial institutions operate in the financial market where capital transactions occur to turn over financial instruments. This leads to the accumulation and redistribution of free money (Adambekova & Andekina, 2013). As in any market there are two types: Those who demand funds (borrowers) and those who supply funds (lenders) (ICSI, 2014).

The financial market can be divided into the Money Market and the Capital Market.

2.2.2. Money Market

The Money Market is a segment of the financial market that ensures that transactions − the loaning and borrowing of investments and funds − can be completed as smoothly as possible without any major costs or difficulty (Bisgaard, 2012). A broader definition refers to the money market as the market for “short-term, debt instruments” or “short-term loanable funds” (Faure, 2013).

The Money Market functions as a wholesale debt market (ICSI, 2014), which usually deals with short-term funding of financial instruments, more commonly known as financial securities. These funds are borrowed with a maturity or redemption date of one year or less (Darškuvienė, 2010). Common characteristics of money market instruments are their liquidity with less risk and a lower return than Capital Market instruments (ICSI, 2014).

Market in money markets refers to how lenders and borrowers of short-term funds are brought together (Faure, 2013). The money market provides those with a surplus of funds a means for safe, liquid, short-term investments and offers borrowers access to low-cost funds (Dodd, 2012). Thus, the purpose of the money market is the facilitation of the exchange of financial instruments (Bailey, 2005).

The short-term requirements set by the borrowers are met in the money market and offer liquidity to the lenders (Faure, 2013). This implies that the money market is a liquidity market that applies liquidity for payments to be transferred due to financial transactions (Bisgaard, 2012).

2.2.3. Capital Market

The Capital Market is a segment of the financial market where capital from those with a surplus is transferred to those with a savings shortage (Bisgaard, 2012). Thus, the Capital Market can be considered as the reallocation of capital from those who supply funds (lenders) to those who need funds (borrowers) (Adambekova & Andekina, 2013).

The Capital Market functions as a retail debt and equity market (ICSI, 2014) that makes long-term funding of financial instruments/securities available. Borrowing and lending of these long-term capital funds are issued to business enterprises by corporations and government's trade. Long-term can refer to capital funds with a maturity of more than one year or with no maturity (Darškuvienė, 2010).

The Capital Market can be divided into two interdepended segments, namely the primary- and secondary market (ICSI, 2014).

Instruments/securities are firstly issued into the primary market (Darškuvienė, 2010); hence the primary market is also known as the *"*new issue market*"* (ICSI, 2014). Later on investors trade and resell these instruments/securities among themselves in the so-called secondary market (Harris, 2011).

The purpose of the primary market is to provide a channel for new instruments/securities to be issued (Bailey, 2005). This entails the issuers of these instruments/securities to raise resources to meet their investment requirements as well as the discharge of some of their obligations (ICSI, 2014). The secondary market's purpose is to provide an efficient platform for investors to trade these instruments/securities (Boyte-White, 2015).

One of the most innovative Capital Markets of today is the Syndicated Loan Market. Loans are issued in the primary market and are traded in the secondary market of the Syndicated Loan Market (Marsh & Basta, 2017).

Financial innovations are the pillars on which the financial system is built (Bailey, 2005). One of the biggest financial innovations that has taken the financial market by storm is the concept of Smart Contracts, especially in the Syndicated Loan Market. The implementation of Smart Contracts in the Syndicated Loan market is researched.

2.3. Bitcoin and Blockchain

To obtain a sound understanding of the function of Smart Contracts it is of the utmost importance to understand the history behind the creation of Bitcoin and Blockchain with their underlying concepts and operations. These need to be clarified to have a basic technological knowledge of the functionality of Blockchain. The mechanics behind Blockchain are discussed before distributed ledger technology and how this technology may potentially impact the Capital Market can be discussed. The Syndicated Loan Market and the concept of Smart Contracts in the Syndicated Loan Market are then explained, followed by the impact these may have on the Syndicated Loan Market.

2.3.1. Overview of Currencies

An American economist by the name of Milton Friedman, made a statement in a 1999 interview conducted by the National Taxpayers Union Foundation about digital currencies before the introduction of cryptocurrencies. This statement shows Friedman's noteworthy intuition (Eikmanns and Sandner, 2015; Friedman, 1999):

> *The one thing that's missing, but that will soon be developed, is a reliable e-cash. A method where buying on the Internet you can transfer funds from A to B, without A knowing B or B knowing A. The way in which I can take a 20 dollar bill and hand it over to you and there's no record of where it came from. And you may get that without knowing who I am. That kind of thing will develop on the Internet.*

The first ever cryptocurrency, Bitcoin, made its appearance as an obscure piece of code in 2009, two years after Friedman's death. This was after Satoshi Nakamoto wrote a white

paper explaining the schematics of a peer-to-peer electronic cash system (Nakamoto 2008; Krause, 2016).

Cryptocurrency is a currency that is produced through solving computational puzzles based on mathematics and cryptography (Huls, 2015). A peer-to-peer network has no central administration or point of control, which means no trusted third parties are necessary for transactions (Elwell, Murphy, & Seitzinger, 2015), unlike the fiat currencies of a country (Krause, 2016).

Fiat currencies can take the form of either digital currencies or physical currencies (Krause, 2016). Fiat currency in its physical form is the physical notes and coins that the government has declared to be the legal tender that exists in a country. Fiat currencies in their digital form, on the other hand, are the electronic records that are held in the global financial market, such as the market for foreign exchange, which is mapped to some digital storage (Ly, 2015).

While physical currencies, like coins and paper notes, are tangible, digital currencies are intangible and exist purely in an electronic form (Ly, 2015). However, digital currencies can be exchanged for physical currencies, for example in that they can be withdrawn from an Automated Teller Machine (ATM) (Erbenová et al., 2016) or by trading digital currencies for a number of fiat currencies.

2.3.2. A Brief Overview of Bitcoin

As previously mentioned, Bitcoin was introduced in 2009 by Satoshi Nakamoto as a semi-anonymous, open source, circulated/decentralised peer-to-peer network (Elwell et al., 2015). This entails Bitcoin not having to rely on a central administration or point of control that needs trusted third parties to validate and secure transactions. Instead, Bitcoin makes use of cryptography for security, transaction verification and anonymous ownership (Abdi, 2014). It allows Bitcoin users to interact directly with one another when transmitting values worldwide at the click of a button (Krause, 2016).

When transacting, Bitcoin users are not fully anonymous; instead the Bitcoin network is semi-anonymous. No personal information is needed when transacting with Bitcoin but all

transactions are made permanently available and public to all Bitcoin users who are on the network (Zhou, 2015). The information that is made public includes the amount of the transaction, the time of the transaction, the sender's address, the receiver's address and the node that confirmed the transaction. This information is stored on a public ledger called Blockchain (Nakamoto, 2008; Elwell, Murphy and Seitzinger, 2015).

2.3.3. Blockchain Mechanics

Blockchain originated through the making of Bitcoin. Blockchain is the underlying technology on which Bitcoin is built (Umeh, 2016) and enables a peer-to-peer network (Pedro, 2015). Because the whole is more than the sum of its parts (Upton, Janeka, & Ferraro, 2014), it is imperative to understand the key concepts and operations of Blockchain and how they fit together. Blockchain and its key concepts and operations are further explained in Figure 6 in the following sections.

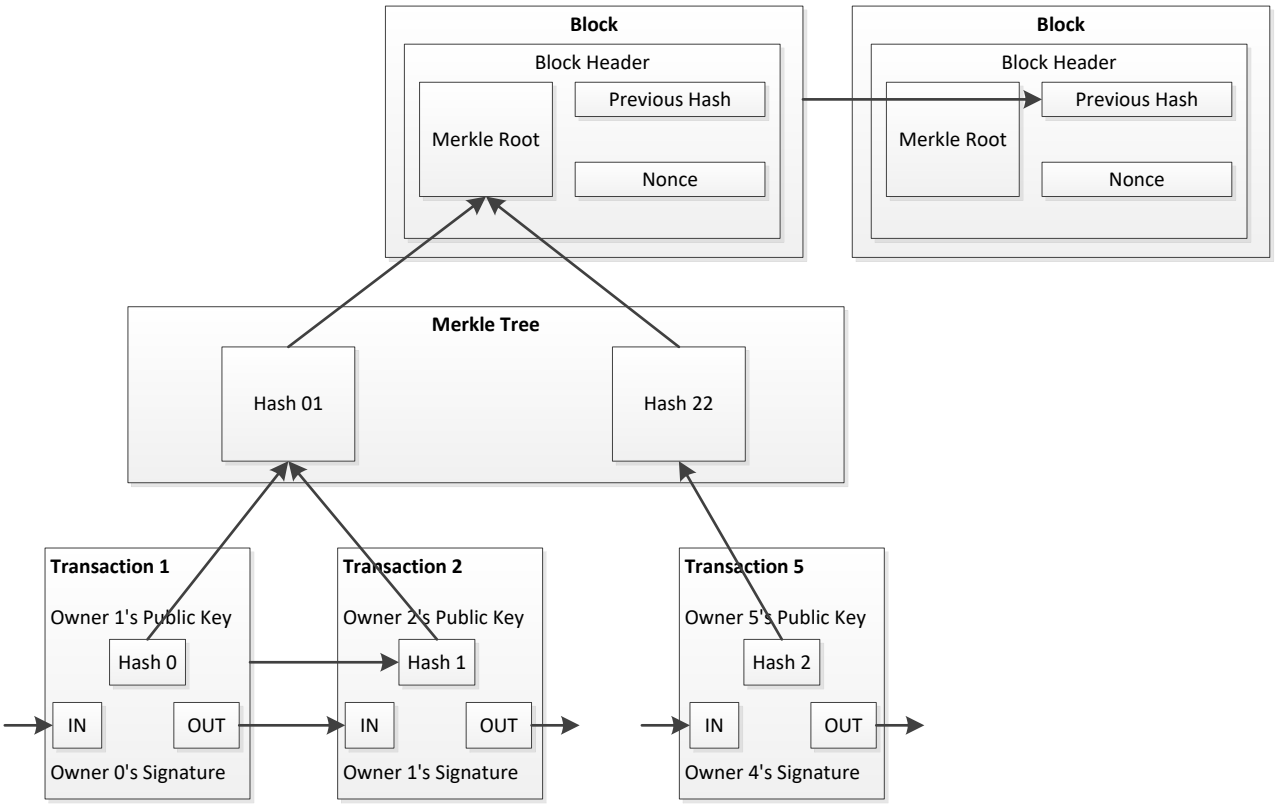


Figure 6: A Breakdown of the Concepts of Blockchain (Rosen, Wengrowski, Clark, & Xianyi, 2014)

Section 1:

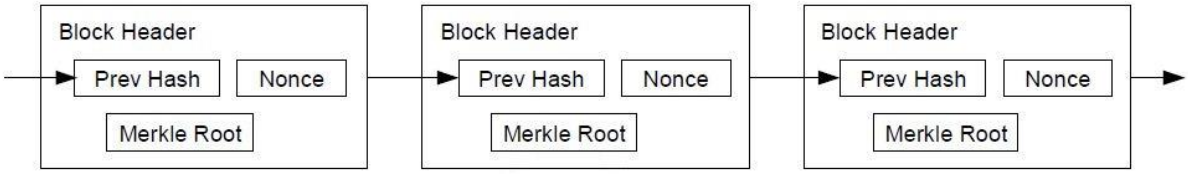


Figure 7: Blockchain Concept (Rosen et al., 2014)

In its most common form, Blockchain can be regarded as a public ledger that holds all the transaction history of every single Bitcoin transaction that has ever taken place since the beginning − January 3, 2009 − up to today (Pedro, 2015). The information is recorded and saved in blocks that are linked to form a chain in this sophisticated, tracking database (Christiansen, 2016). To form the chain, the blocks are connected via their hash values found in the block header. The hash value of the previous block is verified with the hash value of a current block until a match is found to form this connection (Rosen et al., 2014). Once this connection has been made, anyone in the public network can trace the links to the first block in the Blockchain (Umeh, 2016).

The hash value of the blocks in the block headers is a fixed length, numeric output of a hash function (Árnason, 2015). The hash function uses a mathematical algorithm that turns an input into a scrambled, predetermined length output of characters (Christiansen, 2016). It is impossible to figure out what a transaction was, based on its hash value, without guessing at random. This is because hashing is a one-way function with no “key” to reverse this function (Infante, 2014).

Secure Hash Algorithm 256-bit (SHA256) is the hashing algorithm used by Bitcoin that takes large amounts of information and scrambles it to a fixed sized output of characters. In this case, this output is the hash of a 256-bit number, hence the name. This hashing algorithm is sensitive and any minor change to the input can change the output to such an extent that it is entirely unrecognisable (Infante, 2014) as can be seen in Figure 8:

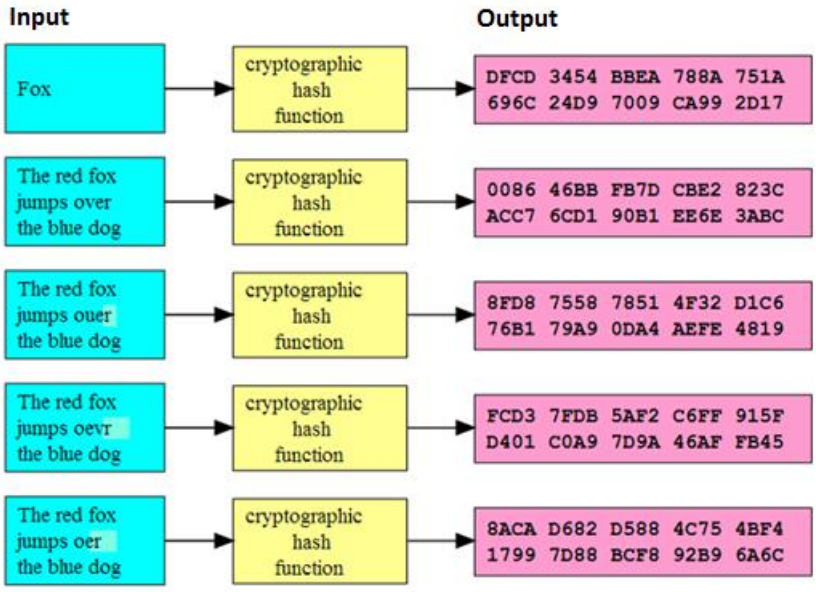


Figure 8: Hashing algorithms of different inputs (Infante, 2014)

As can be seen in Figure 8, through minor changes to the input of the word *over*, for example, the outputs are entirely different.

Section 2:

To understand the mechanics of Blockchain, the best way is to go through the process of a simple transaction. A typical Bitcoin transaction is depicted in Figure 9:

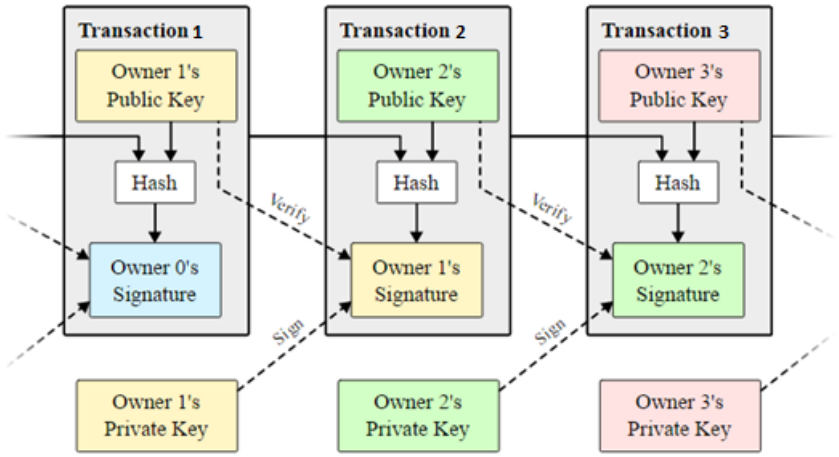


Figure 9: A Typical Bitcoin Transaction (Nakamoto, 2008)

A transaction is an instance where Bitcoin owned by one user (Owner 1) is moved to the next (Owner 2) (Macurak, 2014). In this process the digitally signed hash of the previous

transaction (Transaction 1) together with the public key of the next user (Owner 2) is added to the transaction before the transaction is hashed (Rosen et al., 2014).

Performing a transaction is the first step when creating a permanent block within the Blockchain (Christiansen, 2016). A block in Blockchain can be seen as a page within a ledger. All transactions that have been executed within a set period (approximately ten minutes) are sent out to all the nodes (miners) in the distributed network to be approved (Rosen et al., 2014). These transactions that have been sent out and received by all of the nodes are then combined and hashed in pairs in a tree-like structure. This tree-like structure is called a Merkle tree (Van Oerle & Lemmens, 2016).

Section 3:
The Merkle-tree structure is made up of hashes of transactions that need to be verified to form part of the Blockchain as a permanent block. It is a binary tree that hashes all received transactions' hashes in pairs. If an odd number of leaves (hashes) are received, the leaves are paired in pairs of two and the odd leaf is paired up with itself. This leaf is then paired with a paired hash on the next level to insure there are an even number of leaves.

New transactions are hashed and the new leaves are inserted at the bottom of the Merkle-tree. This means that the tree stems from the leaves and not from the root, like regular binary trees (Rosen et al., 2014). This iterating process continues until the last remaining leaves are combined to form the root of the Merkle-tree. The reason for the iterating process of hashing up until a summarising hash is produced is that it is much easier to compare than to keep track of all the individual transactions' hashes. This summarising hash of all the transactions is called the Merkle-root. The Merkle-root is added to the block's header together with the hash of the previous block and a nonce (Abdi, 2014). See Figure 10 for a schematic illustration of the Merkle-root process.

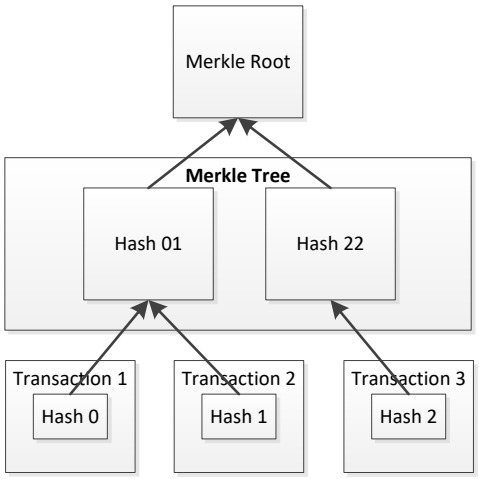


Figure 10: Representation of a Merkle-root (Rosen et al., 2014)

In Figure 10 three transactions were used to explain the process of a Merkle-root and how the Merkle-root is obtained. In reality this process can contain up to hundreds, if not thousands, of transactions.

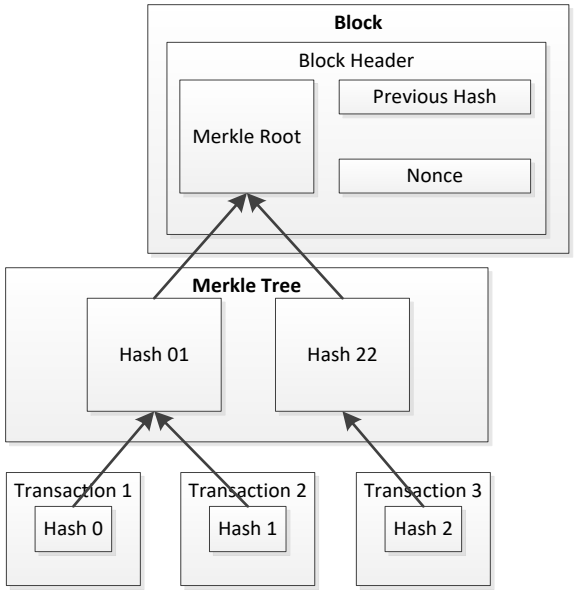


Figure 11: Representation of a Block (Rosen et al., 2014)

After the Merkle-root, which is where the previous hash and the nonce have been added to the block header, the miner has to hash the block header so that it fits a certain criterion. This hash will serve as the block's identifier as seen in Figure 11 (Abdi, 2014). This is easier said than done.

For the network to accept the hash of a block header, the miner must hash the block header with a value less than the target value (a 256-bit number). The target value is set by the Bitcoin protocol (Pilkington, 2016b). The lower the value of the target value, the harder it is to produce a valid hash, which means it is harder to generate a new block. This is because the hash needs to be less than the target value. If the hash that was produced is not less than the target value, it will be rejected by the network (Infante, 2014). This is where the nonce in the block header comes in.

The nonce is a 32-bit number that is incremented on a routine basis every time a hash solution is produced that is not less than the target value (Rosen et al., 2014). The purpose of the nonce is to change the block header for the miner to re-hash it. This random number is incremented until a valid hash for the block has been produced. It takes trial and error before the miner is able to produce a valid hash.

The process of hashing the block header until a valid hash is produced is called the proof-of-work concept (Bitcoinmining.com, 2011). Once a valid hash has been produced, the block is permanently added to the Blockchain and available to all other miners (Buterin, 2014).

As mentioned above, all transactions that have been executed within a set period (approximately ten minutes) are sent out to everyone on the distributed network (Rosen et al., 2014). This means that all the miners are constantly competing for combining the transactions in a valid block. Once a block has been confirmed, all computers start over with new transactions to solve a new block. The first miner to produce a valid hash receives a fee in exchange for this service. Currently this fee is 25 Bitcoin (Stancel, 2015). This process is called mining. This process happens through a series of algorithms performed by the miners' computers. Miners mine Bitcoin for one or both of the following reasons: The first is to confirm the validity of all transactions; the second is to create and receive new Bitcoin (Rosen et al., 2014).

Since the introduction of Bitcoin in 2008, not much attention has been paid to Blockchain technology; however, during the past few years it has rapidly gained traction in the financial market, specifically in the Capital Market. This has raised many questions about distributed ledger technology and whether or not it can be implemented in the Syndicated Loan Market.

2.3.4. The Difference between Blockchain and Distributed Ledger Technology

It is important to understand that there are differences between Blockchain and distributed ledgers. Blockchain is a type of distributed ledger, but distributed ledgers are not necessarily a Blockchain (World Bank Group, 2017). The technology used for distributed ledgers allows for data to be recorded, shared and synchronised across multiple distributed data stores or ledgers. Blockchain makes use of this technology in that Bitcoin transactions are stored and transmitted in connected packages called *blocks* that form a digital chain and are secured by using cryptography. Not all distributed ledgers make use of a chain of blocks (World Bank Group 2017; Umeh 2016; Van Oerle and Iemmens, 2016).

Awareness of distributed ledger technology has grown rapidly during the past few years. The World Economic Forum, with the help of Deloitte, did intensive research on understanding to what extent distributed ledger technology captures attention specifically within the financial system ecosystem (World Economic Forum, 2016).

