THE RISE OF BLOCKCHAIN: AN ANALYSIS OF THE ENFORCEABILITY OF BLOCKCHAIN SMART CONTRACTS

BY

MS. BOONYAORN NA POMBEJRA

A THESIS SUBMITTED IN PARTIAL FULFILLMENT
OF THE REQUIREMENTS FOR THE DEGREE OF
MASTER OF LAWS IN BUSINESS LAWS
(ENGLISH PROGRAM)
FACULTY OF LAW
THAMMASAT UNIVERSITY
ACADEMIC YEAR 2016

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THESIS

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ENTITLED

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was approved as partial fulfillment of the requirements for the degree of Master of Laws

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ABSTRACT

The thesis analyzes legal issues associated with the application of existing Thai law provisions to so-called "smart contracts", defined in the paper as 'agreements existing in the form of software code implemented on the Blockchain platform, which ensures the autonomy and self-executive nature of smart contract terms based on a predetermined set of factors'.

The thesis outlines the particularities of Blockchain as the underlying technology of smart contracts. The main characteristics of smart contracts are described, together with an analysis of the ways in which "smart contracts" differ from other prevailing and more common forms of electronic contracts.

The thesis explores the existing Thai legislative framework and the extent to which it can accommodate blockchain smart contracts in the area of contract formation and legal formality and written evidence requirement. Specifically, this thesis focuses on the Electronic Transaction Act B.E. 2544 (2001) and its amendment B.E.2551 (2008) as a specific law for electronic communication and the Thai Civil Commercial Code as general law of the formation of contract.

The thesis provides comparative studies on enforceability of smart contracts under two different jurisdictions, namely the Commonwealth of Australia and the

Republic of South Africa with an aim to analyze and evaluate the existing legislations and developments of those two legal systems, and their impact on facilitating blockchain smart contracts, with an emphasis on contract formation and legal formality and written evidence requirements.

The thesis provides a comparative analysis between the relevant areas of Thai law and two jurisdictions stated above, in particular those governing the formation of a contract. Through this analysis, the feasibility of the utilization and execution of smart contracts under the current Thai legal system are examined.

The concluding section sets out the core question as to whether a lack of certain rules or mechanism to accommodate the implementation of this technology may leave uncertainty regarding the validity and enforceability of smart contracts under Thai law. The writer suggests that Thai ETA will have to be amended by comparing with laws and regulations of foreign jurisdictions to facilitate the full implementation of smart contract in Thailand. The principles that should be incorporated in this specific law are: (1) the default rule to determine the time of dispatch and receipt of electronic communication; (2) the use of an automated message system; and (3) the relevant competent authorities should be compulsory to make available systems in accordance with the law for fulfilling the required formality for the contract to be registered with the competent authority electronically.

Keywords: Blockchain; Smart contract; Formation of Contract; Formality requirement

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Boonyaorn Na Pombejra

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LIST OF ABBREVIATIONS

Symbols/Abbreviation	Terms
"Australia"	Commonwealth of Australia
"Australian ETA"	Electronic Transactions Amendment Act 2011
"Bill"	Draft Electronic Transaction Act (No…) B.E.....
"BOT"	Bank of Thailand
"CCC"	Thai Civil and Commercial Code
"ECTA"	Electronic Communications and Transactions Act, Act 25 of 2002 (South Africa)
"Thai ETA"	Electronic Transaction Act B.E. 2544 (2001) and its amendment B.E.2551 (2008)
"South Africa"	Republic of South Africa
"Royal Decree"	The Royal Decree on the Rules and Procedures of Electronic Transactions in the Public Sector B.E. 2549

CHAPTER 1
INTRODUCTION

1.1 Background and problem

There has been an eruption of interest in 'smart contracts' and their underlying blockchain technology over the past few years, with software developers, financial institutions, securities and exchange commissions, regulators, and law firms rushing in to explore smart contract design and blockchain development. The hype over smart contracts has resulted in a proliferation of headlines such as 'Blockchain "smart contracts" to disrupt lawyers'[1], and speculation that blockchain smart contract technology 'threatens thousands of legal jobs and lawyers' role in intermediating commercial negotiations and disputes'[2].

Blockchain refers to new database technology where information is shared across a network of users who each hold a full and updated copy of the records. While the underlying technology has been around for a while, the first widely known application of blockchain technology in recent times was the open source code used for creation of the digital currency known as 'Bitcoin' in the original bitcoin white paper[3]. Blockchain, in its essence, is a reliable database, by virtue of the way information is stored, replicated and updated on a distributed ledger, making it trustworthy and transparent. One of the appeals of the blockchain mechanisms is that the technology is not ultimately controlled by a single, centralized party. Instead, a blockchain functions through "nodes", which comprise of a network of participating computers. The nodes

[1]James Eyers, 'Blockchain 'smart contracts' to disrupt lawyers' *The Australian Financial Review Magazine* (Sydney, 20 May 2016) <http://www.afr.com/technology/blockchain-smart-contracts-to-disrupt-lawyers-20160529-gp6f5e> accessed 15 January 2017

[2]James Eyers and Misa Han, 'Lawyers prepare for 'driverless M&A' as smart contract era dawns' *The Australian Financial Review Magazine* (Sydney, 20 June 2016) <http://www.afr.com/technology/lawyers-prepare-for-driverless-ma-as-smart-contract-era-dawns-20160616-gpknyz#ixzz4VmOIeScZ>accessed 15 January 2017

[3]Satoshi Nakamoto, 'Bitcoin: A Peer-to-Peer Electronic Cash System' < https://bitcoin.org/bitcoin.pdf> accessed 15 January 2017

act as the means that store, update, and secure the publicly transacted data. Each node keeps a full copy of the blockchain database, and each copy is kept in synchronization with the other nodes by a system of cryptographically-enforced rules called a consensus algorithm. Significantly, blockchains are immutable databases, which means that as soon as the information is genuinely added, it can never be removed. Each update to the blockchain is secured by a cryptographic process known as a hash function, which allows the network to immediately detect and reject any attempt to distribute an edited copy of the database.[4] With its key performance characteristics, i.e. transparency, time-stamped, immutability, irrevocability and programmability, blockchain could have extensive effects in countless applications. Significantly, blockchain has the capability of disrupting commercial transactions and institutions due to its ability to facilitate exchange of fully digital assets without the need for a trusted intermediary.[5]

The current blockchain ledger technology is able to create and allow decentralized transactions, as well as smart transactions, i.e. automated and computable transactions, and smart contracts that possess the ability to self-execute, in order to accommodate and benefit the smart transactions. A 'smart contract' is a digitally signed, computable and self-executed agreement between two or more parties.[6] Smart contracts are an application of the blockchain technology, referring to computer codes which verify and execute the terms of a contract by an electronic agent, removing the need for humans to monitor compliance and enforcement.[7]Details of smart contracts will be further described in Chapter 2.

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[4]Josh Stark, "How Close Are Smart Contracts to Impacting Real-World Law?" April 11, 2016 CoinDesk <http://www.coindesk.com/blockchain-smarts-contracts-real-world-law/> accessed 13 December 2016

[5]Francoiss Zaninotto, 'the Blockchain Explained to Web Developers, Part 1: The Theory' (28 April 2016) <http://marmelab.com/blog/2016/04/28/blockchain-for-web-developers-the-theory.html.> accessed 22 December 2016

[6]Alan Morrison, 'The end game for public and private blockchains isn't just digital currency—it's digital business flows.' (PWC 2016) <http://www.pwc.com/us/en/technology-forecast/blockchain/digital-business.html> accessed 12 December 2016

[7] Eyers and Han (n 2)