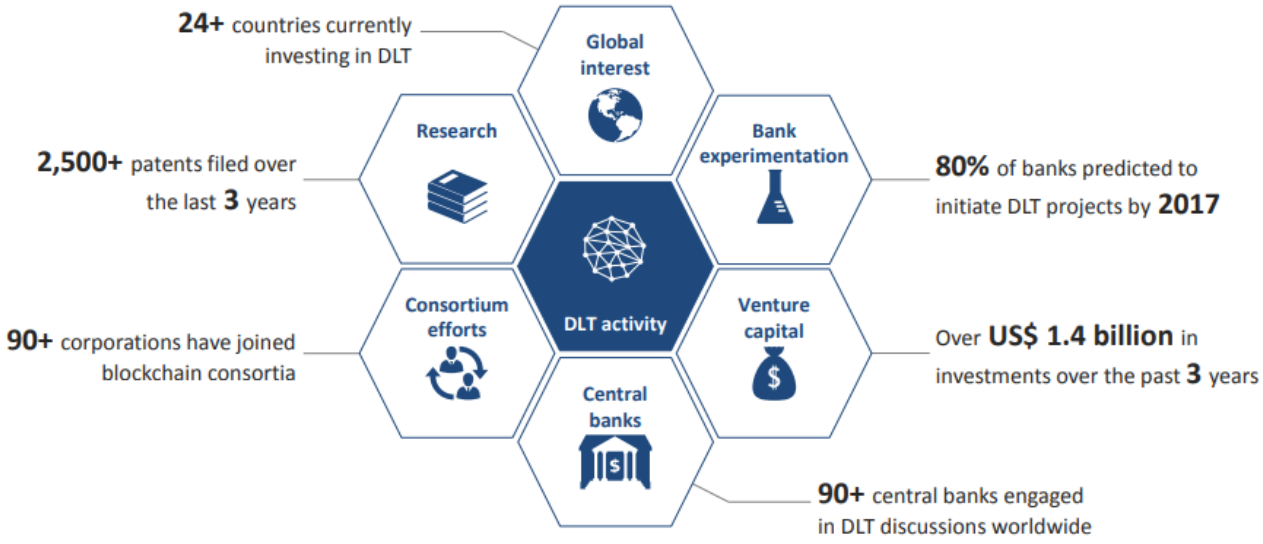


Figure 12: Distributed Ledger Technology Activity (World Economic Forum, 2016)

As distributed ledger technology continues to gain acceptance as seen in Figure 12, a growing number of distributed ledger technology applications are used by individuals and businesses (Hong Kong Monetary Authority, 2017). These applications can be grouped as follows: Cryptocurrencies, Proof of Service, Smart Contracts and Decentralised Autonomous Organisations (Umeh, 2016). Depending on the field of application, different

distributed ledger technology platforms are available, such as Hyperledger, Corda, Ethereum (Hong Kong Monetary Authority, 2017).

Distributed ledger technology must be viewed as one of many technologies that will form and shape the future infrastructure of the financial system (World Economic Forum, 2016). Financial innovations, such as distributed ledger technology applications, can offer the financial system, specifically Capital Markets, more convenient services, creating significant competition for traditional banking (Guo & Liang, 2016).

2.4. Distributed Ledger Technology

This sub-section provides the reader with an overview of distributed ledger technology concept as Blockchain technology has been discussed in depth. To understand the impact that distributed ledger technology can have on the Syndicated Loan Market, one has to take into consideration what the impact of distributed ledger technology on the Capital Market entails.

Originally, distributed ledger technology was used by cryptocurrencies that brought forth the idea of using the technology to build consensus (Accenture, 2016). It is important to remember that distributed ledger technology is not a universal solution. Instead, it is just one of the financial innovations that will form the foundation of next-generation financial services infrastructure (World Economic Forum, 2016); it has the potential to enhance processes in the financial system through consumer and institutional applications (KPMG, 2017).

Through using distributed ledger technology, one can achieve open-sourced, decentralised, replicated, shared and cryptographically secured operations that, in turn, can be applied to many financial services (Accenture, 2016). Distributed ledger technology applications depends on the problem presented through the different use cases and how these problems can leverage from this technology (World Economic Forum, 2016).

In the context of Capital Markets, distributed ledger technology offers a new approach to how data is managed and shared (Euroclear & Wyman, 2016). Currently, traditional ledgers make use of central authorities to manage data. Capital Markets built on distributed ledger

technology use the consensus mechanism implemented to validate data (Accenture, 2016). This is depicted in Figure 13 and Figure 14:

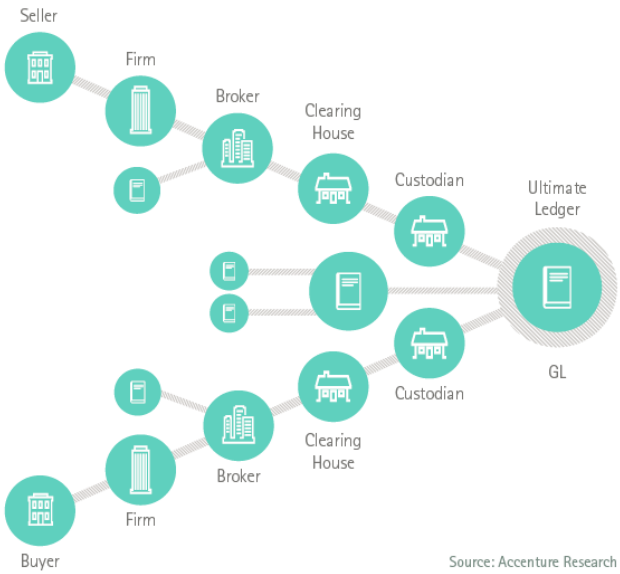


Figure 13: Capital Markets Today (Accenture, 2016)

Figure 14: Capital Markets built on Distributed Ledger Technology (Accenture, 2016)

This consensus mechanism enables all Capital Market participants to work from common datasets (Figure 14). These allow real-time data where supporting operations will either be streamlined or made redundant (Euroclear & Wyman, 2016).

Using this new architecture as the basis by which the Syndicated Loan Market can be optimised, it is evident that distributed ledger technology has the potential to improve the process of syndicated loans (Accenture, 2016). One option of enabling a distributed ledger

technology application to optimise syndicated loans is the concept of Smart Contracts (Capgemini Consulting, 2016).

2.5. Syndicated Loans

This sub-section provides the reader with the necessary, in-depth knowledge and overview of syndicated loans and the components that are necessary for the Syndicated Loan Market to function properly. To understand the impact that distributed ledger technology can have on the Syndicated Loan Market, one has to gain insight into what syndicated loans entail. This should provide the reader with a holistic view of the Syndicated Loan Market.

The Syndicated Loan Market can be traced to the early 1960s and has had rapid advancements since. The existence of syndicated loans came about due to prevailing conditions in the financial markets (Muzvidziwa, 2011). According to Altunbas, Gadanecz and Kara (2006) the Syndicated Loan Market has evolved to such an extent that it can be regarded as a vital element of the global financial system and is a major source of funding for corporate organisations and governments. It has been said that the Syndicated Loan Market generates more underwriting revenue for the financial market than the equity and debt markets combined (Muzvidziwa, 2011).

The reason why loan syndication is attractive to companies is that it can be structured for the specific and customised needs of these companies (Parker, 2016). In addition, loan syndication combines numerous risk-mitigating factors with high income that is an important aspect to investors (Parker, 2016). The role of loan syndication is to share the risk of a loan among the syndicates (Darškuvienė, 2010).

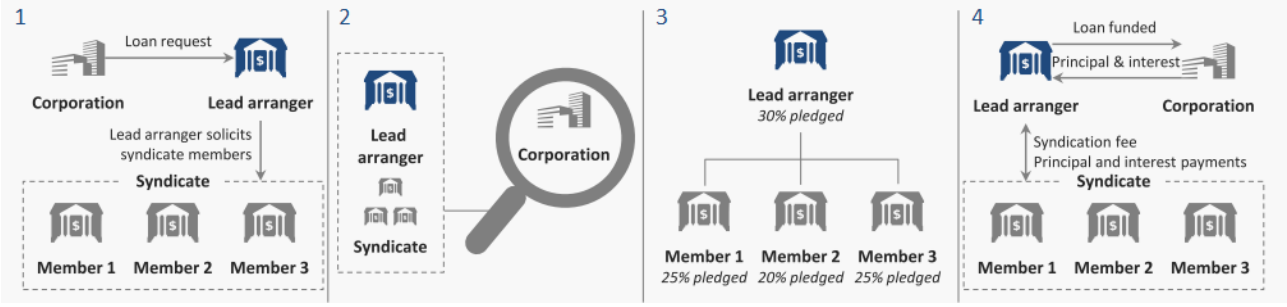
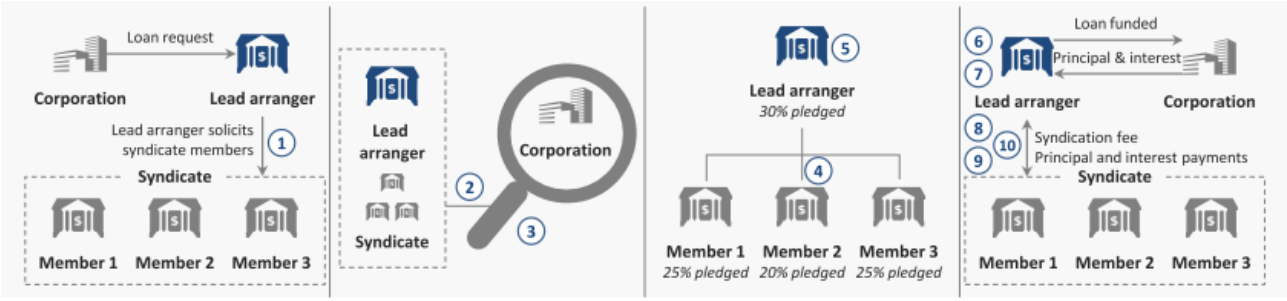


Figure 15: Syndicated Loan Process (World Economic Forum, 2016)

A syndicate loan starts where the arranger receives a requirement from a borrower (Figure 15 refers to a corporation) that is used to identify financial institutions that meet the borrowing requirements. The lead arranger investigates the borrower as well as all financial institutions to determine their financial health before entering into an agreement (World Economic Forum, 2016).

When entering into a loan syndication contract, a syndication agreement is reached between the financial institutions (syndicate) and the borrower (Oracle 2016; World Economic Forum 2016). After an agreement has been reached, all the financial institutions give their contributions to the arranger who disburses the loan. Interest and other income accumulated from the loan is shared between the financial institutions in the ratio of their participations that was agreed to at the time of drawing up the contract (Oracle, 2016). Throughout the lifecycle of the syndicated loan contract the arranger is responsible for all administrative services (Chew & Walters, 2012).

The World Economic Forum (2016) lists several points where the current syndicated loan process can be optimised; consult Figure 16:



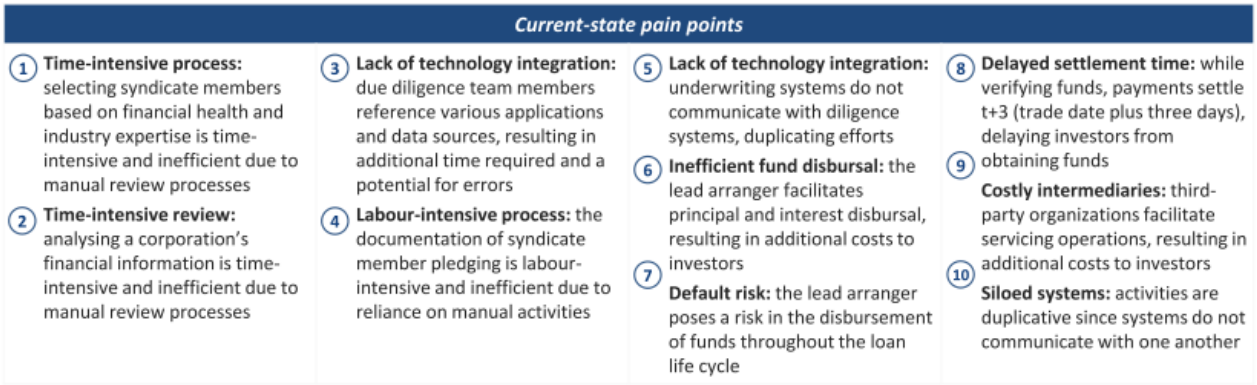


Figure 16: Syndicated Loan Optimisation Points (World Economic Forum, 2016)

Much attention has paid given to front-office functions in the financial markets over the past 20 years, but not much has changed in the middle- and back-office functions. As seen in Figure 16, the Syndicated Loan Market faces many challenges among these middle- and back-office functions (Accenture 2016; Chew and Walters, 2011). These middle- and back-office functions can be optimised by distributed ledger technology (World Economic Forum, 2016).

2.5.1. Smart Contracts within the Syndicated Loan Market

As seen in Figure 16, the syndicated loan process comprises several challenges, all of which can be optimised through implementing Smart Contracts. When looking at the Syndicated Loan Market, one major problem is the long settlement times (Genpact, 2016); the focus of this study is to try and optimise settlement times. According to a report produced by Accenture (2016), syndicated loans take approximately up to 20 days to settle. Compared to other asset classes, syndicated loans take much longer, which can lead to significant amounts of capital being locked up (Genpact 2016; Parker 2016) as is evident in Figure 17.

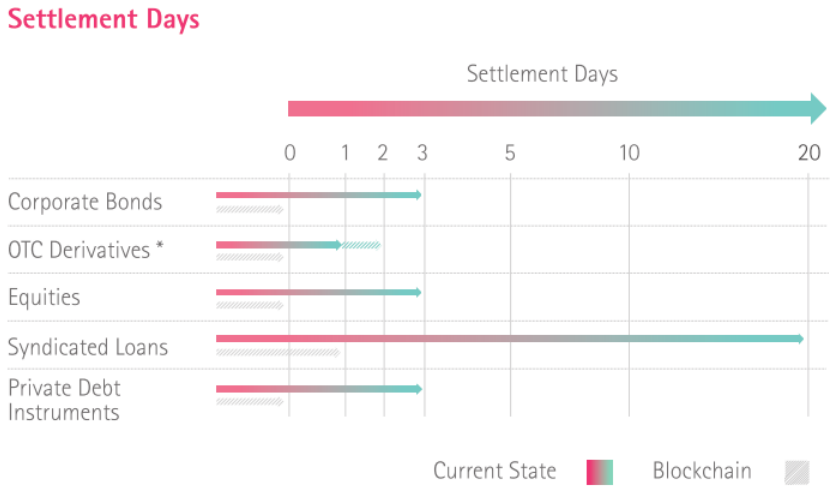


Figure 17: Settlement Days (Accenture, 2016)

There are several factors that contribute to these long settlement times, including borrower consent, arranger consent, ownership verification, KYC (Know your Customer), buyer incentives, arranger freeze and manual data entry (Genpact, 2016). Traditional contracts still rely on trusted third parties. To eliminate human intervention, a suitable alternative to current contracts is to provide an automated contract that runs on distributed ledger technology (Buterin, 2014); these are called Smart Contracts.

Smart Contracts were first identified by Szabo (1997) long before the creation of Bitcoin. Smart Contracts are self-executing, programmable contracts that encode the terms of a traditional contract into a computer program and execute pay-outs between all relevant parties once certain pre-defined criteria have been met. This contract is stored in a distributed ledger. All this is done without the involvement of a middleman (Capgemini Consulting 2016; KPMG 2017). Due to the self-executing nature of Smart Contracts, the risk of relying on someone to follow through on commitments is eliminated (KPMG, 2017). Smart Contracts have the potential to disrupt the financial system as they can do much more than just transfer funds (Umeh, 2016). The impact of Smart Contracts can be seen in Figure 18:

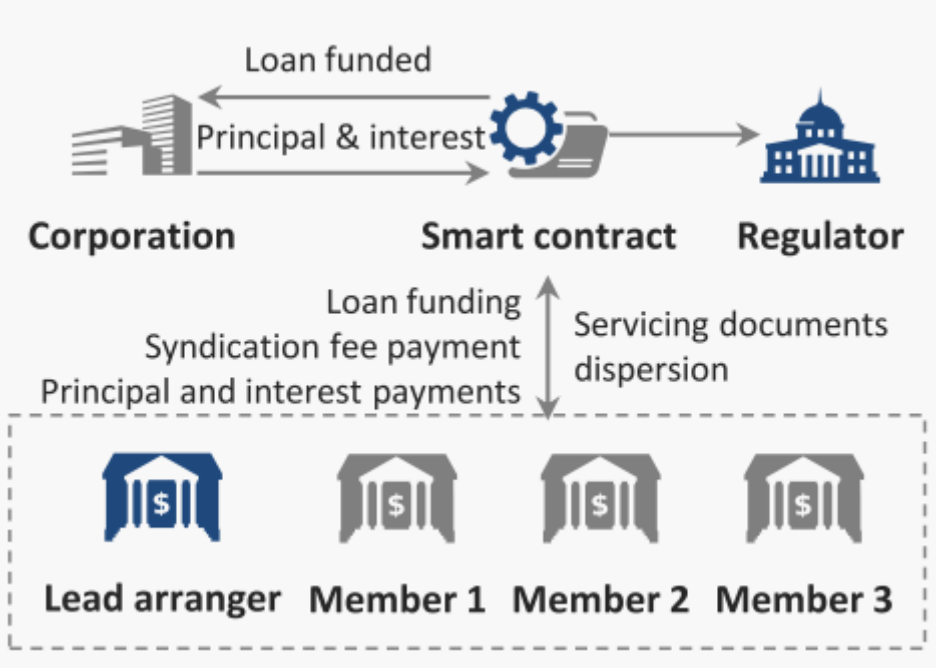


Figure 18: Syndicated Loan Smart Contract (World Economic Forum, 2016)

Through implementing Smart Contracts, as seen in Figure 18, unnecessary third party intermediaries can be eliminated, minimising counterparty risk and settlement times as well as increasing contractual performance and transparency for regular reporting (Accenture 2016; KPMG 2017). Smart Contracts can lower the settlement time of 20 days to an astonishing 6 to 10 days, which will result in an additional 6% growth in future demand (Capgemini Consulting, 2016). This will have a major impact on the global financial system as the Syndicated Loan Market is a major source of funding for corporate organisations and governments (Altunbas et al., 2006).

There are two types of platform on which Smart Contracts can be programmed: Private and public distributed ledger platforms. Private distributed ledger platforms are privately owned, “permissioned” distributed ledgers that connect only known and trusted nodes/groups for additional security (Umeh, 2016).

Public distributed ledger platforms, on the other hand, are public, “permissionless” distributed ledgers where anyone can join the network, which in essence means anyone can create Smart Contracts (Van Oerle & Lemmens, 2016). Ethereum and Codius are examples of a public distributed ledger that offers full featured Smart Contract capability (Umeh 2016; Luu *et al.,* 2016). The difference between private and public distributed ledgers is the extent to which they are decentralised, which can be seen in Figure 19:

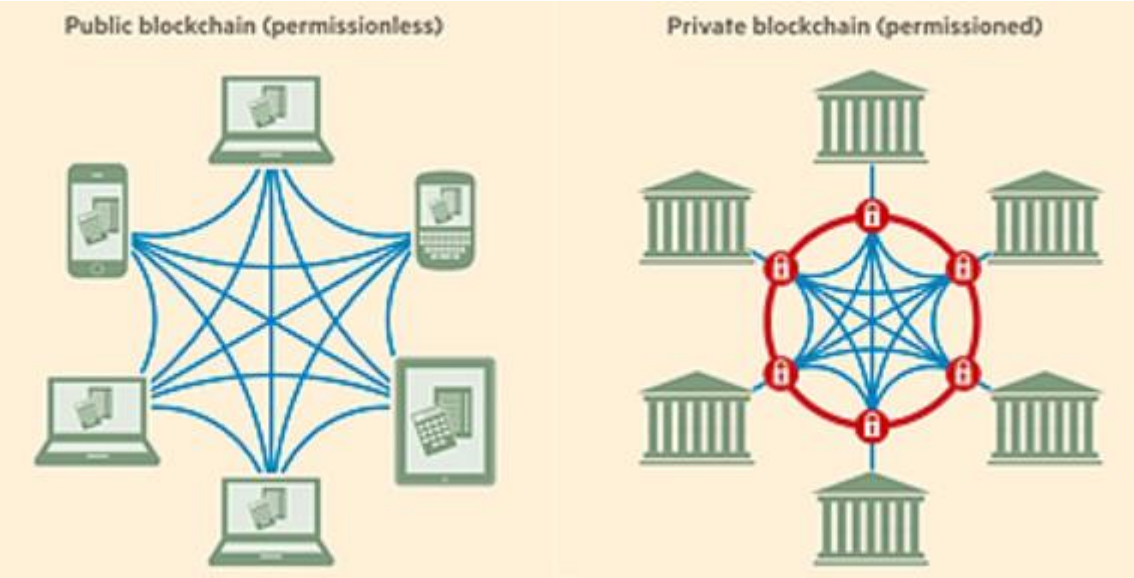


Figure 19: Public versus Private Distributed Ledgers (Digital Value Australia, 2017)

Due to public distributed ledgers being vulnerable to outside manipulations, the most likely platform that will be used within the financial ecosystem is private distributed ledgers (Pilkington 2016a; Luu *et al.,* 2016). This study thus focuses solely on privately owned Smart Contracts in the Syndicated Loan Market.

2.5.2. Smart Contract Functionality

The process of creating a Smart Contract can become extremely abstract and is simplified in this study. First of all, terms and conditions are established and agreed among all parties

in the distributed ledger (Genpact, 2016). These can include interest rates, the currency in which the payments will take place, the time and date (Van Oerle & Lemmens, 2016).

Event triggers responsible for the contract being executed must then be defined. This refers to certain actions that were initiated or information received. Once these trigger events have been triggered, the contract is executed, based on the conditions that have been met (Van Oerle & Lemmens, 2016).

When the contract has met all terms and conditions, the settlement is set. The settlement of a contract can be either digital, such as cryptocurrencies, or physical, such as stocks or fiat currencies or assets (Van Oerle & Lemmens, 2016). See Figure 20.

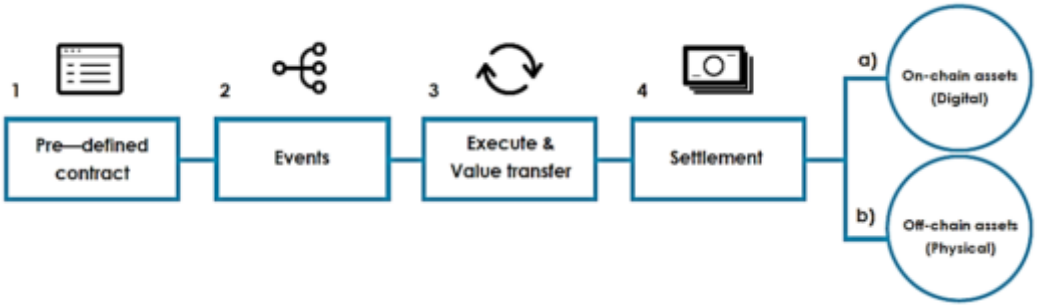


Figure 20: Smart Contract Process (Van Oerle & Lemmens, 2016)

Smart Contracts are indeed a technology ahead of the law. The financial system has built trust among its customers for years through security and privacy. Trust in distributed ledger technology, on the other hand, has not yet been established (Yousafzai, Pallister, & Foxall, 2009). For Smart Contracts to become binding in the future and to progress and grow, deep collaboration, adoption and trust between all syndicated loan parties and in Smart Contracts are required, even if the functions in the system remain the same (Bailey, 2005). This does not only add complexity, but will have an impact on the implementation of Smart Contracts in the Syndicated Loan Market (World Economic Forum, 2016).

2.6. Unified Theory of Adoption and Trust in Technology

As seen before, an area for the implementation of distributed ledger technology lies within the financial systems (Swan, 2015). The realisation of distributed ledger technology in the financial system is constantly increasing across the Capital Market, especially in the

Syndicated Loan Market (Van Oerle & Lemmens, 2016). For financial institutions to implement distributed ledger technology successfully in the Syndicated Loan Market, it is of paramount importance that all syndicated loan parties embrace this new technology. Collaboration, adoption and trust are becoming major obstacles to overcome in ensuring the success of this new technology within the Syndicated Loan Market (Alharbi, 2014). The aspects to be measured for this study thus rollup to adoption and trust. This align with the research question set out in Chapter 1.

The proposed research question for this study set out in Chapter 1 is a two-part problem, one being the adoption of distributed ledger technology in the Syndicated Loan Market and the other is the trust that has to be placed in this technology for it to be successful. The adoption of technology is discussed before trust in these technologies can be investigated.

Research on Information Systems literature consists of many widely used technology acceptance theories. One of the major theories that are used to understand acceptance and/or adoption of new technologies is the Technology Acceptance Model (Davis, Bagozzi, & Warshaw, 1989). It is a unified model formulated to help institutions to assess the likelihood of success for new technology acceptance. This theory is known as the Unified Theory of Acceptance and Use of Technology (Venkatesh, Morris, Davis, & Davis, 2003).

This section offers an overview of the above mentioned models and/or theories that were investigated to select an appropriate theory to be used for this study.

2.6.1. The Technology Acceptance Model (TAM)

The most widely espoused theory used for modelling acceptance and adoption behaviour that focuses on how individuals come to accept and use technology, is TAM. TAM explains how individuals accept Information Technology and use computers (Davis et al., 1989) by focusing on fulfilling individual's extrinsic motivations (Lowry, Gaskin, & Moody, 2015). Davis, Bagozzi and Warshaw (1989) developed this theory based on Fishbein and Ajzen's (1975) Theory of Reasoned Action.

The Theory of Reasoned Action (TRA) explains that one's behavioural intention (BI) depends on one's attitude (A) and subjective norms (SN) (Ajzen & Fishbein, 1980), which

suggests that if one's attitude and subjective norm are known, one's behavioural intention can be predicted as illustrated in Figure 21.

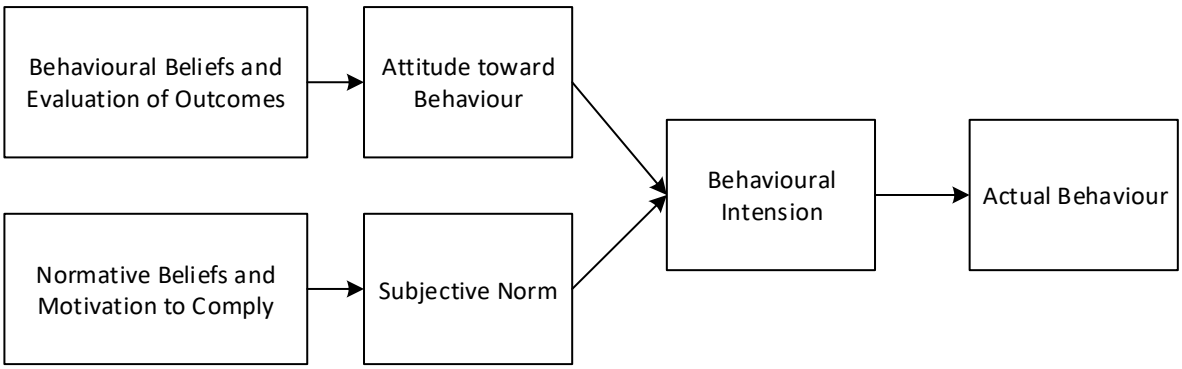


Figure 21: Theory of Reasoned Action (Fishbein & Ajzen, 1975)

The first noticeable difference between the TAM model and TRA theory is the exclusion of subjective norms. Secondly, TAM argues that intended use, rather than actual use, is defined by the perceived ease of use and perceived usefulness (Ajzen & Fishbein, 1980).

TAM replaced many of the attitude measures of the TRA theory with two technology acceptance measures, namely perceived ease of use and perceived usefulness (Davis et al., 1989) as shown in Figure 22.

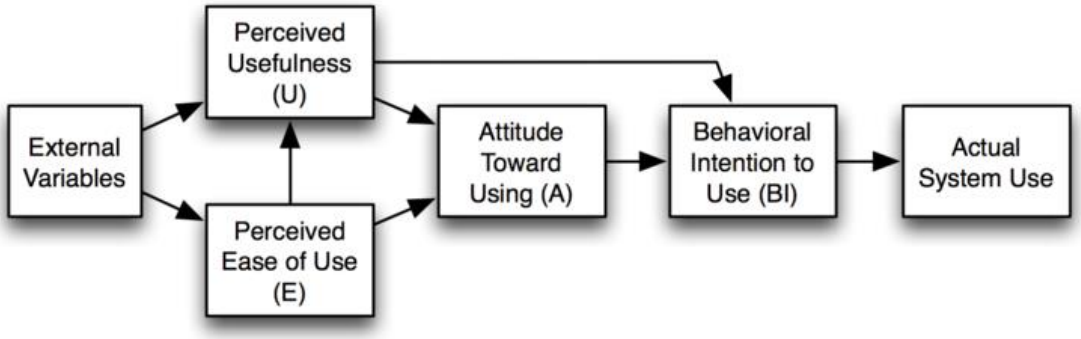


Figure 22: Technology Acceptance Model by (Davis et al., 1989)

The extent to which one believes a system can improve one's performance is termed *Perceived usefulness* whereas *Perceived ease of use* is defined as the degree to which one believes the use of a system is effortless. All system design features that may impact the Perceived usefulness and the Perceived ease of use directly are defined as external

variables. As in TRA theory, one's actual use of the system is determined by the attitude to using an information system that impacts the intention to use the system (Fishbein & Ajzen 1975; Ajzen & Fishbein 1980; Davis et al., 1989).

The acceptance, adoption and use of different kinds of system use has successfully been defined with TAM over the years; however, TAM focuses only on one's extrinsic motivations that are fulfilled (Lowry et al., 2015). This is the main reason why TAM was not used as the preferred method of choice. Extrinsic motivations include the desire for productivity, efficiency and general utility (Davis et al., 1989). By understanding one's motivations, positive user interaction can be encouraged (Lowry et al., 2015).

TAM has widely been criticised due to the fact that it does not consider one's ability to control (Yusuf & Derus, 2013). Rather it focuses on one's perceived usefulness. This has led to more factors being implemented to try and explain how one "perceives usefulness". Based on this, Bagozzi (2007) points out that TAM has too many independent variables for predicting intention and behaviour and leaves out those variables that are important to prevent one from adopting a particular technology.

Although TAM has been criticised over the years, it has broad implications for Information System practice as it provides empirical evidence of the relationship between usefulness, ease of use and system use (Davis et al., 1989). When understanding that usefulness and ease of use are important determinants of system use, these measurements can be used to determine how the success and use of Smart Contracts in the Syndicated Loan Market can be influenced.

2.6.2. Unified Theory of Acceptance and Use of Technology (UTAUT)

In an effort to overcome the drawbacks that previous Information Technology (IT) acceptance models/theories presented, Venkatesh *et al.* (2003) conducted a study to review relevant models. Eight IT acceptance research models and/or theories were reviewed by Venkatesh *et al.* (2003), after which a revised theory, the Unified Theory of Acceptance and Use of Technology (UTAUT) was developed. The UTAUT model was developed by integrating the key elements from across these eight research models and/or theories (Baron, Patterson, & Harris, 2006). The eight research models and/or theories include TRA,

TAM, the motivational model, the theory of planned behaviour, the model combining TAM and theory of planned behaviour; the model of PC utilisation, innovation diffusion theory, and social cognitive theory (Venkatesh et al., 2003).

The purpose of the theory of UTAUT is to help institutions explain and predict the successful acceptance of technology. UTAUT can be seen as:

> *... a useful tool for managers needing to assess the likelihood of success for new technology introductions and help[ing] them understand the drivers of acceptance ...* (Venkatesh *et al.*, 2003, p. 425).

Figure 23 illustrates UTAUT.

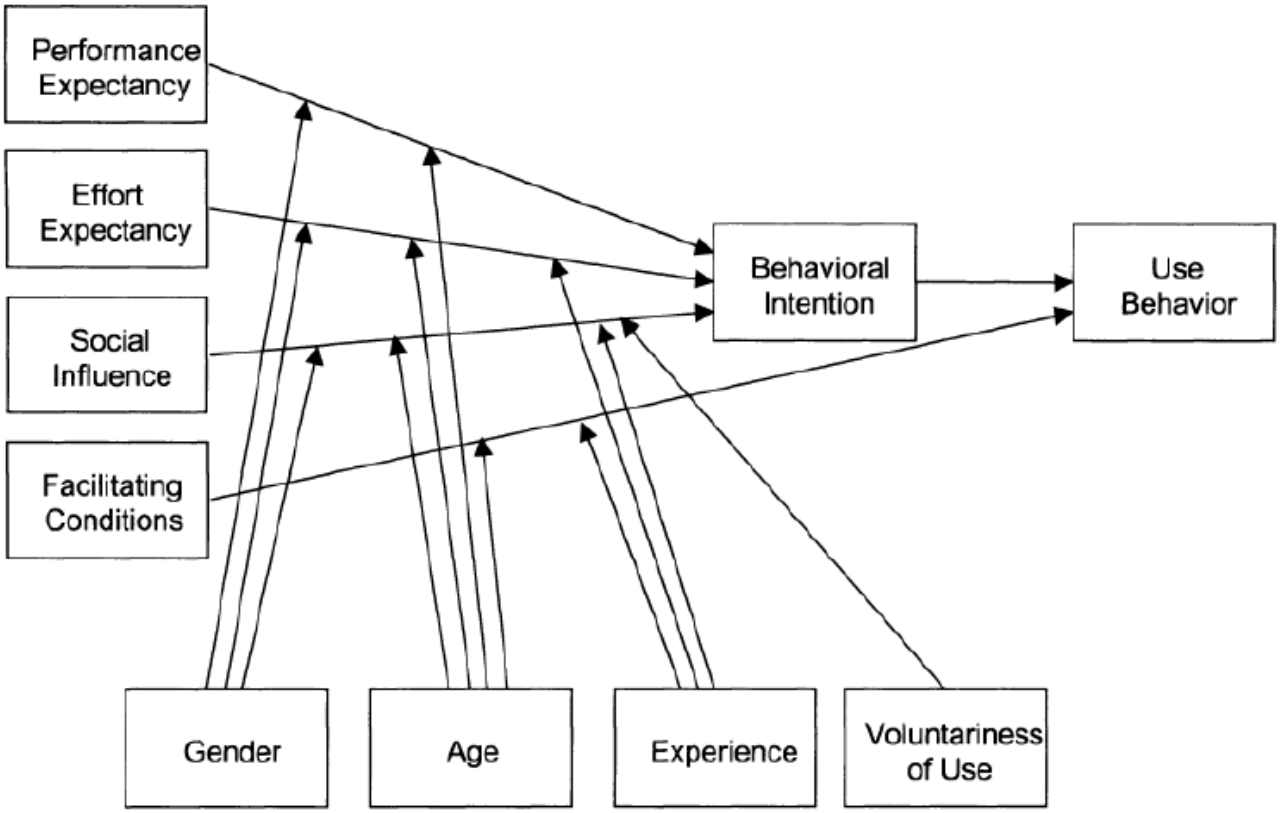


Figure 23: Unified Theory of Acceptance and Use of Technology (Venkatesh et al., 2003)

In Figure 23 there are three noticeable differences in the features of UTAUT and TAM. The first is that attitude to using technology (included in TAM) is not included in the UTAUT model (Davis et al., 1989).

Secondly, the UTAUT model predicts behavioural intention through performance expectancy, effort expectancy and social influence. Use behaviour (actual use), on the other hand, is directly determined by facilitating conditions (Venkatesh et al., 2003). This is different to TAM in that the TAM model determines behavioural intention only through perceived usefulness and perceived ease of use (Davis et al., 1989).

From the eight IT acceptance research models and/or theories, UTAUT's *performance expectancy* can be classified as the constructs of perceived usefulness, extrinsic motivation, job-fit, relative advantage and outcome expectations whereas *effort expectancy* can be classified as the constructs of perceived ease of use, complexity and ease of use (system use). Venkatesh *et al.* (2003) define *social influence* as "the degree to which an individual perceives that important others believe he or she should use the new system" whereas *facilitating conditions* are "the degree to which an individual believes that an organizational and technical infrastructure exists to support use of the system".

The third and last noticeable difference between TAM and UTAUT are the significant moderating variables (gender, age, experience and voluntariness of use) that have been identified and included for the model relationships (Baron et al., 2006).

It is evident that the UTAUT model is a valuable model to use when investigating the acceptance of technology as well as factors, such as demographics and experience that may influence individuals to accept and adopt new technologies (Venkatesh et al., 2003). It is evident that behavioural intention is not sufficient; furthermore, it is important to understand under what conditions a new technology will be used. Due to the nature of this study focusing on the acceptance, adoption and overall success (which is directly linked to the actual use) of Smart Contracts, the UTAUT model is more suitable than the TAM model.

It has been noted while exploring the literature that there is a reluctance to adopt Smart Contracts in the Syndicated Loan Market due to security and privacy concerns. Thus, the lack of trust remains an obstacle in adopting this option to solve current challenges (Yousafzai et al., 2009). In investigating acceptance and adoption it was noted that trust in these technologies plays a fundamental part. Trust must be placed in this technology for its successful adoption. Trust is a major component that is necessary for human beings to

interact, whether it be with one another or through technology (Miller, 2015). Trust has the ability to influence an individual on whether or not to use technology (H. D. McKnight, Carter, Thatcher, & Clay, 2011).

2.6.3. Revised UTAUT Model

Alharbi (2014) identifies “trust” as one of the main barriers in adopting new technologies. Gefen, Karahanna and Straub (2003) suggest that there is a relationship between trust and technology adoption; hence a model that combines the UTAUT and trust was needed. A revised UTAUT model was designed where *trust* was taken as a main construct. This model is depicted in Figure 24:

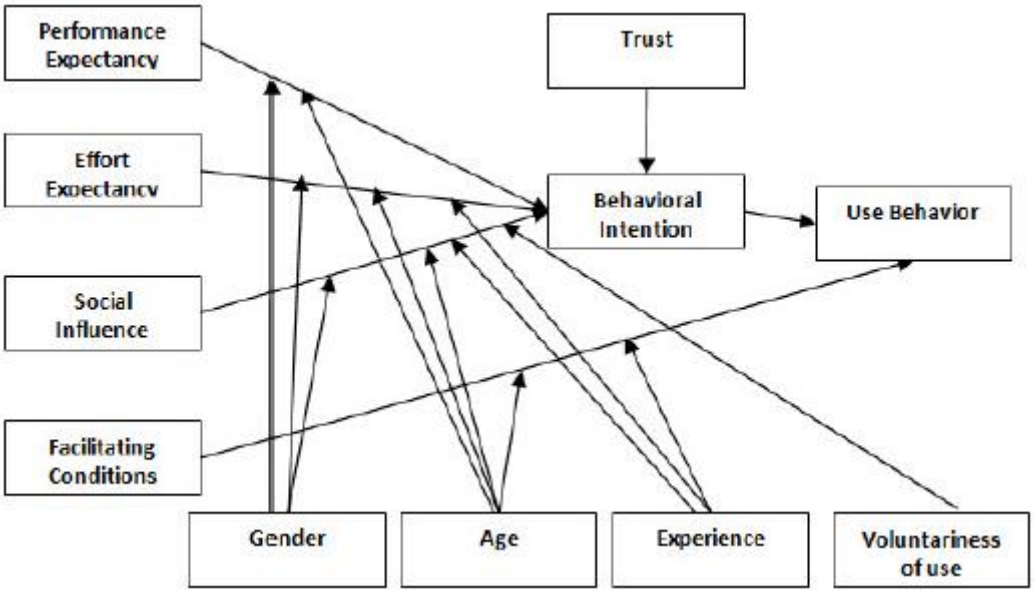


Figure 24: Revised UTAUT Model (Alharbi, 2014)

In Figure 24 it can be seen that *trust* was added to the UTAUT model as a main construct and that it has a direct impact on the “behavioural intention” of an individual to adopt new technologies (Alharbi, 2014).

Although the benefits and advantages of implementing Smart Contracts in the Syndicated Loan Market are well described in the literature, adopting Smart Contracts into the Syndicated Loan Market still faces establishing trust. This provides a new challenge for the Syndicated Loan Market to understand and implement ways to initiate and foster trust in all relevant parties.

For the successful implementation of distributed ledger technology in the Capital Market, especially in the Syndicated Loan Market, an individual's embrace (including acceptance, adoption and trust) of this new technology has been examined. This helped to establish and set out guidelines to build trust that ultimately had a direct impact on the adoption of Smart Contracts. To understand how trust can be built, trust as a construct needs to be understood first.

2.7. Matter of Trust

It is evident from the literature that Smart Contracts can be a solution for most of the current syndicated loan challenges, especially counterparty risk, settlement times, overall contractual performance and transparency of regular reporting (Accenture, 2016). The question has shifted from whether this technology can transform the financial system in general and specifically the Syndicated Loan Market's ultimately optimising middle- and back-office functions, to how the ecosystem can prepare for the future. The issue now faced was whether all relevant stakeholders were willing to trust the technology innovation. This section discusses how trust can have an influence on the outcome of interest and the adoption of technology.

Trust is a fundamental part of life and is necessary for interaction (Mazzella & Sundararajan, 2016). Miller (2015) reveals two distinct elements of trusting in a virtual environment, one being human interaction, the second one technological interaction.

2.7.1. Trust through Technology

Contracts, in a traditional sense, rely on all relevant parties trusting one another to fulfil their side of the obligation (Swan, 2015). This relates to human interaction and the interpersonal trust that is associated with all the relevant parties. This interpersonal trust is often associated with collaboration (Smith & Barclay, 1997), performance (McAllister, 1995) and greater information sharing (Jones & George, 1998). As is evident in the literature, Smart Contracts feature the same kind of agreement but eliminate the human aspect that replaces the need for trust between these parties. This minimises counterparty risk and increases contractual performance and transparency for regular reporting, thus fulfilling the interpersonal trust measurements that include collaboration, performance and greater information sharing (Accenture 2016; KPMG 2017).

Replaced trust refers to the trust Nakamoto (2008) refers to in his white paper:

> *What is needed is an electronic payment system based on* cryptographic proof instead of trust, *allowing any two willing parties to transact directly with each other without the need for a trusted third party. Transactions that are computationally impractical to reverse would protect sellers from fraud and routine escrow mechanisms could easily be implemented to protect buyers* (Nakamoto, 2008, p. 1).

Although distributed ledger technology has been referred to as a “trustless” system (Van Oerle & Lemmens, 2016), it is important to remember that this refers to the trust that is placed in traditional trusted third parties, like banks and insurance companies and not the trust placed in technology. Traditional contracts rely on peoples’ trust in these trusted third parties (Krause, 2016).

Trust is the main attribute to consider when talking about distributed ledger and its applications, such as Smart Contracts (Umeh, 2016). Rather than relying on trusted third parties, distributed ledger technology relies on a system of decentralised consensus (Krause, 2016). The architecture and structures of distributed ledger technology may result in the mitigation of our dependence on banks, governments, lawyers, notaries and regulatory compliance officers (Bohnhoff, 2017). Distributed ledger technology shifts the trust in people and rather builds trust between online peers through technology.

New mechanisms that enable us to trust unknown people, companies and ideas are continuously being developed. Over the past 20 years trust among online peers has grown to such an extent that it is normal to share personal information, such as credit card details and one’s current location with strangers. The next trust wave will include connecting trustworthy strangers to create all kinds of people-powered marketplaces (Botsman, 2016).

It is of paramount importance to understand the power of technology and how to build trust between online peers to achieve a successful adoption. Through such understanding one can improve the outcome of what wants to be achieved when implementing a new technology, specifically distributed ledger technology (Miller, 2015).

Through a trustworthy technology trust can be built between online peers. This eliminates trust placed on people to deliver, and focuses on building trust through cryptographic guarantees that ensure people delivering (Mazzella & Sundararajan, 2016). An example of a trustworthy technology platform is Smart Contracts. Trust is offered through Smart Contracts by means of a single source of truth, which is given to all participants. This single source of truth is built on five foundational technology elements of distributed ledger technology that determine how this single source of truth is achieved (Genpact, 2016). These foundational elements are set out in Figure 25:

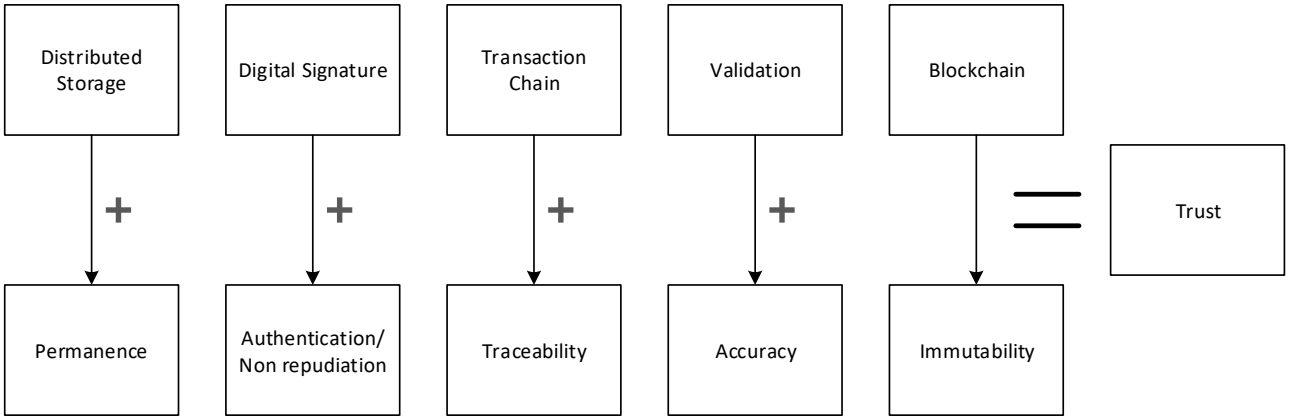


Figure 25: Five Foundational Technology Elements Resulting in the Creation of a Secure Database (Genpact, 2016)

Distributed ledger technology has enabled individuals to trust online peers through technology with five fundamental elements shown in Figure 25. These five elements that embody Smart Contracts solve key security and privacy concerns that sprout from traditional contracts. These concerns are set out in Table 1:

Table 1: Five Key Concerns and Elements (Genpact, 2016)

	Concern	Distributed ledger foundational element
1	Data will be lost.	Distributed storage
2	Unauthorised users can access and modify data.	Digital signatures
3	Lack of historical audit trails.	Transaction chain
4	Data is not accurate.	Validation
5	Data will be retrospectively changed.	Distributed ledger

Distributed storage refers to the architecture that has shifted from a central database to a peer-to-peer or distributed ledger network (Genpact, 2016). It ensures the recording, sharing and synchronisation of the database across the network (World Bank Group, 2017).