Blockchain smart contracts have received significant attention not only from startups and financial technology ('FinTech') companies but also other businesses across a broad range of industry sectors[8]. Companies have already commenced the development and implementation of smart contracts in their business operation in recent years[9] with the belief that blockchain technology and smart contracts would enable these businesses, and their clients, to conclude transactions in a much more time and cost-efficient manner; by foregoing intermediaries and, thus, reducing third-party fees and other associated costs. In particular, the use of blockchain technology is considerably active and emphasized in the financial services sector. Recently, some of the biggest financial companies in the United States of America, such as Goldman Sachs, the Bank of America and Mastercard, with recognition that blockchain technologies will revolutionize existing financial transactions, have established their own dedicated teams for the invention and development of the blockchain and cryptocurrencies-related technologies and, given that most of blockchain applications are built on public open-source code, which is essentially a "shared cryptographically secure ledger of transactions"[10], some have gone as far as patenting such technologies in order to avoid any potential intellectual property dispute. In Thailand, it can be seen that Thai financial institutions have also commenced implementation of blockchain smart contracts in their services. In 2016, Kasikorn Bank, with support from IBM, offered blockchain-oriented services in relation to issuance and certification of financial documents, such as the Letter of Guarantee, as well as to use the said technology for their registry, database and information verification process, such as Know-Your-Client (KYC), asset transactions, and payment registries, for instance.[11] In March 2017, Smart

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[8]Norton Rose Fulbright, *'Smart Contracts: coding the fine print' (*2016) A legal and regulatory guide <http://www.nortonrosefulbright.com/knowledge/publications/137955/smart-contracts-coding-the-fine-print> accessed 23 December 2016

[9]Ibid

[10]Susan Secker, 'Who owns blockchain? Goldman, Bank of America amass patent for coming wars' 21 December 2016 Livemint <http://www.livemint.com/industry/wj3NKg3msPo4OApg0eHM/Who-owns-blockchain-Goldman-Bank-of-America-massa-patents.html?facet=print>

[11]'KBTG in cooperation with IBM lead the adoption of Blockchain for financial transaction documents' (Thai Publica 3 November 2016) <http://thaipublica.org/2016/11/kbtg-ibm-blockchain/> accessed 7 December 2016

Contract Thailand was established to provide the blockchain platform for contracts struck by financial-commerce and other businesses.[12]

Although the commercial applications of blockchain and smart contracts are perhaps most widely publicized in relation to financial services, its use will not be limited to the financial sector. Blockchain technologies are also currently being used in the consumer markets sector, property and real estate sector, insurance sector, healthcare sector, energy sector, transportation and infrastructure.[13] However, while it is arguably inevitable that blockchain technologies and smart contracts will play a significant role in the not-so-distant future of business transactions and eventually replace the current methods, there are still questions whether smart contracts will legitimately trump traditional contracts in terms of their full enforceability under each legal jurisdiction. In Thailand, the principal question is whether, under the current legal framework, smart contracts could be considered a legally enforceable agreement giving rise to obligations for the parties involved.

Therefore, this thesis will provide analysis of the enforceability of smart contracts[14] in blockchain technology under current Thai law, particularly focusing on the following issues:

(1) Legal formation of smart contract; and

(2) Required specific formalities and written evidence of contract under Thai law.

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[12]Nophakhun Kimsamarnphun, 'Smart Contracts use blockchain technology to boost online security' The Nation (Bangkok, 13 May 2017) <www.nationmultimedia.com/news/business/corporate/30315036> accessed 20 June 2017

[13]Chamber of Digital Commerce and Smart Contracts Alliance& Deloitte, 'Smart Contracts: 12 Use Cases for Business & Beyond' (2016) 1(1) <http://www.the-blockchain.com>accessed 23 December 2016

[14]In this thesis, smart contracts merely refer to blockchain smart contracts.

Legal formation of smart contract

In most instances, under Thai law, a legitimate contract can be made orally and without any legal formality, provided that there are elements of an offer and an acceptance between the contracting parties. Nevertheless, as smart contracts are executed via electronic agents, there are issues concerning the recognition of such agents under Thai law as well as other issues such as verification of the intention to create legal relationship in the agreement.

Required specific formalities and written evidence of contract under Thai law

In relation to the formation of an enforceable contract as discussed above, certain Thai law also impose 'formalities' in specific types of contracts, such formality requirements vary depending on the type of transactions and the relevant laws. For example:

(1) Legal formation of smart contract; and

(2) Required specific formalities of legal contract under Thai law.

Legal formation of smart contract

In most instances, under Thai law, a legitimate contract can be made orally and without any legal formality provided that there are elements of an offer and an acceptance between the contracting parties. Nevertheless, as smart contracts are executed via electronic agents, there are issues concerning the recognition of such agents under Thai law as well as other issues such as verification of the intention to create legal relationship in the agreement.