To trace data that has been added to the distributed ledger to its original author, the concept of digital signatures is used (Genpact, 2016). This provides mathematical proof that the original owner approved the data (Ali et al., 2014).
Activities that have taken place on the distributed ledger can be traced to its roots (Genpact, 2016). Not all distributed ledgers make use of a chain, although there is some sort of traceability that is offered through distributed ledgers (World Bank Group 2017; Umeh 2016; Van Oerle and Iemmens 2016).

Due to the digital nature of a distributed ledger, validation is built into the core design of this technology. This ensures that all content added to the distributed ledger has been validated. This allows all relevant parties to agree on a single source of truth (Genpact, 2016). Any unauthorised attempt to tamper with data in the distributed ledger is immediately reversed (Genpact, 2016).

In a virtual environment, human interaction can shift from traditional face-to-face interaction to peer-to-peer interaction. This refers to online peers who are connected through peer-to-peer platforms such as Smart Contracts (Mazzella & Sundararajan, 2016). Thus, through

this single source of truth that accompanies Smart Contracts, the traditional interpersonal trust that is placed in people is replaced by a trust that is built through technology. The reason is that all data coded in Smart Contracts is permanent, authenticated, tractable, accurate and immutable (Genpact, 2016).

Although trust can be built between online peers through a trustworthy platform, it is important to remember that the success thereof not only relies on trusting the peers, but also on trusting the technology. This refers to the second element of trust in a virtual environment, namely technology interaction (Miller, 2015). If people do not trust technology, they will not adopt it. This not only shows that people and technology are intertwined when technology-mediated interactions occur, but that it is necessary to understand both trust through technology and trust in technology. This is due to the fact that humans interact with one another, peer-to-peer, as well as with the technology (Miller, 2015).

2.7.2. Trust in Technology

Recent research indicates that trust involves not only human interaction but also technology interaction. Trust trough technology has been widely examined, but the effect of trust placed in technology has been generally absent (Vance, Elie-Dit-Cosaque, & Straub, 2008). Every time a new technology is introduced to the public, the same question is asked, namely “Can it be trusted?” (HSBC, 2017). By focusing on trust that is placed in technology a better understanding of the acceptance of technology, irrespective of the human aspect surrounding it, can be achieved (H. D. McKnight et al., 2011).

Research on interpersonal trust − trust in people − has led to three drivers of trust, namely ability, benevolence and integrity (Vance et al., 2008). As with trust in people, trust in technology involves a belief. Trust in people and trust in technology differ in the nature of the objective of dependence (H. McKnight, Carter, & Clay, 2009). According to McKnight *et al.* (2011) trust in technology is “a belief that a specific technology has the attributes necessary to perform as expected in a given situation in which negative consequences are possible”.

Yousafzai *et al.* (2009) found that trust in people drivers (ability, benevolence and integrity (Miller, 2015)) can be regarded as the dimensions of trustworthiness that ultimately help to

build the foundation of trust. Although these drivers are recognised as the main drivers of trust, it has been noted that in a virtual environment, lack of security and privacy can result in the reluctance of adoption of technology (Yousafzai et al., 2009). The first step to establish trust in a virtual environment is to guarantee that all information will be safeguarded (Belanger, Hiller, & Smith, 2002). In this study, privacy and security refer to the trust that is built through technology as set out above.

Both security and privacy as well as the trustworthiness of technology have a direct effect on trust. For the perception of high security and privacy to exist, there must be a belief that the technology is trustworthy to perform reliably as expected (Yousafzai et al., 2009). Thus, trust must be earned and is built over time through the performance of technology. Trust exists as long as technology performs as expected (HSBC, 2017).

Technology interaction in a virtual environment involves a greater risk compared to human interaction. Trust is of paramount importance when risk is involved, as trust allows for participation in risky situations (Miller, 2015). Perceived risk surrounding technology can ultimately be associated with the perception of security and privacy and the behavioural intention of a person (Yousafzai et al., 2009). This is illustrated through a model of trust that is proposed in Figure 26:

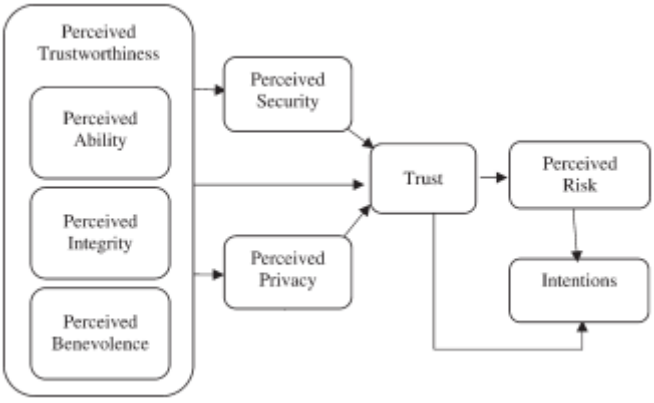


Figure 26: A Model of Trust (Yousafzai et al., 2009)

To grasp the concept of trust in technology, the three drivers of trust in people have been compared to trust in technology. McKnight *et al.* (2009) made the comparison and found functionality, helpfulness and reliability to be the common concepts.

Functionality relates to whether technology has all the necessary features to perform as expected, whereas helpfulness refers to the need to be helped if there is a problem using technology. Reliability of a specific technology depends on whether or not this technology will operate properly in a consistent manner (Mayer, Davis and Schoorman 1995; McKnight *et al.*,, 2009). Due to the fact that technology does not consist of a moral agency, trust in technology reflects the beliefs about its capability (or functionality) rather than its will or its motives (H. McKnight et al., 2009).

It is evident that the likelihood to adopt technology is higher if one trusts it; thus trust in technology may complement adoption models. Trust in technology results in a deeper exploration, adoption and repeated use of a particular technology (Miller, 2015). For this study the trust model (Yousafzai et al., 2009), using trust in technology drivers (H. McKnight et al., 2009), together with the revised UTAUT model (Alharbi, 2014) to construct the Trust and Adoption of Technology model. This model is used to study the trust and adoption of Smart Contracts. This model is set out in Figure 27:

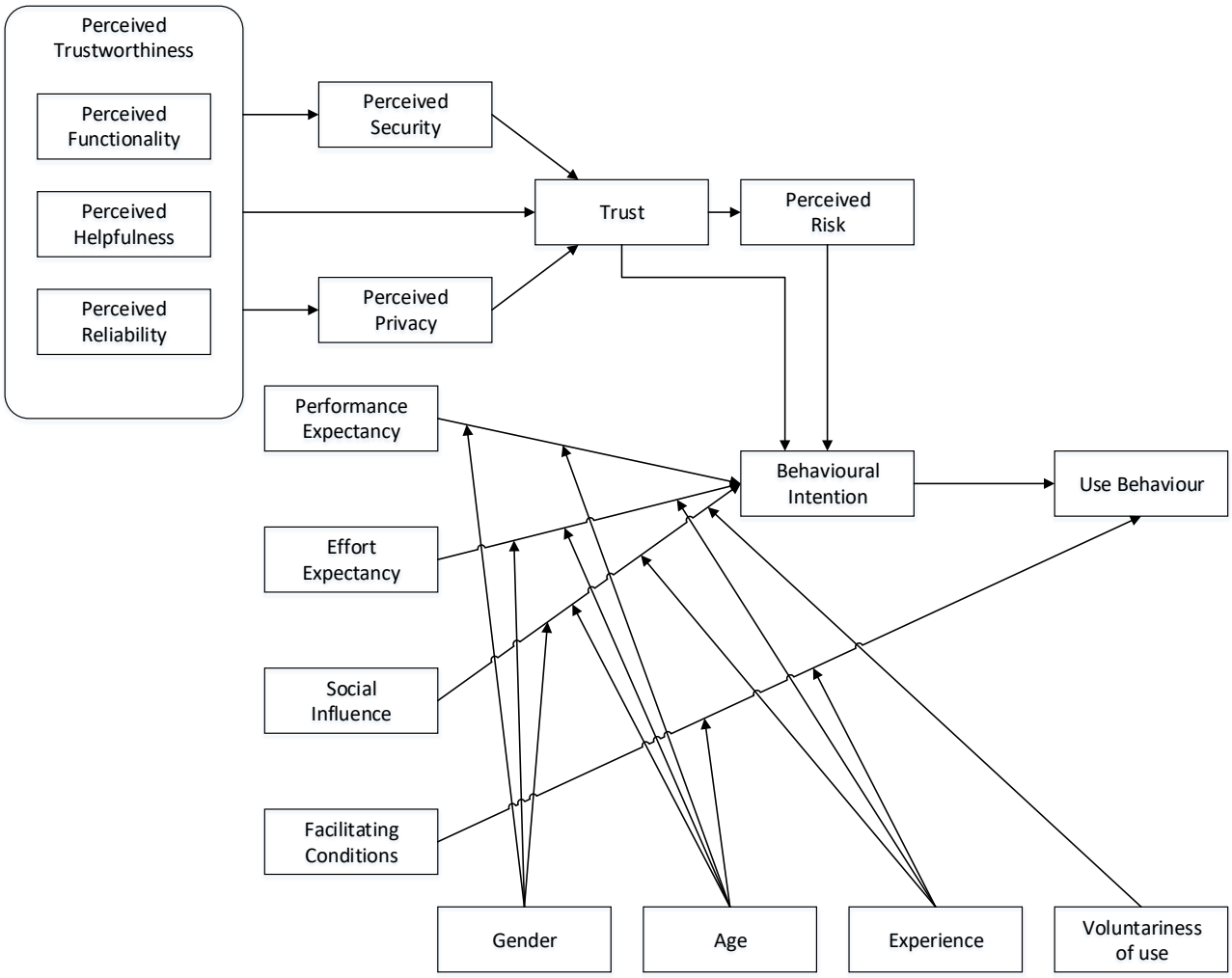


Figure 27: Trust and Adoption of Technology Model

In the model depicted in Figure 27 the dependent variable is the Behavioural Intention of an individual. The relevant variables from both the trust model (Yousafzai et al., 2009) and the revised UTAUT model (Alharbi, 2014) were extracted and merged. Venkatesh *et al.* (2003) found that the Facilitating Conditions are directly linked to the use behaviour of an individual. The rest of the variables are mediated by the behavioural intention of an individual to use technology and are influenced by moderating variables (Gender, Ager, Experience and Voluntariness of Use) (Eikmanns & Sandner, 2015). The behavioural intention of an individual is influenced by Trust and Perceived Risk.

By merging the trust model with the revised UTAUT model an understanding how one's trust in technology influences one's behavioural intention, overall acceptance and adoption of technology can be achieved. Through this understanding, organisations can offer new opportunities to adapt processes to support trust and adoption (Lippert & Davis, 2006).

Therefore, a set of guidelines for Smart Contracts that take into consideration trust and adoption standards is proposed.

2.8. Conclusion

Throughout this chapter the research topic and research question were outlined in the context of current literature. Various viewpoints were highlighted to explicate the role of adoption when implementing Smart Contracts in the Syndicated Loan Market. In this chapter it is evident that Smart Contracts can be regarded as one of the biggest financial innovations that have been introduced into the financial market, specifically within the Syndicated Loan Market. Using Smart Contracts can theoretically optimise settlement times in the syndicated loan process.

Through understanding the current literature on the Syndicated Loan Market and Smart contracts it was noted that the reason for the success of the current infrastructure of the financial market is due to trust that has been built throughout the years. Although it is clear that Smart Contracts have the potential to transform the Syndicated Loan market positively, if organisations or individuals do not trust and adopt Smart Concepts, their implementation will not be successful. It is evident that there is a gap in the literature regarding building a deep collaboration, adoption and trust in Smart Contracts. The researcher of this study has developed a Trust and Adoption of Technology Model by merging the trust model, trust in technology drivers and the revised UTAUT model. This model has given the researcher insight into the reasons why individuals place their trust in technology and into their behavioural intention to adopt and use this technology.

3. Methodology

3.1. Introduction

Up to this point the financial system and distributed ledger technology have been examined separately. An outline has been provided of how these two concepts when combined, may play an integral part in disrupting the Capital Market in general and the Syndicated Loan Market in particular. It is evident from the literature that by using Smart Contracts, the Syndicated Loan Market will have significant benefits, such as minimising counterparty risk and settlement times, as well as increasing contractual performance and transparency for regular reporting (Accenture 2016; KPMG 2017). Although the Syndicated Loan Market will greatly benefit by implementing distributed ledger technology, it has been noted that the success lies with the trust placed in this technology and whether or not all relevant parties will accept and adopt it.

The aim of this chapter was to provide the reader with an overview of the relevant research methodology this study followed, as well as the justification for the methodological choices. This is known as the methodology phase (depicted in Figure 28) as it introduces the methodology that was used in this study.

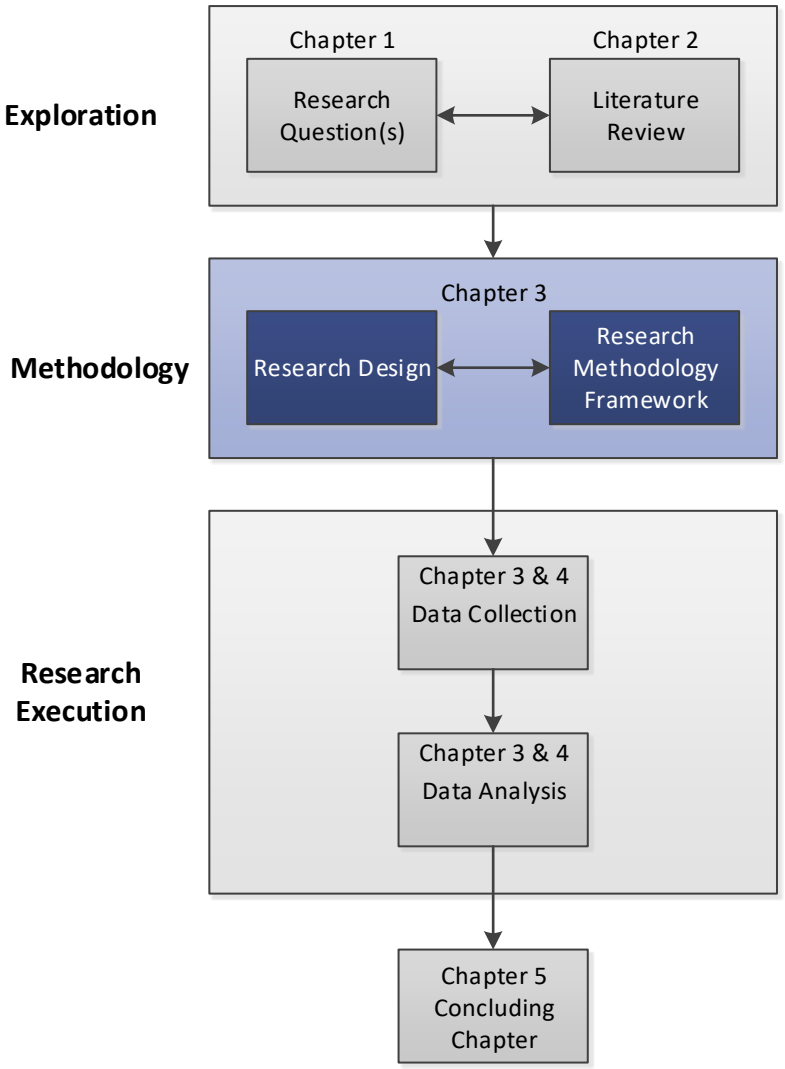


Figure 28: Dissertation Layout focussing on the Methodology (Bhattacherjee, 2012)

When formulating a methodology an effective tool to use is the research onion that was developed by Saunders, Lewis and Thornhill (2009). This guides a study by identifying the research philosophy, research approach, research strategy and data gathering techniques. The data gathered through the research instruments resulted in obtaining a better understanding of the trust currently placed in this new technology. Analysing the trust placed in technology allowed the researcher to draw up guidelines on how this new technology can be accepted, adopted and trusted.

3.2. Research Design

The research design of a study refers to the general or staged plan for addressing the research question and objectives. This is done through structuring the research problem and objectives and planning the investigation of the study.

A literature study was conducted to determine how Smart Contracts can disrupt the Syndicated Loan Market. This foregrounded the influence of trust when implementing technology. It has been noted that there is a reluctance to adopt Smart Contracts in the Syndicated Loan Market due to a lack of trust. A Trust and Adoption of Technology Model was constructed to achieve a better understanding of one's trust in technology and how it may influence one's behavioural intention and overall acceptance and adoption of technology.

3.3. Research Philosophy

The way in which one views the world, which is closely linked to what is perceived as real, is part of what is known as philosophy. Thus, a research philosophy refers to the beliefs surrounding the way in which reality is perceived or investigated. A research philosophy is of paramount importance as it provides the underlying justification for the manner in which the research is conducted. This is due to the fact that the way in which research is conducted relates to the researcher's reality that will greatly influence the way in which the researcher will gain knowledge (Mason, 2014).

Long (2007) states perceived reality itself can only be defined once the nature of reality has been defined. The reason for this concept is quite simple: The paradigm (the nature of reality) used to perceive reality (the research philosophy) is very likely going to influence this perceived reality, which ultimately influences the way in which research is conducted (Mason, 2014). Understanding the nature of the knowledge that one wants to gain and investigate can lead to the choice of research philosophy for a study. Thus, the research philosophy is dependent and can be characterised, based on the research paradigm (Levy, 2006).

3.3.1. Research Paradigm

Oates (2006) identifies two types of research paradigm: qualitative and quantitative. It is essential to establish what research paradigm will be followed before the research philosophy can be determined. This is because the philosophy is characterised through the paradigm (Guba, 1990). This study followed a qualitative research paradigm.

The current study investigated how the Syndicated Loan Market is impacted by implementing the distributed ledger platform. Secondly, this study aimed to determine whether the implementation of Smart Contracts in the Syndicated Loan Market will be accepted, adopted and trusted by all relevant parties. As seen in the literature, the measurements and concepts related to acceptance, adoption and trust depend on the opinions, behaviour and experience of these parties.

The preferred research paradigm used to explore the research question and objectives was a qualitative methodological approach. This is relevant as a qualitative research paradigm allows the researcher to work closely with the participants partaking in the research study. It results in obtaining information pertaining to the personal thoughts and experiences of the participants (Akotia, 2014).

Qualitative research is advantageous due its ability to produce rich and detailed data. The data includes, but is not limited to words, images, websites and sounds. It can lead to various, different and valid conclusions from different researchers (Oates 2006; Corbin and Strauss 1998). An effective means through which a researcher can interpret individuals' own reality is through conducting interviews (Bryman, 2012). Interviews were used as the data gathering technique in this study to explore the diversity of certain behaviours of individuals (Harrie, 2010).

3.3.2. Philosophy

As mentioned, the research philosophy is determined through the research paradigm. The research paradigm followed in this study is qualitative research. The aim of qualitative research is to gather and understand individuals' opinions, behaviours and experiences in their various roles and situations (Alasuutari 2010; Akotia 2014). Qualitative research

focuses on understanding an individuals' behaviour and the reasons that govern this behaviour (Bryman, 2012).

To uncover the deeper and real issues associated with trust and the adoption of Smart Contracts, an interpretivist approach was followed. As the aim of this study is investigating and understanding trust and the adoption of Smart Contracts, and as acceptance, adoption and trust of Smart Contracts are interconnected with the beliefs of the public, an interpretive perspective was appropriate.

Interpretivist studies are the subjective interpretation of individuals that contribute to the understanding of the social context and order (Levy, 2006). Thus, it is the understanding of the world from the social actors' point of view. The possibility of different interpretations is evident and an interpretivist study is thus subjective (Oates, 2006).

In Information Systems (IS) research, interpretivist studies focus on the social context and order. This includes the understanding of the social processes of development and interpretation, as well as the understanding of how the social setting is influenced by and through IS (Oates, 2006).This helped in investigating the issues of trust and the adoption of Smart Contracts and in determining the relationship between adoption, trust and technologies.

When the research philosophy has been identified it can be used as the starting point to clarify the research approach. This ultimately leads to the development of an appropriate and suitable research methodology (Akotia, 2014).

3.4. Research Approach

Oates (2006) identifies three research approaches − inductive, abductive and deductive reasoning. The deductive approach was selected for this study.

Traditionally, qualitative studies adopt an inductive research approach while quantitative studies adopt a deductive approach (Hyde, 2000). However, it has been argued that a deductive approach can be used in a qualitative study as it is best suited for analysing pre-structured data (Harrie 2010; Wiles, Pain and Crow 2010). Thus, qualitative studies using a

deductive research approach are ultimately a theory-guided research to develop a hypothesis. This means that a theory is first established and tested systematically to produce patterns and not only one dominant theme (Wilson, 2010).

Deductive reasoning was the most suited research approach for this study as it assisted in drawing conclusions based on a theoretical framework. Deductive reasoning is the process of using pure logic in that an explicit hypothesis is tested to be confirmed or rejected. This is where an existing theoretical framework or model, found in the literature, is applied to a study to gather data to be analysed. It is a theory-testing process where an established theory is tested to see if it applies to a specific instance (Hyde, 2000).

Thus, a deductive research approach can be used to draw conclusions, make predictions, or construct explanations based on existing knowledge (Oates, 2006). This approach is also known as the top-to-bottom approach (Orlikowski & Baroudi, 1991).

The two frameworks that were identified in Chapter 2 as the Revised UTAUT model (Alharbi, 2014) and Trust Model (Yousafzai et al., 2009) were used to construct the Adoption and Trust of Technology Model. This model is used in this study to examine the acceptance, adoption and trust of Smart Contracts.