Required specific formalities of legal contract under Thai law

In relation to the formation of an enforceable contract as discussed above, certain Thai laws also impose 'formalities' in certain specific types of contracts, such formality requirements vary depending on the type of transactions and the relevant laws. For examples:

(1) A contract for the sale or other disposition of an interest in immovable properties will be void unless the contract is executed in writing and registered by the competent official;[15]

(2) Hire purchase[16] is void unless in writing; and

(3) A loan contract in an amount over than THB 2,000 is not enforceable unless evidenced in writing with the signature of the borrower.[17]

These various formalities and written evidence requirements could impede the deployment of smart contracts in certain contexts. For smart contracts, the issue then arises as to whether an encoded smart contract, where the contractual terms are rendered in the form of computer code, would be considered to have been "made in writing" for the purposes of such required legal formality. In addition, an analysis that takes into account the matter of the proof of an electronic signature is also required to determine whether the technology that supports the entering into a smart contract would satisfy the relevant legislation requirement. Most importantly, for contracts which require registration with government officials, such as sale and transfer of ownership of land, it seems impossible that a smart contract would meet such required formality given current infrastructure, and, thus, have a legally binding effect under the Thai law.

With regards to the requirements of writing or signature in the e-commerce context, the Electronic Transaction Act B.E. 2544 (2001) and its amendment B.E. 2551

[15]Section 456 of the Civil and Commercial Code
[16]Section 572 of the Civil and Commercial Code
[17]Section 653 of the Civil and Commercial Code

(2008) (the "Thai ETA") has been enacted to provide legal recognition of data messages used in the transaction by treating them in the same way as a message made or evidenced in writing with an aim to promote the reliability of electronic transactions to have the same legal effect as the transaction made by traditional means.[18]

However, there is a theoretical and legal challenge by scholars that a contract made by automated system, or sometimes called "electronic agent", is not legally valid under the Thai ETA.[19] This is because it could be argued that entering into a contract that is carried out by an electronic agent (without human review or intervention) may not be consistent with the true intention of the relevant party. Given that smart contracts are made and executed by electronic agent, their validity under the Thai ETA is therefore, questionable while a specific rule on this matter is absent.[20]

Apart from the issues of contract formation, smart contracts could be problematic in dispute resolution cases. For instance, technically, a transaction using blockchain technology can be conducted anonymously whereby contracting parties may not have even encountered one another. As such, in case there is a dispute, there is an issue of how an aggrieved party would be able to identify the other party in order to bring legal proceedings against it.[21]In addition, the issue of evidence and admissibility of electronic evidence by the Thai Courts are also of significant concerns. Last but not least, there is the issue of jurisdiction and governing law. Since a smart contract automatically executes across distributed ledgers, it may be difficult for the court to determine as to the place that the contract is formed and what governing law to apply to the smart contract. However, these issues are outside the scope of this thesis.

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[18] Reasons for promulgation of Electronic Transaction Act B.E. 2544 (2001) in its remark.

[19]Electronic Transactions Development Agency (public organization), Online Consumer Protection on e-Commerce Contract, (2nd edn. 2016) 69

[20] UNCITRAL secretariat, Explanatory note on the United Nation Convention on the Use of Electronic Communications in International Contracts (United Nation Publication 2007) 69.

[21]Norton Rose Fulbright (n 8)

1.2 Hypothesis

Current Thai legal system does not facilitate the complete implementation of blockchain smart contracts. Thus, amendments of relevant laws and regulations are required.

1.3 Objective of Study

(1) To study general concept of blockchain smart contracts and their role in the modern day's business transactions in foreign countries and in Thailand;

(2) To analyze provisions of Thai law and legal system and regulations on contracts, and specific contract formalities;

(3) To do a comparative study of abovementioned legal issues relating to smart contracts under foreign jurisdictions; particularly the Commonwealth of Australia and South Africa; and

(4) To propose legal solutions to amend the existing laws and practical proceeding in order to reduce the obstacles for full implementation of smart contracts in Thailand.