3.5. Research Strategy

The research strategy of a study refers to the way in which the research question(s) and objectives of a study are investigated (Akotia, 2014). Oates (2006) discusses six strategies: Survey, design and creation, experiment, case study, action research and ethnography.

Due to the nature of this study that examines causative variables between different types of data, the research strategy used in this study is surveys. Surveys allow for a cost-, time- and effort-efficient method to collect data. Surveys are used for descriptive, exploratory, or explanatory research and are best suited when individual people are used as the unit of analysis. Surveys are also used when the same kind of data is required from a large group of people (Bhattacherjee, 2012).

3.5.1. Data Gathering Technique

The data gathering technique of a study is the means by which data is produced. Data gathering is a systematic process to produce data that is aligned with the variables of the pre-defined research question and objectives. The data produced is used to help solve the pre-defined research question and objectives. The first step in determining the data gathering technique is to understand the nature and type of the data required that will meet the objectives of the study (Akotia, 2014). As mentioned above, the data gathering technique best suited for qualitative studies and used within this study, is interviews.

The nature of this study required obtaining detailed data from individuals with and without knowledge of distributed ledger technology. It included an explanation of their opinions, behaviours and experiences at length. It also included the explanation of some of the questions, depending on their level of knowledge of the study topic. The data gathering process required gathering the data at a minimum expense within the shortest possible timeframe.

Interviews are regarded as one of the most important techniques data can be gathered with for qualitative studies (Myers, 2013). Interviews refer to a conversation between people where the researcher has control over the agenda and the proceedings. The researcher can have control either for the entire interview or only at the beginning and will ask most of the questions (Oates, 2006). They allow the researcher to focus on the participant's world by listening, prompting, encouraging and directing the participant rather than by imposing. For this study this was of paramount importance as a participant was more likely to disclose issues of trust and the adoption of Smart Contracts in an interview (Myers, 2013).

Interviews can be classified into three basic types: structured, semi-structured and unstructured interviews (Myers 2013; Oates 2006). Due to the fact that this study required the understanding of an individual's opinion, behaviour and experience regarding trust and the adoption of Smart Contracts, pre-populated questions were formulated prior the interview sessions. Thus, structured interviews were used in this study (Myers, 1997).

3.5.2. Participants

The data set of a study includes the target population and sample size of the study. Both the target population and sample size for this study were decided to ensure that in-depth and detailed discussions on the topic could be conducted.

The aim of this study is to analyse the behavioural intention of individuals to use Smart Contracts. It is backed by the unified theory of adoption and trust set out in Chapter 2. The moderating variables that were identified and that had an influence on the behavioural intention were gender, age, experience and voluntariness of use (Baron *et al.*, 2006).

Due to the time constraints and limited number of suitable participants, 20 interviews were conducted in the Information Systems environment in South Africa to gather the required data. The interviews were conducted over a period of a month.

The target population of this study consisted of individuals of different gender and age groups who were readily available. Friends, family and friends of friends were chosen who fit the particular criteria. These individuals had various levels of understanding regarding distributed ledger technology in general and Smart Contracts in particular. Interviews were conducted to gather data regarding the opinions, behaviour and experience of these individuals of distributed ledger technology and its implementation.

As surveys focus on seeking patterns in the world and relationships in the data, it is necessary to make a careful choice of what sampling frame and sampling techniques need to be used. The sampling technique used in this study was convenience sampling as the researcher selected participants that were most convenient and willing to help (Oates, 2006).

3.6. Alignment of the Research Method

The following objectives were set:

1. What implications will the implementation of Smart Contracts have on loan syndication?
2. What factors are relevant when Smart Contracts are implemented in the Syndicated Loan Market?

3. What factors should the Capital Market consider when implementing Smart Contracts in general and the Syndicated Loan Market in particular?

The methodological and research approach together with the research strategy and fact finding approach for each research objective is outlined in Table 2.

Table 2: Alignment of the Research Method

Research Question	Methodological Approach	Research Approach	Research Strategy	Fact Finding Approach
What implications will the implementation of Smart Contracts have for loan syndication?	Qualitative	Deductive	Survey	Systematic Literature Review
What factors are relevant when Smart Contracts are implemented in the Syndicated Loan Market?	Qualitative	Deductive	Survey	Literature Review and Interviews
What factors should the Capital Market consider when implementing Smart Contracts in general and the Syndicated Loan Market in particular?	Qualitative	Deductive	Survey	Literature Review and Interviews

3.7. Research Execution Process

After deciding the methodology of this research the researcher identified the participants, concepts and research method to be used. The next step was to proceed to the research execution phase (Bhattacherjee, 2012). The research execution phase is the third phase as explained in Chapter 1. This can be seen in Figure 29:

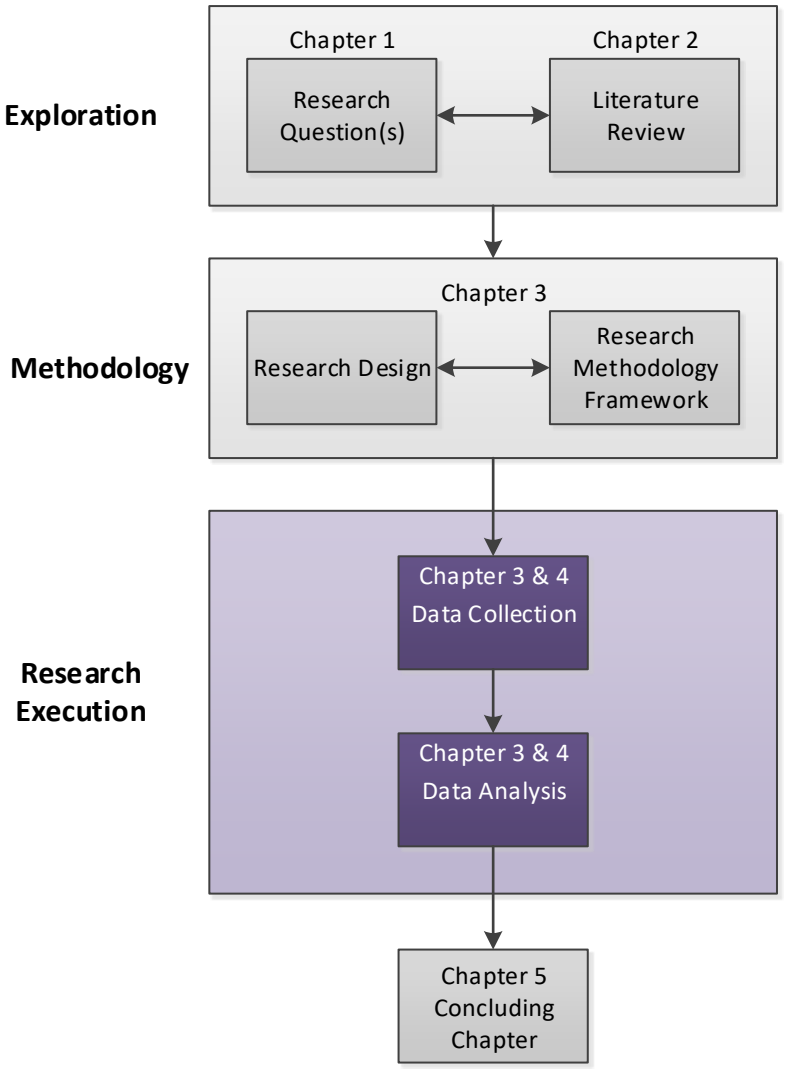


Figure 29: Dissertation Layout focussing on the Research Execution Planning (Bhattacherjee, 2012)

Planning the execution of a study is significant as it sets the tone of the entire study. It is important to understand what the timeline of the proposed study is so that the data collection and analysis of this data can be aligned with the set timeframe.

3.7.1. Data Collection

For this study, structured interviews were conducted that highlighted a list of themes that were identified. Questions regarding distributed ledger technology and acceptance, adoption and trust were formulated based on the Trust and Adoption of Technology Model set out in Chapter 2 (Oates, 2006).

Background information regarding the participants and their social context and order was collected. A list of the topics that were going to be discussed was sent to all relevant participants a week before the interview, giving them time to think and prepare their view and essentially establishing the credibility of the study. This helped in managing the timeframe for the interview as the topic is very broad and it would have taken up much time to explain the concepts.

Interviews were conducted with participants individually. All the participants were informed a week prior to the interview what the purpose of the interview was, the likely duration of the interview as well as the venue where the interview would take place. The participants were informed that field notes and audio tape recording would be involved during the progress of the interview.

Before the interviews started the participants had to sign a consent form. This ensured that they were placed first and that they knew that they did not have to partake if they did not feel like doing so.

The final interview layout that was followed is presented in Appendix B.

3.7.2. Data Analysis

This section focuses on the data analysis process this study followed. The data analysis of a study refers to the process when the data that was gathered with the data gathering techniques is analysed to determine themes and patterns (Bhattacherjee, 2012).

Due to the use of a qualitative methodological approach, data that is non-numerical was gathered (Levy, 2006). Interviews have become a common method used to collect data for qualitative studies (Aronson, 1995). After collecting the data, the next phase is analysing the data. Due to the rich and detailed nature of qualitative data it could be overwhelming to some researchers. This can lead to the inability of identifying themes and patterns as this is dependent on the interpretation of the researcher (Oates, 2006). One way of identifying themes and patterns from rich data is thematic analysis that was used for this study.

Braun and Clarke (2006) describe thematic analysis as the process of identifying, analysing and reporting themes and patterns in the data that are grouped and categorised to be further investigated. This allows the researcher to organise and describe rich data.

Aronson (1995) states that there is insufficient literature that outlines the procedure of performing a thematic analysis in a logical manner and suggests a number of steps for the analysis. This procedure is depicted in Figure 30:

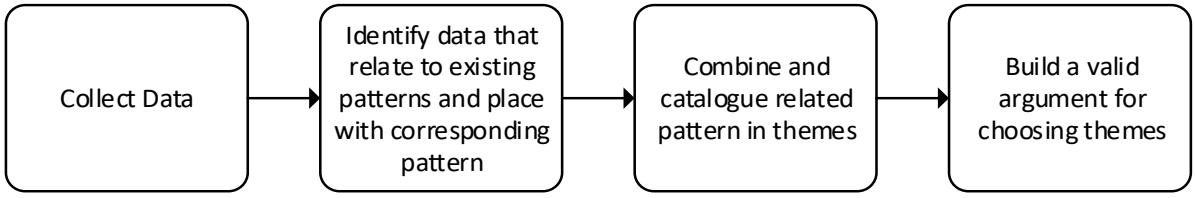


Figure 30: Pragmatic Process of Thematic Analysis (Aronson, 1995)

As seen in Figure 30 Aronson (1995) identifies four phases when performing thematic analysis. These phases include collecting data, identifying data that relates to existing patterns and placing it with a corresponding pattern, combining and cataloguing related patterns in themes and building a valid argument for choosing themes.

Step 1 includes collecting and transcribing the data. From this the researcher is able to identify patterns from direct quotes or when paraphrasing common ideas that materialised in the interviews held (Aronson, 1995).

Step 2 is where the researcher analyses the data and identifies all data that relates to existing, classified patterns. This data is then placed with the corresponding pattern (Aronson, 1995).

In Step 3 all related patterns that have been identified in Step 2 are combined and catalogued into themes. To identify themes, the researcher has to piece together components and fragments of ideas or experiences to form a comprehensive picture (Aronson, 1995).

The fourth and final step is to build a valid argument regarding the themes that have been identified in Step 3 as the understanding and motivation of the researcher might differ. This

is done by referring to the literature study that was conducted in Chapter 2. This allows the researcher to formulate theme statements (Aronson, 1995).

For this study the aim was to analyse the perceptions and beliefs of the participants to identify themes that could be grouped into factors that influence the acceptance, adoption and trust on the distributed ledger technology platform, specifically when implemented as Smart Contracts. These factors were then further investigated. Based on the data analysed, a clear understanding of the research question and objective set-out in Chapter 1 is given.

3.8. Ethical Process

In this section the measures taken to comply with the ethical standards of treating the study participants are discussed.

It is imperative that the participants that partake in a study are placed first. There are several responsibilities that the researcher has to comply with to ensure that the rights of the participants are protected (Oates, 2006). These responsibilities include the following:

1. The participants that partake in the study must be given a consent form to sign. If a participant does not agree with the terms and conditions set-out in the consent form he or she cannot take part in the study.
2. The participant must be aware of the fact that he or she may withdraw at any given time.
3. The participant must be aware of the fact that voice recordings can be made during the interview proceedings.
4. During the transcription of the voice recordings, the researcher must ensure that no names are used. The voice recording may not be distributed.
5. The contact details of the researcher’s supervisor must be provided for any complaints if any of the participants feel that the researcher did not comply with the ethical standards.
6. The Ethics Committee of the university has to approve the study before the research commences.

The letter of informed consent that was sent to the participants is available in Appendix C.

3.9. Conclusion

This study used survey interviews to gather data that was analysed through using qualitative methods. A thematic data analysis process was used to extract themes and patterns that were analysed to help answer the research question and objectives set out in Chapter 1. Answering the research question and objectives allowed the researcher to draw up guidelines on how the technology under discussion can be accepted, adopted and trusted.

4. Findings and Analysis

4.1. Introduction

The aim of this chapter was to relate the primary and secondary data to the research question. Secondary data is the data that already exists in the literature whereas the primary data of a study refers to the data that is collected by means of the selected data gathering technique (Bhattacherjee, 2012). In this section the implementation of the study is presented to the reader and is referred to as the research execution phase. This can be seen in Figure 31:

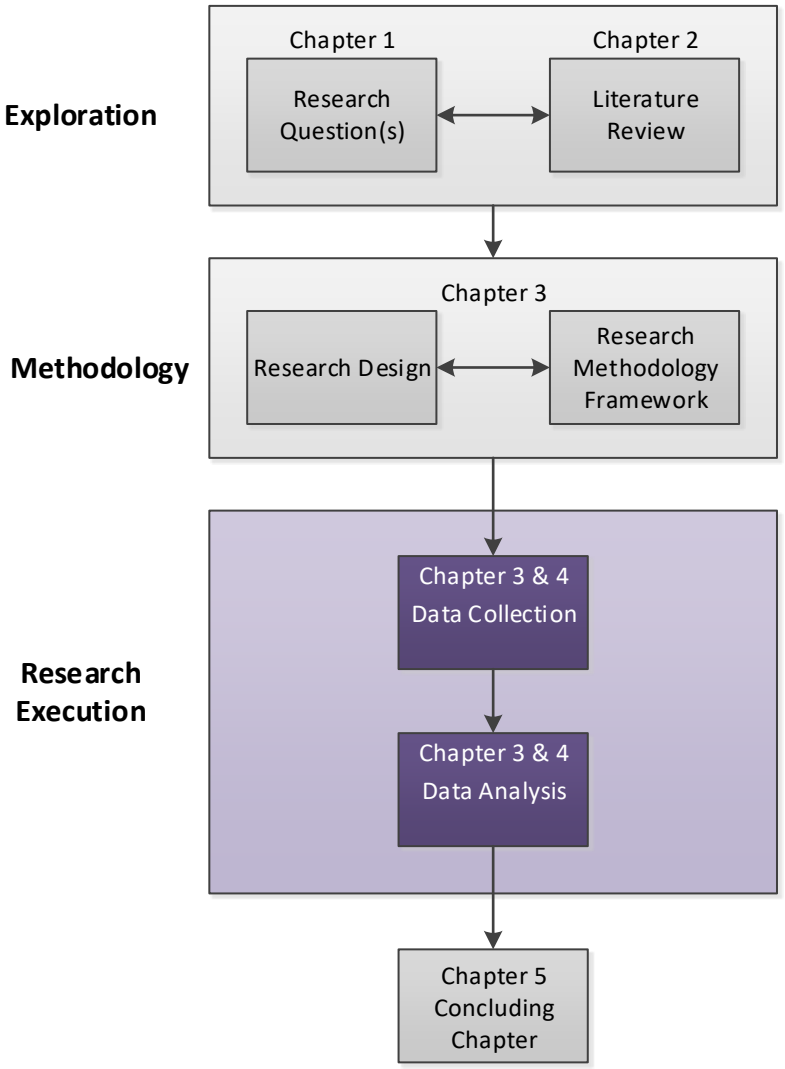


Figure 31: Dissertation Layout focussing on the Research Execution (Bhattacherjee, 2012)

The theoretical model, trust and adoption of technology used in this study was created through merging the revised UTAUT model (Gefen et al., 2003) with the trust model (specifically with trust in technology drivers (H. McKnight et al., 2009)) (Yousafzai et al., 2009). This model integrates the key concepts of these two models.

To understand the demographics of all participants a general survey analysis was conducted. This gave the reader all information necessary to understand the background of the participants.

In the literature study that was conducted, it was identified that *trust* is a major barrier to the adoption of new technologies. For an individual to consider adopting a particular technology, trust must first be built (Alharbi, 2014). This study therefore firstly focused on trust and the adoption of technology. Three constructs that influence the trust of an individual were identified. These are perceived trustworthiness, perceived security and perceived privacy.

The second part of the model, the revised UTAUT model, investigates the four key constructs of adoption, namely direct determinants of the usage and behaviour of technology. These constructs include performance expectancy, effort expectancy, social influence and facilitating conditions relating to a particular technology. In conclusion, the connection between the key variables on the behavioural intention of the participants is discussed.

The constructs that influence the trust of individuals as well as the constructs that investigates adoption depends on opinions, behaviour and experiences. These constructs are transferred into a quantitative measure. Transferring these qualities ensures measuring character and personality traits. This is done though the Likert scale that analyse a series of questions that when combined describe a personality trait or attitude (Likert, 1932).

4.2. General Survey Information

Data was gathered from a total of 20 participants through conducting interviews. The characteristics of the participants are shown in Table 3. Five age groups were identified from a pragmatic and comparative point of view. The data was categorised according to the following age groups: 18 to 24, 25 to 34, 35 to 44, 45 to 54 and 55 to 64. In the data gathered

10% of the participants fell in the 18 to 24 age group, 60% fell in the 25 to 34 age group and 30% fell in the 35 to 44 age group. There were no participants that fell in the last two age groups.

It is evident from the data that the participants were highly unbalanced in terms of gender, age, experience and voluntariness of use. This can be seen from the ages ranging from 18 to 44 with 60% of the participants being male and 40% being female. More than half of the participants worked in an Information Systems environment (60%) with employment duration ranging from less than three years to more than nine years.

The interview questions were designed in such a way that data from individuals with and without distributed ledger technology or smart contract knowledge was collected. The data set included participants with knowledge of distributed ledger technology (85%) in general and Smart Contracts (60%) in particular as well as those without any knowledge of the distributed ledger technology (15%) in general and Smart Contracts (40%) in particular.

To compare the relationship between the main constructs and the moderating variables from the revised UTAUT model an analysis was conducted by testing the statements that were identified in the literature. From the data it was determined whether gender, age, experience and voluntariness of use plays a part in the behavioural intention to adopt distributed ledger technology in general and Smart Contracts in particular. The differences in the relationship of the main constructs (performance expectancy, effort expectancy, social influence and facilitating conditions) and the behavioural intention among these moderating variables were examined.

Table 3: Characteristics of the Participants

Measure	Categories	No. of Responses	Percentage
Gender	Male	12	60,00%
	Female	8	40,00%
Age	18 to 24	2	10,00%
	25 to 34	12	60,00%
	35 to 44	6	30,00%
Working in an Information	Yes	12	60,00%
	No	8	40,00%

Systems Environment			
Years of Experience	Under 3 years	6	30,00%
	3 - 6 Years	6	30,00%
	6 - 9 Years	2	10,00%
	More than 9 years	6	30,00%
Distributed Ledger Technology (DLT) Knowledge	Yes	17	85,00%
	No	3	15,00%
Smart Contract Knowledge	Yes	12	60,00%
	No	8	40,00%
Voluntariness of DLT Use	Yes	12	60,00%
	No	8	40,00%
Voluntariness of Smart Contract Use	Yes	14	70,00%
	No	6	30,00%

4.3. Performance Expectancy

Performance expectancy can be defined as,

> *"The degree to which an individual believes that using the system will help him or her to attain gains in job performance"* (Venkatesh et al., 2003).

To assess the performance expectancy of participants related to Smart Contracts (Venkatesh *et al.*, 2003) suggest that gender and age have an indirect influence on the relationship between the performance expectancy and behavioural intention of an individual. An analysis was done to determine the effect of gender and age on the relationship between the performance expectancy of the participants and the behavioural intention of these participants to use Smart Contracts.

The influence of the moderating variables on the relationship between performance expectancy and behavioural intention to use Smart Contracts was evaluated through asking the following questions:

- Will using Smart Contracts benefit you in your personal or professional life? If so, how?

- When using/having to use Smart Contracts, what expectations do you have?

The performance expectancy data gathered was analysed and compared to the moderating variables. Each of the moderating variables is discussed separately.

4.3.1. Gender

In Figure 32 the relationship between performance expectancy and the behavioural intention to use Smart Contracts is positively linked. This means that all participants believed that if their performance would improve through using Smart Contracts their intention to use Smart Contracts would be positive. This aligns with the statement made by Venkatesh *et al.* (2003). Other than this finding no significant effect of gender was found.

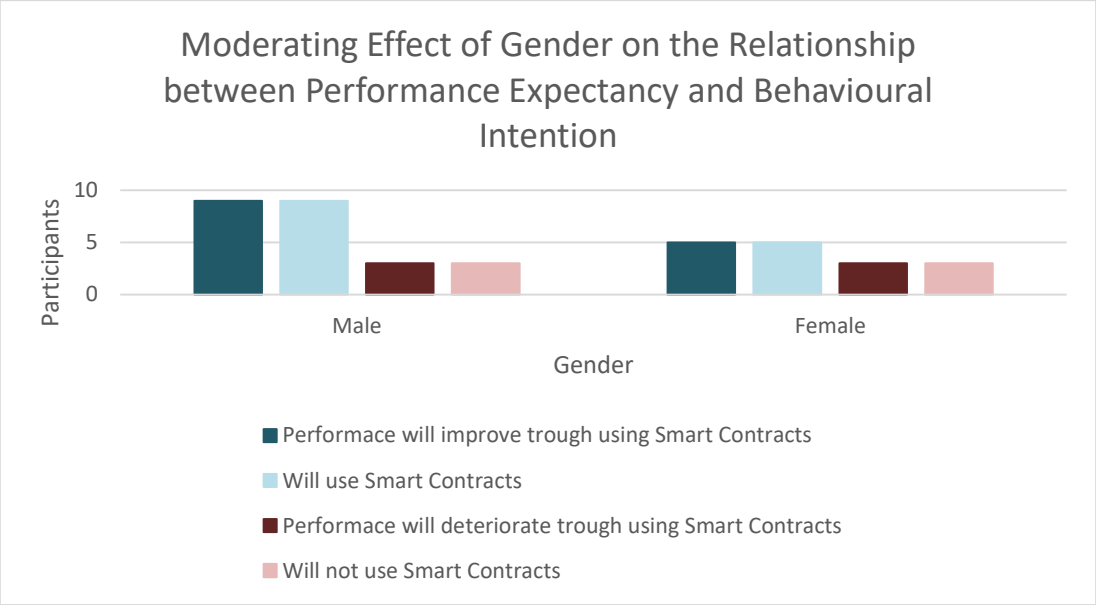


Figure 32: Moderating Effect of Gender on the Relationship between Performance Expectancy and Behavioural Intention

4.3.2. Age

The results set out in Figure 33 show that the performance expectancy of the participants had a direct influence on the behavioural intention to use Smart Contracts. If a participant believed performance would improve through using Smart Contracts, the likelihood of using Smart Contracts was positive. This aligns with the statement made by Venkatesh *et al.* (2003). Other than this finding no significant effect of age was found regarding the performance expectancy of the participants.

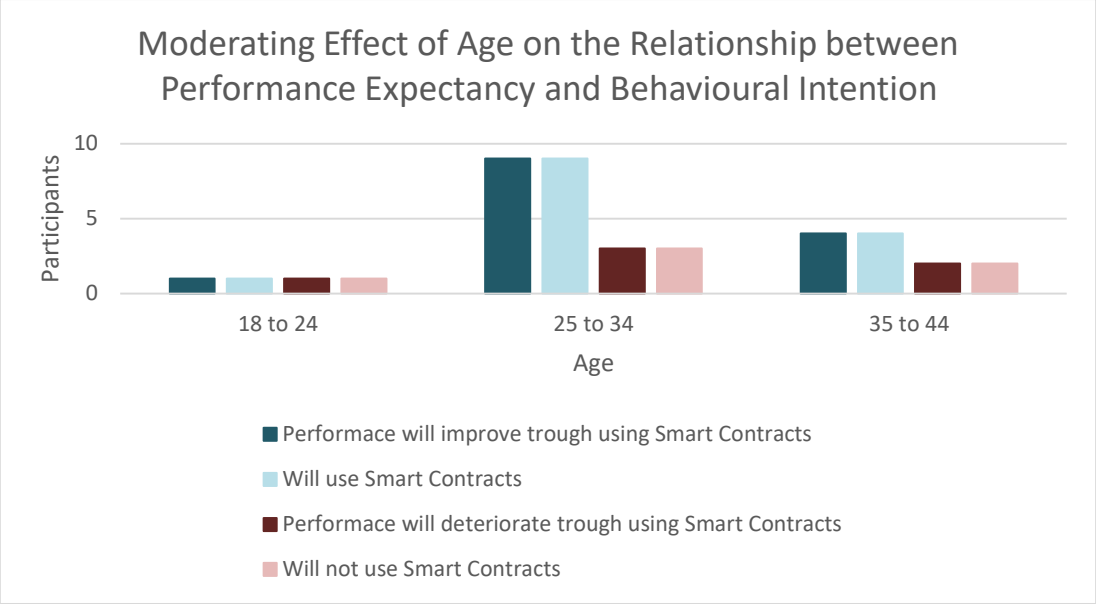


Figure 33: Moderating Effect of Age on the Relationship between Performance Expectancy and Behavioural Intention

This study has found that there is a strong relation between performance expectancy and the behavioural intention of the participant. However, this study found that gender and age have no significant effect on the relationship between performance expectancy and the behavioural intention to use Smart Contracts.

4.4. Effort Expectancy

Effort expectancy can be defined as,

> *"The degree of ease associated with the use of the system"* (Venkatesh et al., 2003).

To assess the effort expectancy of participants related to Smart Contracts, Venkatesh *et al.* (2003) suggest that gender, age and experience moderate the effect of the relationship between effort and the behavioural intention of an individual. To see what the effect of moderating variables was on the relationship between effort expectancy and the behavioural intention of an individual to use Smart Contracts an analysis was conducted. This was done by asking the following question:

- What are your expectations of the effort needed when using Smart Contracts?

Gender, age and experience and their influence on the behavioural intention were analysed and the outcome is discussed separately.

From the data analysed it was noticed that the participants divided effort expectancy relating to Smart Contracts into two themes. The first is the upskill and training that the participants felt they had to undergo before being able to use Smart Contracts. This is discussed further in the facilitating conditions relating to Smart Contracts. The second, which refers to effort expectancy, was the effort expectancy of the actual use of Smart Contracts.

4.4.1. Gender

In Figure 34 it is evident that a considerably lower effort was expected when using Smart Contracts than existing methods. Venkatesh *et al.* (2003) state that effort expectancy has a positive influence on the behavioural intention of a participant. This can suggest that the easier a system is to use the more likely it will be used, as outlined by one participant[1]:

Participant 2:

> *"I expect this technology to be geared towards normal users which do not have technical skills".*

This provides strong empirical support relating to the seminal work of Venkatesh *et al.* (2003). However, no significant effect of gender on the effort expectancy of the participants was found.

[1] The responses of the participants are provided verbatim and have not been edited.

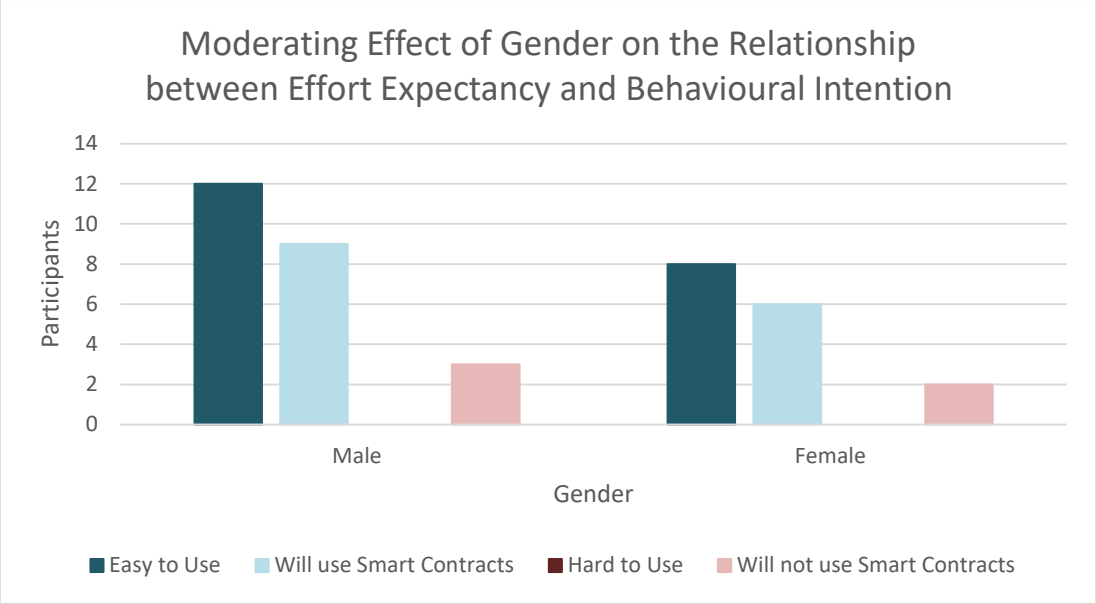


Figure 34: Moderating Effect of Gender on the Relationship between Effort Expectancy and Behavioural Intention

4.4.2. Age

The research results in Figure 35 show that effort expectancy had a positive influence on the behavioural intention of a participant as suggested by Venkatesh *et al.* (2003). However, the research results differed from the revised UTAUT model in that no significant effect of age on the effort expectancy of the participants was found.

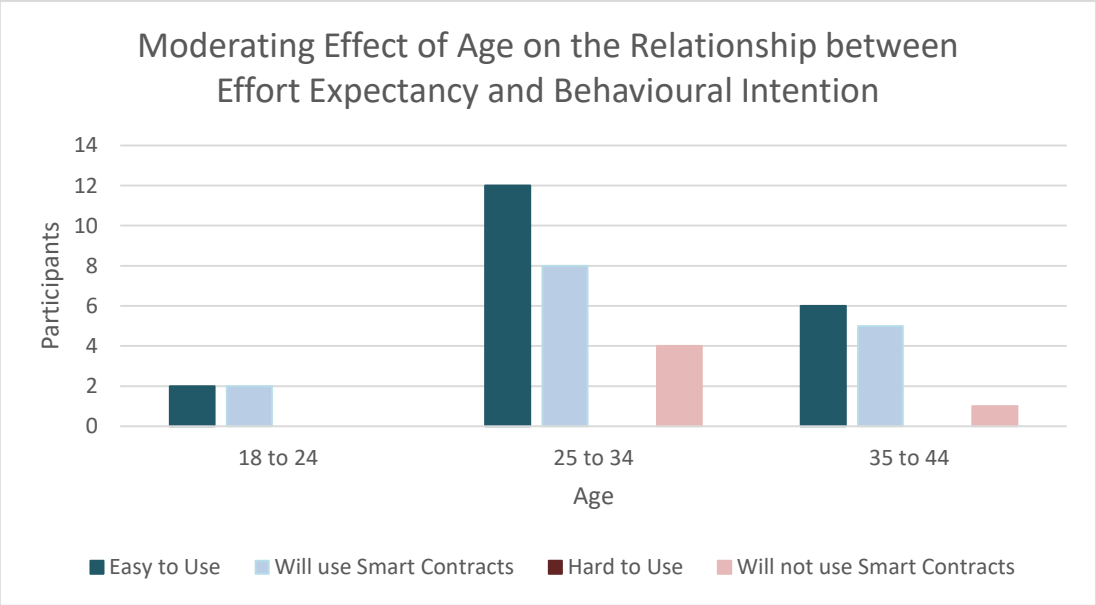


Figure 35: Moderating Effect of Age on the Relationship between Effort Expectancy and Behavioural Intention

4.4.3. Experience

Data was gathered to analyse the effect of experience on the relationship between effort expectancy and the behavioural intention of participants. The experience of the participants refers to the experience they had when they encountered the technology under discussion for the first time. Due to Smart Contracts still being a new technology application, none of the participants had used Smart Contracts in their personal or professional life. Overall the participants had a lower effort expectancy to use Smart Contracts in contrast to existing methods, irrespective of their experience. The reason for this can be found in the response of one participant:

Participant 18:

> *"With every new technology the aim is always to make things more user friendly and efficient".*

Venkatesh et al. (2003) suggest that greater experience can lead to an overall positive influence on the relationship between effort expectancy and the behavioural intention of an individual. Although the data analysis could not be aligned with the statement made by Venkatesh et al. (2003), the response of one participant underscored the following:

Participant 13:

> *"In my environment it is essential to keep track of what transpired when. The time periods are vital in the legal process, and to have a digital record thereof that is automatically created when you create a transaction will be essential in my work. This will enhance the experience of my day-to-day work entirely and might influence my intention to use Smart Contracts".*

In the current study, effort expectancy pertains to the seminal statement made by Venkatesh *et al.* (2003). They suggest that effort expectancy has a direct effect on the behavioural intention of the participants. However, this study found that gender and age have no significant effect on the relationship between effort expectancy and the behavioural intention to use Smart Contracts. The effect of experience could not be determined in this study as Smart Contracts are relatively new.

4.5. Social Influence

Social influence can be defined as,

> *"The degree to which an individual perceives that important others believe he or she should use the new system"* (Venkatesh et al., 2003).

To assess the social influence of participants related to Smart Contracts, Venkatesh *et al.* (2003) suggest that gender, age, experience and voluntariness of use significantly moderate the behavioural intention when investigating the social influence of an individual. To see whether this statement holds any truth an analysis was conducted. To evaluate the influence of the moderating variables on the relationship between social influence and intention of use the following question was asked:

- What do your colleagues and/or friends think of the use of Smart Contracts?

The data gathered for each moderating value was analysed and the outcome is discussed separately.

4.5.1. Gender

As suggested in the revised UTAUT model by Venkatesh *et al.* (2003) and the data analysed, it is evident that social influence has a positive influence on the behavioural intention of a participant. A participant is more likely to use Smart Contracts if the people whose opinions he or she values are in favour of the use of Smart Contracts. However, there is no difference in the beliefs of the participants based on their gender. This is reflected in Figure 36:

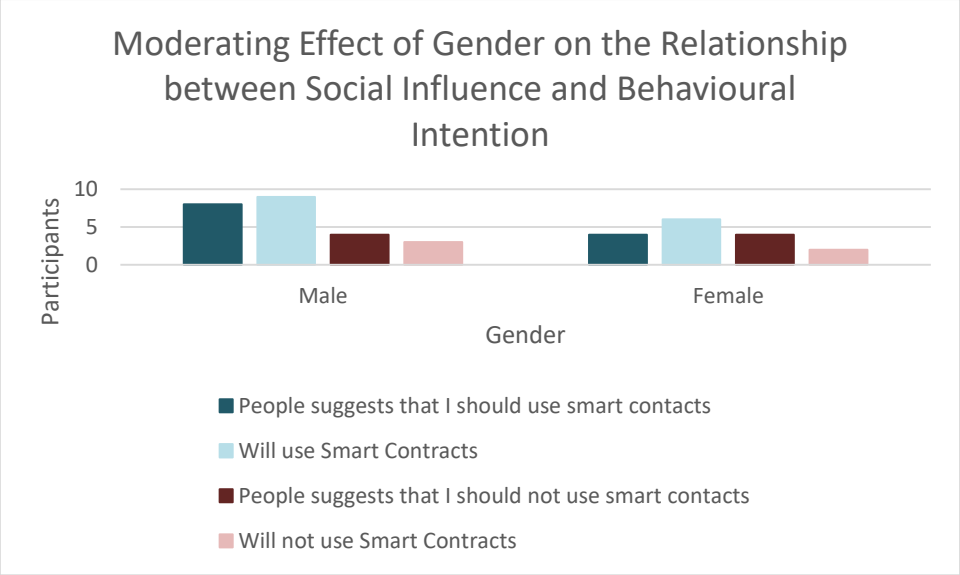


Figure 36: Moderating Effect of Gender on the Relationship between Social Influence and Behavioural Intention

4.5.2. Age

In Figure 37 it is evident that social influence has a positive influence on the behavioural intention of a participant as suggested by Venkatesh *et al.* (2003). The stronger the social influence to use Smart Contracts, the greater the willingness is to use this technology. However, this was seen in all the age groups, which contradicts the statement that was made that age has a moderating effect on the relationship between the behavioural intention and the social influence of an individual. No significant effect of age on the social influence of the participants was found.

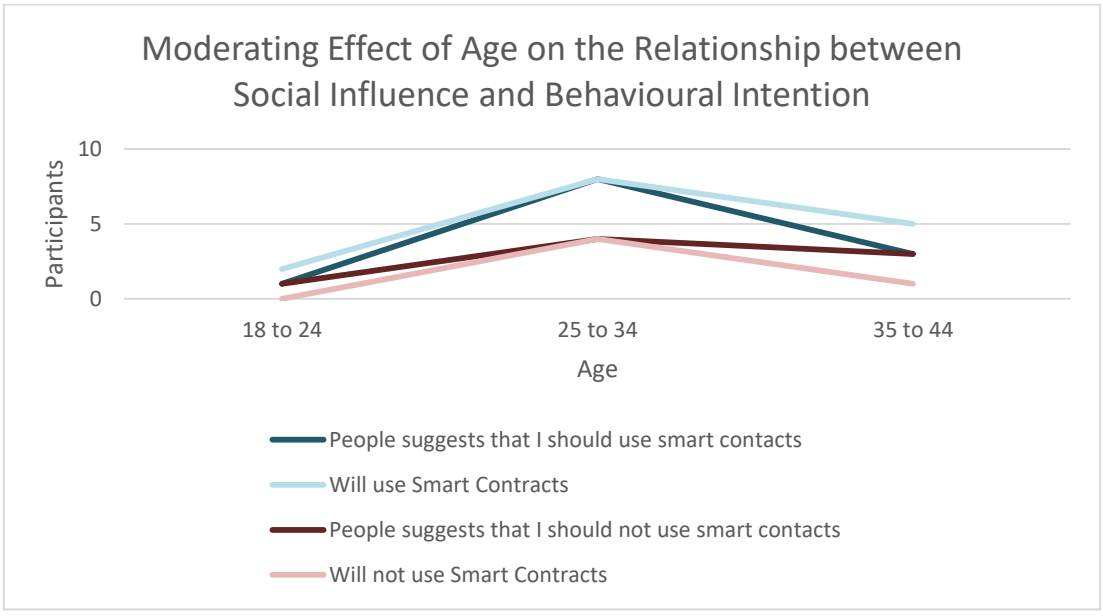


Figure 37: Moderating Effect of Age on the Relationship between Social Influence and Behavioural Intention

4.5.3. Experience

Due to Smart Contracts being a relatively new technology application of which various options are still being investigated, none of the participants had used Smart Contracts. It has, however, been noticed from the data analysed that social influence has a positive effect on the behavioural intention to use Smart Contracts, irrespective of the experience of these participants. The statement made by Venkatesh *et al.* (2003) who suggest that experience has a moderating influence on the overall relationship between social influence and the behavioural intention of the participant, could not be investigated.

4.5.4. Voluntariness of Use

Voluntariness of Use can be defined as the degree to which the use of Smart Contracts, as per this study, is perceived as being voluntary (Venkatesh et al., 2003). Due to Smart Contracts being in a use case phase, none of the participants had used this new technological application; thus voluntariness of use was examined using a hypothetical scenario. The participants were asked whether they would use Smart Contracts or not if the environment in which they worked changed to accommodate Smart Contracts and they had to make use of this technology. The outcome can be seen in Figure 38:

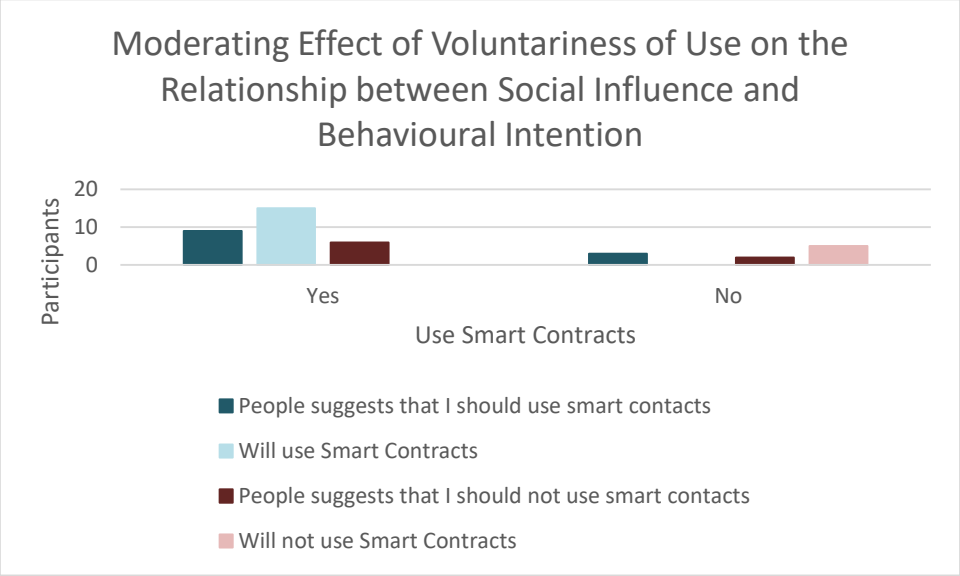


Figure 38: Moderating Effect of Voluntariness of Use on the Relationship between Social Influence and Behavioural Intention

From the data analysed it is clear that social influence has a positive influence on the behavioural intention to use Smart Contracts as suggested by Venkatesh *et al.* (2003).

Furthermore, it is evident that voluntariness of use negatively influenced the use of Smart Contracts. If Smart Contracts are required to be used within the work environment, the behavioural intention to use Smart Contracts will increase. This is evident from the following participant's answer:

Participant 13:

> *"I don't use it because, in the environment in which I work are still reliant on a lot of paperwork. The industry had not evolved as yet to incorporate this type of technology into the process. At present the only reason I will use this technology is if it becomes legislation".*

In this study strong agreement was found regarding the statement that social influence has a positive effect on the behavioural intention to use Smart Contracts (Venkatesh et al., 2003). However, this study differs in terms of the influence of gender and age. This study found that these moderating variables have no significant effect on the relationship between social influence and the behavioural intention to use Smart Contracts. Voluntariness of use negatively influenced the behavioural intention of the participants. The effect of experience could not be tested in this study as the concept of Smart Contracts is relatively new.

4.6. Facilitating Conditions

Facilitating Conditions can be defined as,

> *"The degree to which an individual believes that an organizational and technical infrastructure exists to support use of the system"* (Venkatesh et al., 2003).

Regarding the impact of facilitating conditions related to Smart Contracts on participants Venkatesh *et al.* (2003) suggest that facilitating conditions determine technology use. The influence of the participants' perception regarding the facilitating conditions relating to Smart Contracts and the effect these have on actual use behaviour was analysed to see if age and experience play any part.

To evaluate the influence of age and experience on the relationship between facilitating conditions and the actual use of Smart Contracts, the following questions were asked:

- Do you believe you have/do not have the proper resources and knowledge to make use of Smart Contracts?
- What makes you feel you have/do not have the proper resources and knowledge to make use of Smart Contracts?

The data analysis relating to age and experience is discussed separately.

4.6.1. Age

As seen in Figure 39, participants felt that they could only decide whether or not to use Smart Contracts after they had obtained the proper knowledge to form an opinion of this new technology. Overall the participants expected training and practical examples as expressed succinctly by one participant:

Participant 20:

> *"My expectation is that once the platform is created, training in the professional environment in which it will be used must be undergone".*

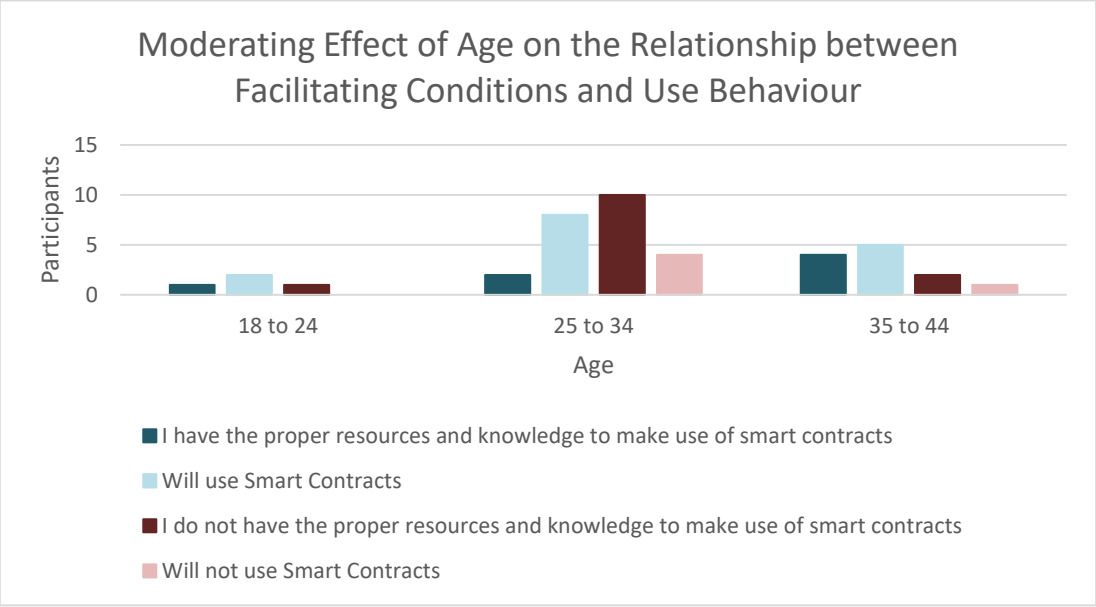


Figure 39: Moderating Effect of Age on the Relationship between Facilitating Conditions and Behavioural Intention

However, it was noted that although participants preferred to be trained in the overall concepts, set-up and use of Smart Contracts, the lack thereof did not influence their use behaviour regarding Smart Contracts. Furthermore, between the ages 35 to 44 there were

more participants that felt that they had the proper resources available than those that felt that they did not.