1.4 Scope of Study

This thesis will be focusing on the use of smart contracts transactions under blockchain technologies in modern day businesses, and identifying the legal problems of blockchain smart contracts implementation in Thailand by analyzing the existing provisions of the Thai Civil and Commercial Code and the Electronic Transaction Act with comparative study of the same or similar laws of foreign jurisdictions.

1.5 Methodology

The study methodology is based on documentary research by emphasizing legal texts, Thai and foreign legislative provisions, court's judgment and case precedents both domestic and international cases, legal articles and publications, online database as well as opinion of legal practitioners in relation to blockchain smart contracts.

1.6 Expected Result

(1) To understand the general concept of blockchain technologies and smart contracts.

(2) To understand the legal principles of contract formation, and specific contract formalities of smart contracts and electronic documents in Thailand and foreign jurisdiction.

(3) To understand the challenges and obstacles for implementing smart contracts and electronic documents under existing Thai legal system as well as foreign jurisdictions.

(4) To be able to provide recommendations on the amendment of laws and regulations concerning smart contracts implementation in Thailand.

CHAPTER 2
SMART CONTRACTS

2.1 Overview of Blockchain

"Blockchain" is a new database technology where information is shared across a network of users who each hold a full and updated copy of the records. For the purpose of this thesis, the writer uses the term "blockchain" or "blockchain technology" to refer to a distributed, decentralized ledger that, when combined with a digital transaction validation process, allows for peer-to-peer electronic transfer of an asset without the need for an intermediary, such as a bank.[22] With its key performance characteristics, blockchain enables decentralized transaction because its mechanism is not controlled by a single, centralized party. Blockchain is an immutable database, which means that once the information is added, it cannot be removed or changed. Each update to the blockchain is secured by hash function, which allows the network to immediately detect and reject any attempt to distribute and edit copy. Although blockchains are much more general, this thesis will only focus on their applicability to smart contracts due to the intense interest in smart contracts.

A Blockchain is a Decentralized Ledger

As mentioned above that a blockchain is a ledger. When considering the word "ledger," think of a simple database (like an excel spreadsheet) that can store all kinds of information (i.e., person's name, age, address, etc.)[23]. For instance, currently the Bank of Thailand ("BOT") maintains a ledger with respect to credits and debits between it and its member banks. That ledger is considered centralized because all of the transactions are manually inputted by one party (a bank employee or software controlled by the bank). Consequently, the member banks must trust the BOT to

[22]Alan Cohn, Travis West & Chelsea Parker, 'Smart After All: Blockchain, Smart Contracts, Parametric Insurance, and Smart Energy Grids' (2017) Georgetown Law Technology Review <https://perma.cc/TY7W-Q8CX> accessed 19 June 2017

[23]Joe Dewey and Shawn Amuial, 'What is a Blockchain?' (2015) Bloomberg Law <https://bol.bna.com/> accessed 10 January 2017

properly maintain the ledger so that the member banks can accurately determine their current position toward the BOT. Under this framework, if a member bank has a deposit made into its account with the BOT, the deposit is processed electronically and the centrally-kept database at the BOT is updated to credit the member bank's account. Ultimately, this centralized approach is responsible for keeping track of how much money is in each account.

Blockchains tracking the transfer of virtual currency, like Bitcoin, essentially maintain a similar ledger that keeps track of the transfer of Bitcoin from a transferor to a transferee. However, as opposed to the BOT's centralized ledger, a blockchain ledger is considered decentralized because transactions are stored on (several thousand) computers connected to a common network via the Internet.[24] These computers are known as "nodes." Each node contains a complete history of every transaction completed on each blockchain beginning with the first transactions that were processed into the first block on that blockchain. The first block of transactions for any blockchain is typically called the "genesis block" since it represents the beginning of time for that blockchain.[25]

Maintained and Verified by a Peer-to-Peer Network

As indicated above, all of the nodes are connected to a common network via the internet. This network consists of a peer-to-peer platform whereby each node or computer that stores a copy of the blockchain ledger is connected via the Internet, but in a completely decentralized manner. In other words, there is no single server to which all the nodes are affixed. So, when we refer to the network, this refers to all of the peer-to-peer nodes operating under the same set of rules (commonly referred to as a "protocol") that are embodied in computer code that one has downloaded onto their computer (now considered a node on that network). Thus, the essence of every

[24]Shawn S. Amuial, Josias N. Dewey, and Jeffrey R. Seul, *The Blockchain: A Guide for Legal & Business Professionals* (1st edn, Thomson Reuters 2016)

[25]Ibid

blockchain is an agreed upon protocol that ensures that only information upon which the network reaches consensus[26] will be included in the blockchain. In other words, a *network* of computers all running a common software application must come to agreement upon whether a change to the blockchain should be made, and if so, what that change should be. This consensus is driven by all of the nodes (i.e., all ledgers) operating under the same rules (i.e., a protocol) for determining how consensus is reached within the network.[27]

In applying this concept into Bitcoin transaction, Bitcoin's ledger is a recording of all of the transfers of Bitcoin from one person to another. For instance, if John wants to transfer one Bitcoin to his friend, Alex, he would type in a command on his computer (or node) alerting the network of his desire to transfer one Bitcoin to Alex. Once he broadcasts his intent to execute the transaction, other nodes connected to the Bitcoin network will immediately and automatically verify whether the proposed transaction is actually valid (e.g., there is no double spend).

While the transaction between John and Alex has been broadcasted throughout the peer-to-peer network, the last step is to store it into a block on the Bitcoin blockchain ledger. "Blocks" are simply a way to aggregate transactions into larger groups (or batches) for processing purposes. The transactions bundled up and included in a block do not necessarily have any relationship with each other (just as a batch of checks being processed by a bank may have no relationship to each other). Another important characteristic of each block is that it contains a reference to the prior block — creating the "chain" in blockchain. This link is critically important because it all ensures that a third-party cannot tamper with how past transactions are saved on the blockchain.[28]

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[26]Consensus occurs when the nodes operating on the network (usually at least a majority of the nodes) agree that the proposed transaction is indeed "valid."
[27]Amuial, Dewey, and Seul (n 24)
[28]Dewey and Amuial (n 23)

Rather than simply referring to the prior block by some random numbering system (e.g., Block 1, Block 2, Block 3 and so on), each block (including all of the transactions that were bundled up into that block) are subject to a specific mathematical algorithm that results in a unique "hash." If you change any aspect of that block or any transaction within it, then subjecting the block to the same algorithm will produce a different "hash." Therefore, each block includes the hash of the prior block.[29]

This resulting relationship between all of the blocks makes it more difficult to alter a prior entry in the ledger. In a ledger that does not rely on blocks each linked to their predecessor, someone with computational power of *x* could alter a prior entry for malicious purposes. With a block-based system, a malicious actor would need computational power of *x* to the *y* power, where *y* is a very large number. Not only do we need to alter the data for the specific transaction we wish to change, but every block thereafter has to be altered because the hash in each of those blocks will no longer be valid. Thus, for the transfer of Bitcoin from John to Alex to become final, that transaction will eventually be bundled up with numerous other transactions broadcast throughout the network and become part of the next block. The responsibility for bundling transactions and processing blocks is handled by a unique subset of nodes commonly referred to as "miners."[30]

2.2 Overview of Smart Contract

Given that there is no general consensus on the definition of a blockchain-based smart contract, it is important to make it clear for the purposes of this thesis. A blockchain smart contract here refers to a contract between two or more parties that is stored and digitally executed on the blockchain using code.[31] While human involvement

[29]Ibid
[30]Amuial, Dewey, and Seul (n 24)
[31]Christopher D. Clark, Vikram A. Bakshi & Lee Braine, 'Smart Contract Templates: Foundations, Design Landscape and Research Direction' (2016) <https://arxiv.org/abs/1608.00771>accessed 10 December 2017

is still necessary to define the contract and input the code, the actual execution of the contract is automated based on a defined parameter, such as an event or price.[32]

As opposed to the traditional contracts which are drafted using natural and common language, smart contracts are "drafted" by inputting computer and software codes, comparable to programming languages such as javascript, C++, Go or HTML, in which the rules and consequences would be defined according to the parties' different circumstances in the same way as a typical contract would[33]. The defined code is alike to a series of "If-Then" statements, where the "ifs" are preconditions that must be met in order to trigger the "thens".[34] Once the code has been validly input, the contract is then automatically "executed" by a distributed ledger system in a computer; provided that the terms and conditions of the agreement are met, and there is a set of defined inputs, the smart contract enforces its own terms.