More participants between the ages of 25 to 34 felt they did not have the proper resources or knowledge. A reason for this can be lack of time as suggested by one participant:

Participant 2:

> *"Time is probably the most obvious resource required, which in my environment there is never enough".*

Another participant explained the issue of time as follows:

Participant 19:

> *"I have not invested time into learning how to use Smart Contracts and how Smart Contracts could benefit me. If I had put in the time and learned to understand everything about Smart Contracts then my opinion might change."*

4.6.2. Experience

Facilitating conditions refer to whether the participants get enough support to be able to learn more about Smart Contracts. Venkatesh *et al.* (2003) suggest that if the experience of a participant using Smart Contracts is agreeable, the participant will familiarise him- or herself with the technology, enhancing knowledge that will eventually reduce dependence on external support. Due to the nature of Smart Contracts being a new technology concept having been discussed only in theory, none of the participants had made use of it. However, the data analysis indicated that there were more participants that, irrespective of the availability to use Smart Contracts, said they would still make use of Smart Contracts if given the choice. This contradicts the statement of Venkatesh *et al.* (2003).

This study lacks evidence to agree or disagree on the statement made about facilitating conditions. It was noted that age has no significant effect on the relationship between performance expectancy and the behavioural intention to use Smart Contracts. The effect of experience could not be tested in this study due to Smart Contracts being relatively new.

4.7. Perceived Trustworthiness

To understand and evaluate the perceived trustworthiness of Smart Contracts, three trust in technology drivers were used as identified by McKnight *et al.*, (2009). These drivers are functionality, helpfulness and reliability.

Perceived functionality refers to the belief that a specific technology has all the necessary features to perform as expected and do what needs to be done (Mayer *et al.*,1995). To measure the functionality expected by the participants, the following question was asked:

- Do Smart Contracts possess features required for your daily tasks and what you want them to do?

Perceived helpfulness that is tested in this study refers to the belief that Smart Contracts provide adequate and responsive help if need be (Mayer et al., 1995). The following question was asked to determine what the expectations of helpfulness of Smart Contracts were:

- Do you feel there is sensible and effective online support that will help you in effectively making use of Smart Contracts?

Reliability, on the other hand, refers to the consistent operation of Smart Contracts (Mayer *et al*, 1995). As Smart Contracts are not yet operational, reliability was measured through the belief relating to the participants' concept of reliability regarding Smart Contracts. To measure perceived reliability the following question was asked:

- What is your belief regarding the reliability of Smart Contracts (i.e. are they dependable, highly consistent, do they behave in a predictable way, will not fail you, will not malfunction)?

All data was categorised and scaled according to the responses given to represent the overall perceived trustworthiness of Smart Contracts. This representation is provided in Figure 40:

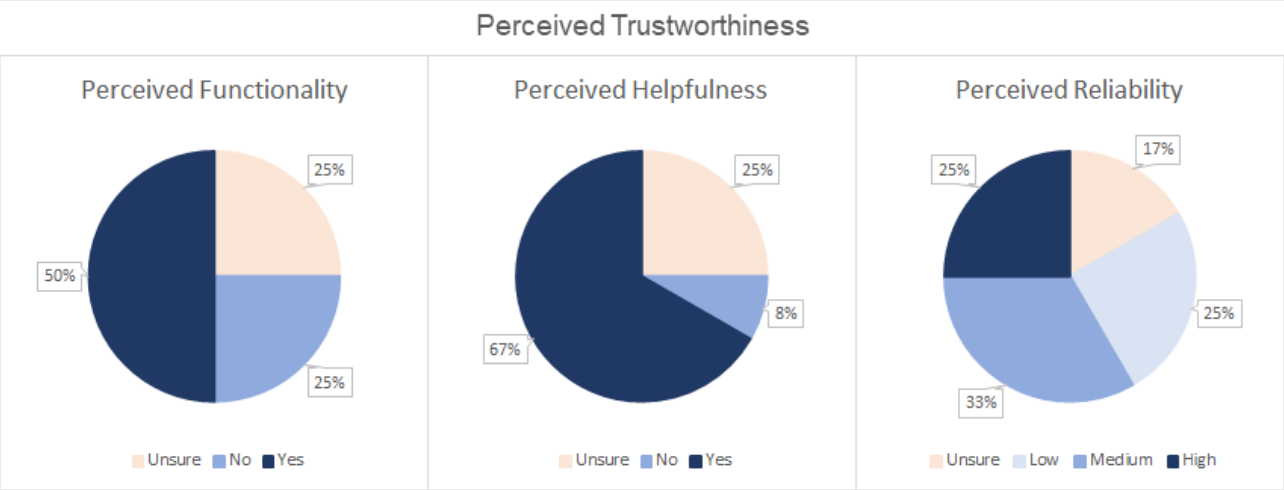


Figure 40: Perceived Trustworthiness of Smart Contracts

In Figure 40 it is evident that overall high perceived functionality (50%) and helpfulness (67%) were associated with Smart Contracts. However, more participants were undecided regarding the perceived reliability of Smart Contracts (33%). Reasons given for the perceived reliability include the fact that due to Smart Contracts being a new and growing technology, the environment and security features have not yet been tested. This is evident from the following response of a participant:

Participant 8:

> *"I believe Smart Contracts have huge potential, however as it is still new, lots of testing is required to ensure it is reliable and safe, thus in theory it is reliable, but because it has not been proved I cannot say with certainty that Smart Contracts are reliable."*

As trustworthiness is measured through the three drivers set out above, overall high trustworthiness can be ascribed to Smart Contracts. The logic for this relationship is that trust in Smart Contracts reflects the beliefs relating to their capability and functionality.

Furthermore, it has been identified that perceived trustworthiness will positively influence perceived security and privacy of a technology. To understand and evaluate the relationship between trustworthiness and security, as well as trustworthiness and privacy, these two concepts are examined separately.

4.7.1. Perceived Security

As seen in the literature study, security is recognised as one of the major barriers in the adoption of a new technology. Perceived security can thus be defined as,

> *"The participants' perception of the degree of protection against threats which create the circumstances, conditions, or events with the potential to cause economic hardship to data or network resources in the form of destruction, disclosure, modification of data, fraud, and abuse"* (Yousafzai et al., 2009).

Perceived security was examined by asking the following question:

- Do you believe Smart Contracts have the ability to secure all personal information?

Through examining perceived trustworthiness it was identified that security plays a major role in the overall adoption as can be seen in the following participant response:

Participant 8:

> *"The security relating to Smart Contracts is yet to be proven, however I still belief Smart Contracts have the potential to be highly secure. Nevertheless, if I constantly hear or read about security breaches I will stop using it".*

This is evident in Figure 41:

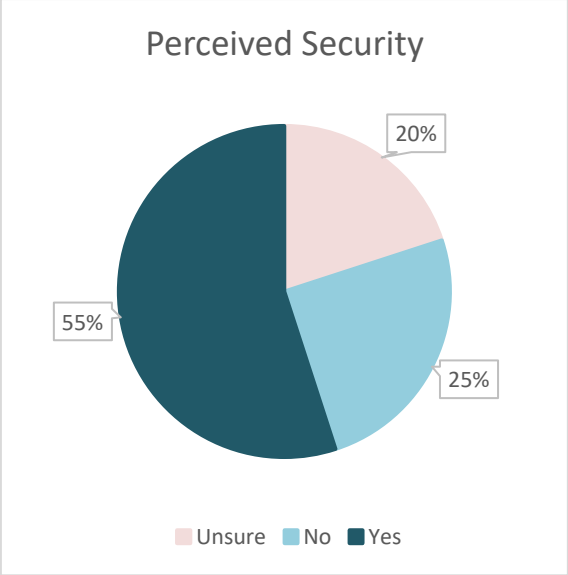


Figure 41: Perceived Security of Smart Contracts

Figure 41 represents the perceived security that is placed in Smart Contracts. It is evident that a small majority of participants (55%) believe Smart Contracts are secure despite the fact that, as stipulated by some participants, in Smart Contracts security issues have not been tested. Participants suggested that constant updates and strengthening of security is imperative as the lack thereof will result in their terminating all use of Smart Contracts:

Participant 9:

> *"I believe Smart Contracts are more secure than paper contracts; however, cybercrime is literally unstoppable and a further consideration should be given to the security of the information."*

4.7.2. Perceived Privacy

Yousafzai *et al.* (2009) define perceived privacy as,

> *"Customers' perception regarding their ability to monitor and control the collection, use, disclosure, and subsequent access of their information".*

This study explored participants' perspective on the privacy of Smart Contracts, based on the answers to the following question:

- Do you believe Smart Contracts have the ability to protect your privacy?

In asking this question it became evident that participants' privacy needs to be ensured as a prerequisite to engaging with Smart Contracts. This aligns with the statement made by Yousafzai *et al.* (2009). This can be seen in Figure 42:

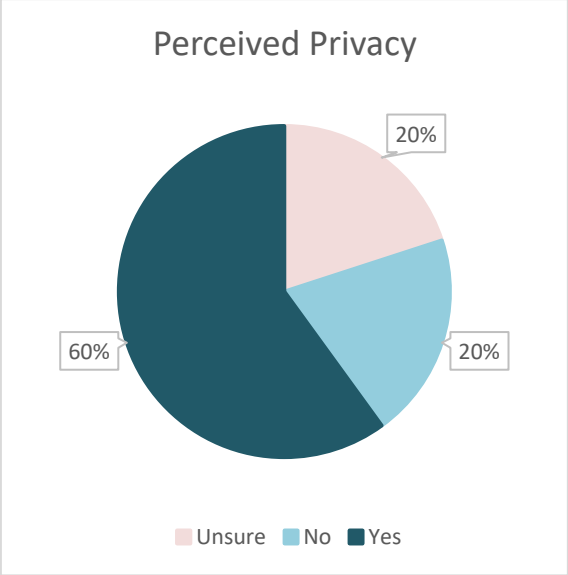


Figure 42: Perceived Privacy of Smart Contracts

It is evident that the majority of participants (60%) perceived Smart Contracts to protect personal information. However, one participant pointed out the following:

Participant 2:

> *"It can capture specific details of transactions without anyone knowing the parties involved. This is how it's intended to be used, but like any technology there might be concerns around how private it actually is."*

4.8. Relationship between Trust, Risk and Behavioural Intention to Use Smart Contracts

In the literature study it was evident that trust in technology plays an essential role in the likelihood of an individual adopting and using the technology. Trust has a negative effect on the perceived risk involved, which in turn affects the behavioural intention of the participants. In the trust model of Yousafzai *et al.*, (2009) it can be seen that the relationship between trust and perceived risk, which is a consequence of trust, influences the behavioural

intention of an individual. To understand this relationship in relation to the adoption of Smart Contracts, trust and perceived risk are examined separately.

4.8.1. Trust

As suggested by Yousafzai *et al.*, (2009) perceived trustworthiness, perceived security and perceived privacy have a direct influence on the participants' trust of Smart Contracts. As has been outlined, participants perceived Smart Contracts to be trustworthy, secure and private. To evaluate whether the statement made aligned with the data gathered, trust was examined separately. This study measured the trust placed in Smart Contracts through asking the following question:

- Would you/Do you trust Smart Contracts?

Trust is conceptualised as "the willingness of a party to be vulnerable to the actions of another party based on the expectation that the other will perform a particular action important to the trustor, irrespective of the ability to monitor or control that other party" (Mayer et al., 1995). The majority of participants trust Smart Contracts (70%) as seen in Figure 43:

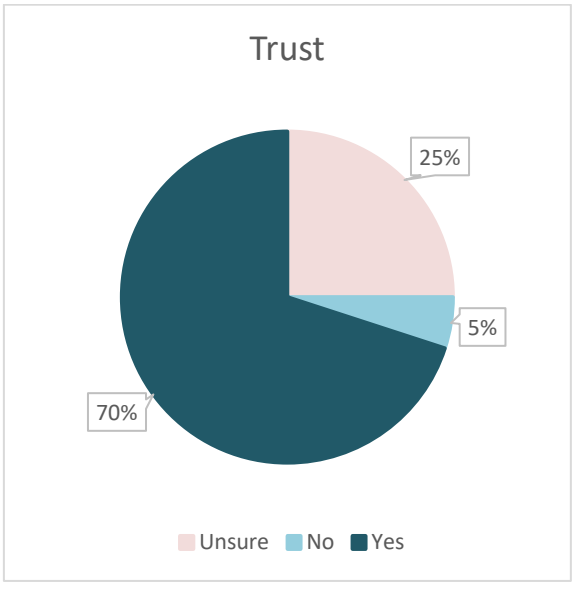


Figure 43: Trust Placed in Smart Contracts

Based on the statement made by Yousafzai *et al.* (2009), it can be noted that due to the participants developing a positive attitude to the trustworthiness, security and privacy placed

in Smart Contracts, an overall trust increase can be expected. This study thus strongly agree on the statements made by Yousafzai *et al.* (2009). To establish trust among peers a guarantee must be provided that their personal information will be safeguarded.

4.8.2. Perceived Risk

According to Yousafzai *et al.* (2009), trust is associated with a low level of perceived risk, which is made up of an individual's perception of security and privacy. From the above analysis it has been found that an overall high level of trust was placed in Smart Contracts due to high privacy and security expectations. It follows that a low risk is associated with Smart Contracts. To examine this statement, risk placed in traditional contracts was measured against the risk placed in Smart Contracts. The following question was asked to evaluate perceived risk:

- Do you believe that using Smart Contracts involves more risk when compared to traditional contracts?

In Figure 44 it is evident that only half of the participants (50%) expected a lower level of risk when using Smart Contracts compared to traditional contracts.

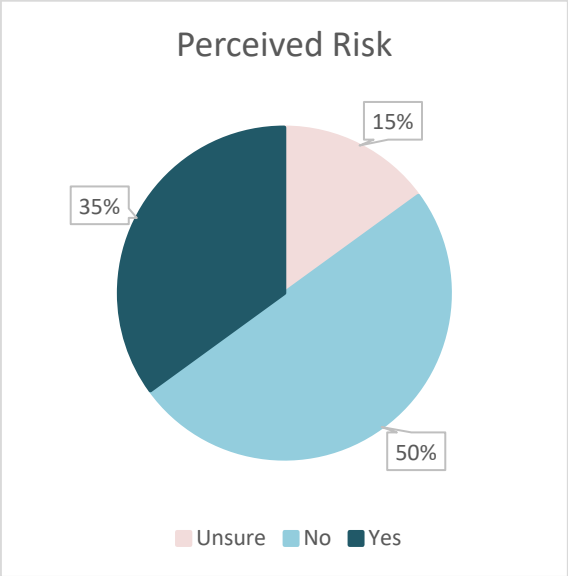


Figure 44: Perceived Risk of Smart Contracts

This study strongly agrees on the statement made by Yousafzai *et al.* (2009). This suggests that the higher a participant's trust regarding a particular technology is, the lower he or she

will perceive the risk to be associated with this technology, which will ultimately lead to a positive behavioural intention.

4.8.3. Trust, Risk and Behavioural Intention

As mentioned earlier, the overall trust placed in a technology ultimately influences the behavioural intention of an individual. Also, trust negatively influences the perceived risk that is placed in technology, which in turn affects an individual's behavioural intention. To understand the relationship between these three variables − trust, perceived risk and behavioural intention to use Smart Contracts − the outcomes of trust and perceived risk were aligned with the outcome of the behavioural intention of the participants. The results are shown in Figure 45:

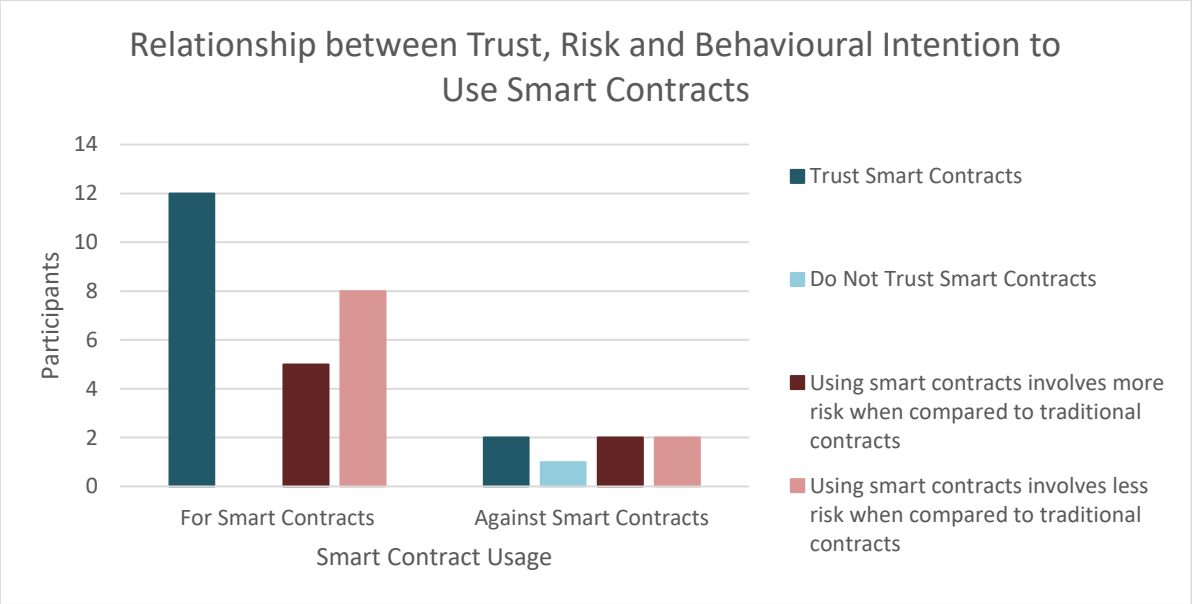


Figure 45: Relationship between Trust, Risk and Behavioural Intention to Use Smart Contracts

At first glance trust has a major effect on the willingness to use Smart Contracts as suggested in the seminal findings on trust research. None of the participants that do not trust Smart Contracts was willing to use Smart Contracts; however, it was noticed that perceived risk did not have an effect on the behavioural intention to use Smart Contracts.

After analysing why participants were still willing to use Smart Contracts even though the risk associated with their use was higher than for traditional contracts, it was determined that this was due to their trust placed in Smart Contracts.

Trust was found to have a negative effect on perceive risk; however, trust has a higher influence on behavioural intention to use compared to perceived risk. This is evident from one participant who said,

Participant 3:

> *"There is generally a learning curve when it comes to the implementation of a new technology, so to expect the public to use Smart Contracts is more risky. However, Smart Contracts do not have the risks of traditional contracts due to fraudulent actions being minimised, which is why the risk involved with Smart Contracts will decrease as it matures and becomes more mainstream. Thus I trust this new technology."*

4.9. Behavioural Intention

All variables, including the key concepts and moderating variables regarding trust and the adoption of technology model used in this study were tested before the overall behavioural intention of the participants to use Smart Contracts was determined. In the revised UTAUT model, the relationships between the key concepts and behavioural intention were examined with regard to the moderating variables. From there the trust in technology model was used to determine the influence of the key variables on the overall trust placed in Smart Contracts, which contributes to the perceived risk and the behavioural intention to use. This section discusses the overall behavioural intention of all the participants and results in the main findings of this study.

To gain insight into the intention of a participant to behave in a certain way, his or her belief must first be understood. This is suggested by Ajzen and Fishbein (1980) who state that beliefs lead to attitude, which leads to behavioural intention. The beliefs of the participants were measured through the analysis of the key concepts and moderating variables of the trust model (Yousafzai et al., 2009) with trust in technology drivers and the revised UTAUT model (Alharbi, 2014).

These key concepts from the Trust and Adoption of Technology Model used in this study include performance expectancy, effort expectancy, social influence, facilitating conditions, perceived trustworthiness, perceived security, perceived privacy, and trust and perceived

risk. From this analysis it was found that performance expectancy, effort expectancy and social influence have a positive effect on the behavioural intention of participants. However, this study has found that gender, age and experience had no significant effect on the relationship between the behavioural intention to use Smart Contracts and the respective key concepts. Voluntariness of use was found to have a negative influence on the behavioural intention of the participants regarding social influence. This study provides evidence that facilitating conditions have a positive effect on the behavioural intention of the participants.

When trust is placed in a technology it will lead to deeper exploration, adoption and repeated use as noted in this study. However, for a participant to trust Smart Contracts, it was found that perceived trustworthiness, security and privacy have a positive influence on the trust placed in Smart Contracts. Trust was found to have a higher influence on the behavioural intention to use compared to perceived risk even though perceived risk was found to have a negative influence on the behavioural intention to use Smart Contracts. Trust was found to have a positive influence on behavioural intention and a negative effect on the perceived risk of the participants.

The dependent variable from both the models identified is the behavioural intention to use Smart Contracts. This was measured and analysed, and implemented in the development of a set of guidelines for implementing Smart Contracts. These guidelines interpret the trust and adoption standards found in this study. The following section outlines these guidelines.

4.10. Trust and Adoption Guidelines for the Implementation of Smart Contracts

This study has exposed a need for formal guidelines to build, maintain and manage an organisation or individual's trust and overall adoption of technology in general and Smart Contracts in particular. The determinants of trust and the adoption of Smart Contracts were identified. The Trust and Adoption of Technology Model used in this study leads to the understanding of how an individual's trust in technology influences his or her behavioural intention and how the overall acceptance and adoption of technology can be achieved. Through this understanding the researcher has been enabled to offer a set of guidelines for

the implementation of Smart Contracts. These guidelines are outlined and discussed in the next section.

Each standard identified is accompanied by a practical guideline to provide recommended procedures for the implementation of Smart Contracts. It is, however, important to understand that the actual use behaviour of potential adopters might deviate significantly, depending on the market used.

4.10.1. Progress Appetite for Adoption through Trust

Trust is recognised as a major barrier when implementing Smart Contracts. The purpose of building trust is ultimately to direct the behavioural intention to the adoption of Smart Contracts. At the heart of adoption is trust; Smart Contracts must be trustworthy, secure, private and free of risk.

The following topics should guide organisations or an individual to build trust when implementing Smart Contracts:

1. Establish your audience:

Step 1: Establish your audience
• Have all the relevant internal and external stakeholders been identified? • Have the roles and responsibilities been established? • Are the intended goal and expectations clear?

   The first and most important consideration is to establish the intended audience. This should ultimately guide the entire adoption outcome. The intended goal for the use of Smart Contracts depends on the selected audience.

2. Shape the overall trustworthiness of Smart Contracts:

Step 2: Shape the overall trustworthiness of Smart Contracts
• Has the functionality of Smart Contracts been explained? • Is there a full, comprehensive set of explanatory notes (including the drawbacks and benefits of using Smart Contracts)? • Is there a good understanding of the intention of Smart Contracts?

Understanding the functionality and providing effective support that will assist in the use of Smart Contracts is of the utmost importance. These considerations influence potential adopters through providing knowledge of Smart Contracts to form an attitude to Smart Contracts. Knowledge influences attitude, which leads to the decision whether to use Smart Contracts or not.

An understanding of the drawbacks and benefits relating to Smart Contracts must also be discussed, as it should propagate a discussion on the intention for implementing Smart Contracts.

3. Discuss Security of Smart Contracts:

Step 3: Discuss Security of Smart Contracts

- Have all security aspects of the current organisational methods and of Smart Contracts been identified and documented?
- Have mitigation actions and owners been clearly identified?

All security aspects of the current organisational methods and of Smart Contracts, based on the specific audience and context, should be introduced. For the Syndicated Loan Market these securities may include the management of the loan life cycle, KYC verification, the review of due diligence, the distribution of payments, etc. These guidelines are intended to provide a compact and holistic overview of the most important security measures to safeguard an organisation. Understanding these security measures relating to the implementation of Smart Contracts should result in the decrease of security concerns.

4. Discuss the Privacy of Smart Contracts:

Step 4: Discuss the Privacy of Smart Contracts

- Have all privacy aspects of the current organisational methods and of Smart Contracts been identified and documented?
- Have owners been identified?

All aspects relating to the privacy of Smart Contracts must be explained to the intended audience as the audience influences the discussion and level of detail.

Understanding what privacy is, or whether there are any privacy issues will impact the adoption of Smart Contracts. For the Syndicated Loan Market the most important aspect is the implication of making KYC information more public.

5. Risk management:

Step 5: Risk Management

- Have all risks been identified?
- Is it a risk or an opportunity?
- Have mitigation actions and owners been clearly identified?

Addressing the risks identified in accordance with the right audience is of the utmost importance. It is important to measure all threats that have been identified for existing methods and Smart Contracts, and determine whether each is in fact a risk or an opportunity. It is therefore important to discuss all the identified risks.

4.10.2. Acceptance of Change

Despite trust being a major barrier in the adoption of Smart Contracts, there are several factors that also play an integral role. The proposed guidelines are considered based on these factors.

At their core, these guidelines include guidance for the acceptance of Smart Contracts and the behaviour of an individual:

1. Performance

Step 1: Performance

- Is there an understanding of how Smart Contracts will improve the overall performance of the organisation and its day-to-day procedures?

Smart Contracts offer a solution for automated processes, procedures and operations with improved information accuracy, achieved through increasing the speed of business operations. Understanding how Smart Contracts will improve the overall performance of an organisation and particular the day-to-day procedures of each employer will allow for a smooth transition in the acceptance of Smart Contracts.

2. Effort

Step 2: Effort

- Is there an understanding of how Smart Contracts will improve the competitiveness of the entire organisation?

How competitive an organisation or individuals are effects their success. Thus, the more efficient an organisation or individual is, the more competitive it will be. Explaining how Smart Contracts will result in the automation of tasks and the streamlining of business operations will result in the understanding of the overall work effort that will definitely boost efficiency.

3. Social Influence

Step 3: Social Influence

- Is there an understanding of the design and intention of Smart Contracts?

Smart Contracts have not yet gained the much needed attention due to an overall lack of understanding the design and intention of distributed ledger technology application. Due to a lack of understanding there is a negative attitude to this new technology. This has led to the design of the guidelines set out in this study. These guidelines endeavour to prevent this lack of understanding to influence an organisation or individuals' belief about Smart Contracts.

4. Facilitating Conditions

Step 4: Facilitating Conditions

- Does the infrastructure support the use of Smart Contracts?
- Has technical support been identified and allocated?
- Has system support been identified and allocated?

Insuring that an organisation or individual's technical infrastructure supports the use of Smart Contracts will impact system usage. Smart Contracts' nature is highly reliable on the network within which they operate; thus the availability of technical resources to enable use is highly important. System and technical support within an organisation for assistance must also be ensured.

4.10.3. Adoption of Smart Contracts

Adoption of a new technology ultimately depends on the trust that is placed in the new technology and its acceptance. The behavioural intention and the actual use of technology will grow from trust, acceptance and adoption of the technology. From the 20 interviews conducted an adoption approach was tailored for organisations or an individual who wishes to implement Smart Contracts. The recommendations conceptualised in this study emphasise the trust, acceptance and adoption of Smart Contracts. They range from shaping trustworthiness of Smart Contracts to enhancing the performance and effort of business operations and processes.

However, adopting Smart Contracts will significantly change the entire organisational streamlining and will require careful planning and strategy. To adopt a technology, the following factors are of paramount importance:

1. Strategic Alignment

Step 1: Strategic Alignment
• Has a strategic plan been established? • Have the goals and objectives been identified?

2. Execution Plan:

Step 2: Execution Plan
• Has an execution plan been established?

It goes without saying that for a project like implementing Smart Contracts, the strategy is of great importance. The strategy and the execution plan go hand-in-hand. This includes the communication of the enhancements that will take place, as well as the tracking and reporting structures that have to be followed.

4.11. Conclusion

The aim of this chapter was to explore the beliefs of the public with regard to Smart Contracts. This understanding includes the acceptance, adoption and trust of Smart Contracts, which were tested through merging the trust model (Yousafzai et al., 2009) with trust in technology drivers, together with the revised UTAUT model (Alharbi, 2014). From

this, drivers for the behavioural intention of the participants were uncovered, which led to the development of guidelines that can be used when implementing Smart Contracts.

These guidelines are not intended to be a set list of criteria, but rather general guidelines to ensure that all parties are ready to implement Smart Contracts. It is impossible to impose a single set of guidelines to build trust as everyone has an own concept of trust.

5. Findings, Conclusions and Recommendations for Future Research

The aim of this chapter is to present a summarised view of the main findings and contribution of the study and conclude this study as seen in Figure 46. From this study recommendations that arose for future research are listed together with the delineation and limitations.

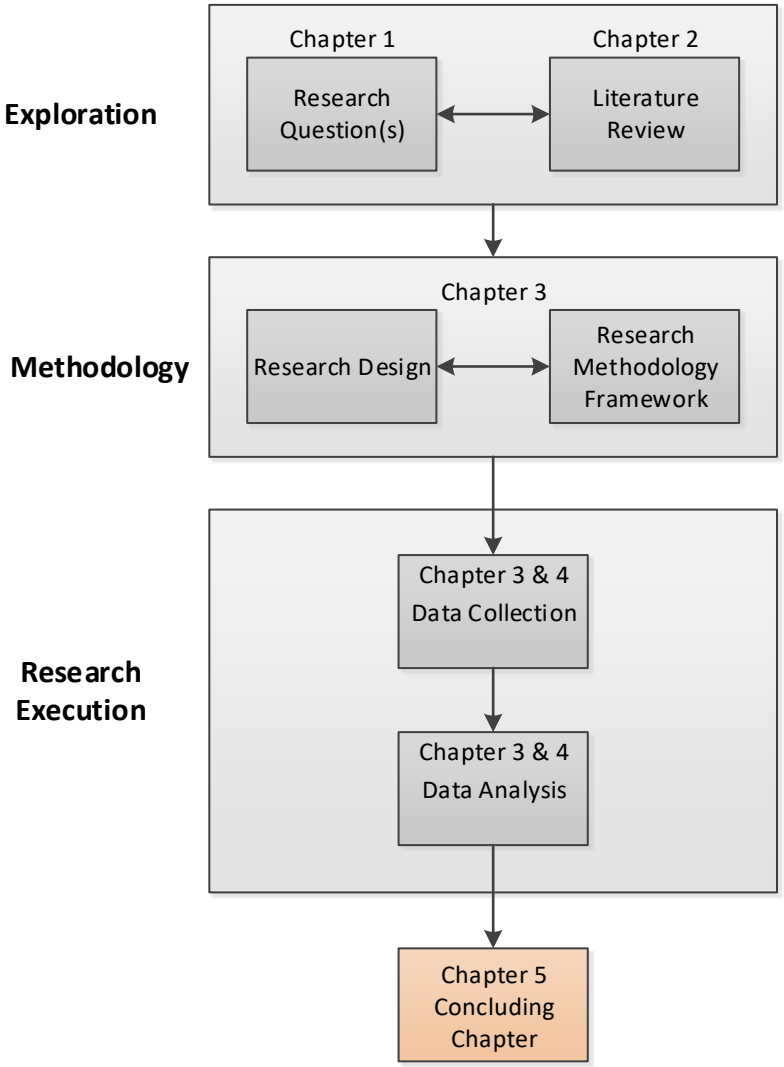


Figure 46: Dissertation Layout focussing on the Concluding Chapter (Bhattacherjee, 2012)

The core concern this study focused on and analysed was whether Smart Contracts are a trustworthy technology to adopt and implement. This study focused on critical elements that shape the Syndicated Loan Market to trust and adopt Smart Contracts. This chapter outlines the key findings, draws conclusions and makes recommendations for future research

5.1. Main Findings

The focus of this study is the implication of the implementation of Smart Contracts on the Syndicated Loan Market; it outlines the influence of trust on the adoption of technology. Three research questions as stated in Chapter 1 have been answered

1. What implications will the implementation of Smart Contracts have on loan syndication?
2. What factors are relevant when Smart Contracts are implemented in the Syndicated Loan Market?
3. What factors should the Capital Market consider when implementing Smart Contracts in general and the Syndicated Loan Market in particular?

The first research question was covered through a review of existing literature in Chapter 2. From the literature it was noted that, specifically in the Syndicated Loan Market, Smart Contracts have the potential to minimise counterparty risk, reduce settlement times, improve contractual term performance and increase transparency for regulatory reporting. However, it was noted that the implementation of Smart Contracts does not guarantee success. Thus, an overall theoretical insight was required to better understand the barriers that influence the successful implementation of Smart Contracts by organisations or an individual.

This led to the answering of the second research question. Trust-related factors and the effect that trust has on the adoption of technology were identified. A single, unified approach to building trust by organisations and/or individuals seeking to make use of Smart Contracts has been provided. This study introduces the Trust and Adoption of Technology Model adopted from the trust model (Yousafzai et al., 2009), using the trust in technology drivers (H. McKnight et al., 2009), together with the revised UTAUT model (Alharbi, 2014).

The influence of relevant factors on the practical implementation of Smart Contracts has been outlined; this resulted in identifying contributing factors relating to the general implementation of Smart Contracts. In the literature study it was evident that behavioural intention plays an integral role in the success of implementing Smart Contracts. Understanding the behavioural intention of an organisation or an individual serves as a focal point in formalising drivers to trust and adopting Smart Contracts.

An analysis was conducted on data obtained from 20 interviews conducted with participants to determine the impact of trust on the adoption of Smart Contracts. This allowed the researcher to propose guidelines for building trust. Organisations or an individual that wants to implement Smart Contracts should consider a number of factors, such as performance expectancy, effort expectancy, social influence, facilitating conditions, and the trustworthiness of Smart Contracts, privacy, security and identifying risks and challenges. Once these factors have been considered, an organisation or an individual can begin developing a detailed implementation roadmap.

5.2. Main Contribution

The main contribution of this study is the guidelines that can be followed to implement Smart Contracts, specifically in the Syndicated Loan Market as suggested in Chapter 1. To formulate these guidelines the researcher executed a study using the Trust and Adoption of Technology model introduced in this study. All factors specific to Smart Contracts were analysed. The conclusions drawn from the analysis are presented next:

- Research exists that explores trust through technology. It was found that Smart Contracts offer trust by means of a single source of truth by eliminating trust placed in people. This shifts the focus to building trust through cryptographic guarantees that ensure security and privacy. This was found to be an extremely useful concept to implement in the Syndicated Loan Market.
- By implementing Smart Contracts in the Syndicated Loan Market counterparty risk will be minimised, settlement times will be reduced and contractual term performance and transparency for regulatory reporting will be improved. However, it was noted that the success of Smart Contracts does not lie in the trust offered through Smart Contracts but rather the trust placed in Smart Contracts.
- Although research exists that explores trust through technology, little or no research has been conducted regarding the trust and adoption of Smart Contracts. Consequently the Trust and Adoption of Technology Model that merged the revised UTAUT model and the trust model (with trust in technology drivers) was developed.
- The dependent variable identified in both models was identified as the behavioural intention to use Smart Contracts.
- Eight factors − performance expectancy, effort expectancy, social influence, facilitating conditions, trustworthiness, privacy, security and risk − were identified that

significantly influence the behavioural intention of an organisation or an individual in trusting and adopting Smart Contracts. Of these factors performance expectancy, effort expectancy and social influence had a positive influence on the behavioural intention to use Smart Contracts.

- The findings of this study suggest that the moderating factors in the revised UTAUT model −gender, age and experience − do not have an influence on the behavioural intention of the participants. However, voluntariness of use has a negative influence on the social influence of the participants. This can be ascribed to the work environment. If Smart Contracts are to be implemented in an organisation, participants will be obliged to learn how to use Smart Contracts.
- The three constructs in the trust model −trustworthiness, security and privacy − have been found to have a positive influence on the trust placed in Smart Contracts. The overall trust placed in Smart Contracts has a positive influence on the behavioural intention and a negative effect on the perceived risk of the participants. Perceived risk has been found to have a negative influence on the behavioural intention to use Smart Contracts.

In understanding the factors that influence the trust and adoption of technology, the researcher was able to formulate guidelines for organisations to use when implementing Smart Contracts. These guidelines are set out in Table 4:

Table 4: Trust and Adoption Guidelines for the Implementation of Smart Contracts

Trust
Step 1: Establish your audience • Have all the relevant internal and external stakeholders been identified? • Have the roles and responsibilities been established? • Are the intended goal and expectations clear?
Step 2: Shape the overall trustworthiness of Smart Contracts • Has the functionality of Smart Contracts been explained? • Is there a full, comprehensive set of explanatory notes (including the drawbacks and benefits of using Smart Contracts)? • Is there a good understanding of the intention of Smart Contracts?
Step 3: Discuss Security of Smart Contracts • Have all security aspects of the current organisational methods and of Smart Contracts been identified and documented? • Have mitigation actions and owners been clearly identified?
Step 4: Discuss the Privacy of Smart Contracts • Have all privacy aspects of the current organisational methods and of Smart Contracts been identified and documented? • Have owners been clearly identified?
Step 5: Risk Management • Have all risks been identified? • Is it a risk or an opportunity? • Have mitigation actions and owners been clearly identified?

Accept
Step 1: Performance • Is there an understanding of how Smart Contracts will improve the overall performance of the organisation and its day-to-day procedures?
Step 2: Effort • Is there an understanding of how Smart Contracts will improve the competitiveness the entire organisation?
Step 3: Social Influence • Is there an understanding of the design and intention of Smart Contracts?
Step 4: Facilitating Conditions • Does the infrastructure support the use of Smart Contracts? • Has technical support been identified and allocated? • Has system support been identified and allocated?

Adopt
Step 1: Strategic Alignment • Has strategic alignment been executed?
Step 2: Execution Plan • Has an execution plan been established?

Given these findings, it can be concluded that the research outcomes of this study are instrumental in understanding how Smart Contracts impact the Syndicated Loans Market and in perceiving Smart Contracts as a trustworthy technology. Through understanding the factors that influence trust and the adoption of technology on behavioural intentions, markets and institutions can develop operational strategies that can foster positive acceptance and transition. This study provides a theoretical and practical contribution to the body of knowledge on the topic researched

5.3. Recommendations for Future Research

The main question that emerged from this study is not whether a revolution is imminent; it is rather what can be done to ensure its success. The revolution is about business self. Recommendations for future are the following:

1. Further investigation of the factors identified to influence trust and adoption with regard to the actual implementation of Smart Contracts.
2. Further investigation of the factors identified to influence trust and adoption with regard to other technology applications.
3. An in-depth investigation to explore the levels of involvement in the delivery of Smart Contracts
4. Further investigation of a multi-motive Information Systems acceptance model.

5.4. Delineation and Limitations

The concept of distributed ledger is still relatively new. Although it has attracted much attention, it is still in its early developing stages. There are currently many speculations of how the distributed ledger technology in general and Smart Contracts in particular can impact the financial industry, but no hard evidence has been tabled. Consequently not many academic papers on the execution and use of Smart Contracts are available. Therefore this study had to rely on the reports of FinTech companies to explore the impact of Smart Contracts on the Syndicated Loan Market.

The field of innovative technologies, specifically the concept of distributed technologies, is evolving rapidly; this study scrutinised literature published up to 2018. To isolate the core focus of this study, the researcher focused on current literature relating to one distributed ledger technology application, namely Smart Contracts and its impact on the Syndicated

Loan Market specifically. Furthermore, it investigated whether Smart Contracts are a trustworthy application to be implemented in the Syndicated Loan Market.

Due to the limited timeframe for this study, research was narrowed down to one methodology, the Trust and Adoption of Technology Model (developed from the revised UTAUT model and the trust model together with the trust in technology drivers). This model was used to determine what barriers impact the trust and adoption of Smart Contracts within the Syndicated Loan Market.

Because this study examines only the trust in Smart Contracts, the results cannot be generalised to other distributed ledger technology applications. Future research should validate the model and findings in the actual implementation of Smart Contracts as well as of other distributed ledger technology applications.

5.5. Conclusion

While there are still many questions that have to be answered, many of which arose from this study, it has been found that building trust will lead to a higher likelihood to adopt a technology. This research resulted in the Trust and Adoption of Technology Model. Trusting in a technology has been shown to result in a deeper exploration, adoption, and repeated use. Through this understanding this study provides guidelines to build an environment enabling this trust and adoption of Smart Contracts.

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7. Appendices

Appendix A

Interview Instruction and Permission

1. Check to see if the recording device is working.
2. Make sure the participant understands the questions being asked.
3. The researcher introduces herself.
4. The researcher describes the purpose, content and likely duration of the interview shortly.
5. The interview will last about 30 to 60 minutes.
6. Ask permission to record the interview.
7. Does the participant have any questions? If not, start the interview.

Note the date and the starting time.

Start the recording device.

Appendix B

Interview Layout

Revised UTAUT	
Background Information	What is your age?
	What is your gender?
	Do you work in a computer science field/environment? If not, what field do you work in?
	How many years of experience do you have in your profession?
	Are you familiar with distributed ledger technology (For example, Blockchain)?
	In your opinion, what can distributed ledger be used for?
	Are you familiar with the concept of Smart Contracts? If so, what is your understanding thereof?
	Would you/Do you use distributed ledger technology?
	Why won't/don't you use distributed ledger technology?
	Why would/do you use distributed ledger technology?
	Would you/Do you use Smart Contracts?
	Why won't/don't you use Smart Contracts?
	Why would/do you use Smart Contracts?
Performance Expectancy	Will using Smart Contracts benefit you in your personal or professional life? If so, how?
	When using/having to use Smart Contracts, what expectations do you have (E.g. increased productivity, accomplish tasks more quickly, improve performance, etc.)?
	Will performance expectancy influence your intention to use Smart Contracts?
Effort Expectancy (Ease of use)	What are your expectations of the effort needed when using Smart Contracts (E.g. learning to operate within this new environment, effort needed to use this new technology, etc.)?
	Will the effort expectancy influence your intention to use Smart Contracts?
Social Influence	What do your colleagues and/or friends think of the use of Smart Contracts?
	Does the opinion of your colleagues and/or friends influence your intention to use Smart Contracts?
Facilitating Conditions (technical resources	Do you believe you have/do not have the proper resources and knowledge to make use of Smart Contracts?

and organisational support)	What makes you feel you have/do not have the proper resources and knowledge to make use of Smart Contracts?	
	Would you still use Smart Contracts without the proper resources and knowledge?	
Behavioural Intention	How do you view your future use of Smart Contracts?	
	Would you recommend Smart Contracts to other organisations?	
Trust Model		
Perceived Trustworthiness	**Reliability**	What is your belief about the reliability of Smart Contracts (i.e. dependable, highly consistent, behave in a predictable way, will not fail you, will not malfunction)?
	Functionality	Do Smart Contracts possess features required for your daily tasks and what you want them to do?
	Helpfulness	Do you feel there are sensible and effective online media that will help you in making effective use of Smart Contracts?
	Do you perceive Smart Contracts to be trustworthy?	
Perceived Security	Do you believe Smart Contracts have the ability to secure all personal information?	
	Will matters on security influence you in using Smart Contracts?	
Perceived Privacy	Do you believe Smart Contracts have the ability to protect your privacy?	
	Will matters of privacy influence you in using Smart Contracts?	
Trust	Would you/Do you trust Smart Contracts?	
Perceived Risk	Do you believe that using Smart Contracts involves more risk when compared to traditional contracts?	

Appendix C

Informed Consent Form

Title of the study:
Implementing Smart Contracts in the Syndicated Loan Market: An Issue of Adoption

Purpose of the study:
To examine the possible impact of distributed ledger technology and what effect trust and adoption will have on the implementation of Smart Contracts within the Syndicated Loan Market.

Description of the study:
A set of interview questions will be asked to a group of professionals (with or without distributed ledger technology knowledge).

Data that will be gathered:
Voice recordings of the sessions of the participants will be made.

Research conditions:

- Individual interviews will be conducted with the participants.
- The participants will remain anonymous through this study.
- The voice recordings will be kept strictly confidential.

Time required:
The interview session will last approximately 60 minutes.

Contact details of the researcher:
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If you wish to receive the final findings, please provide your email address. If not, continue to the next page.

Thank you for your participation in this study.

I (name) _____hereby declare that I am aware of the above information and that I can, at any time, decide to withdraw from this study.

The nature, objective, possible safety and health implications have been explained to me and I understand them.

I understand my right to choose whether to participate in the project and that the information furnished will be handled confidentially. I am aware that the results of the investigation may be used for the purposes of publication.

Upon signature of this form, the participant will be provided with a copy.

Signature	Place	Date
Witness	Place	Date
Researcher	Place	Date