The term "smart contract" was first introduced by a computer scientist Nick Szabo in his early 1995 paper "Smart Contracts: Building Blocks for Digital Markets". In his 1995 article, Szabo defined a contract as being "a set of promises agreed to in a meeting of the minds, is the traditional way to formalize a relationship", whereas he defined smart contract as "a set of promises, specified in digital form, including protocols within which the parties perform on the other promises"[35] Capturing each element of Szabo's definition, the key characteristics of smart contracts are as follows:[36]

(1) "*set of promises*" – such promises may be contractual or non-contractual depending on the model of smart contract (which will be discussed in the following section 2.3). Contractual terms and/or

[32]Chamber of Digital Commerce and Smart Contracts Alliance& Deloitte (n13)
[33]Stark (n 4)
[34]Christopher Burniske, "Bitcoin and Ethereum: How Smart Contracts Work" May 29, 2016 < https://ark-invest.com/research/smart-contracts-work> accessed 11 December 2016
[35]Nick Szabo, 'Smart Contracts: Building Blocks for Digital Markets' Extropy Magazine 1996
[36]Norton Rose Fulbright, 'Can smart contracts be legally binding contracts?' An R3 and Norton Rose Fulbright White Paper 2016

equivalent functional outcomes according to business logic are embedded as code within software.

(2) "*specified in digital form*" – it consists of lines of code as well as the software that prescribes its conditions and outcome.

(3) "*protocols*" – a computer protocol in the form of an algorithm constitutes a set of rules for processing data in which technology enabled and rules-based operation enable actions to be performed such as the release of payments and actions conditional on payment.

(4) "*within which the parties perform*" – the heart of a smart contract is it performs automatically. Blockchain technology as the underlying technology makes smart contract become irrevocable. Once initiated, the outcomes for which a smart contract is encoded to perform cannot typically be stopped (unless an outcome depends on an unmet condition).

Szabo described in such paper that the vending machine, as something embodying its characteristics, is the simplest real-life example of a smart contract. When the money is paid, an irrevocable set of action is put in motion and the machine then simply enforces the terms of the deal: it computes and dispenses customer's choice of product as well as change.[37] Based on his example, Szabo further suggests that in the more complicated deals or transactions, the technology allows individuals or companies to utilize computer code, instead of mechanical devices, to facilitate more complex transactions of digital property. Thus, a smart contract could transfer ownership of all types of property, both tangibles and intangibles, such as real-estate, shares, or intellectual property.[38]

[37]Szabo (n 35)
[38]Ibid

This can be illustrated by describing a simple shares options contract, where a call options contract entitles the holder to buy a given security at a defined price. For instance, as illustrated in the below figure 2.2, the Holder (Alice) agrees to purchase "smart options contract" from the Seller (Bob). Under the agreed contract terms, the Holder is entitled to purchase 100 shares in the Company (Acme Inc.) from the Seller at a defined price of USD 50 per share. The contract has a defined period which the Holder can exercise the right to purchase (i.e. the expiry date), which once expired the Holder will not be able to purchase the share at the defined "strike price".

Figure 2.2 Sample smart contract expressed in pseudo-code[39]

```
contract Option {

   strikePrice = $50
   holder = Alice
   seller = Bob
   asset = 100 shares of Acme Inc.
   expiryDate = June 1st, 2016
   function exercise ( ) {

      If Message Sender = holder, and
      If Current Date < expiryDate, then
         holder send($5,000) to seller, and
         seller send(asset) to holder
   }
}
```

As can be seen in the sample code above, the smart options contract first defines the relevant terms of the agreement, i.e. the essential asset, the price, the identities of each party, and the fixed term or time condition of the agreement (i.e. the expiry date). Subsequently, the "exercise" function allows the holder to exercise the right to purchase the shares at the strike price at any time prior the expiry date. The

[39]Josh Stark, 'Introduction to Smart (Legal?) Contract-Part-1' <http://blog.ledgerlabs.io/introduction-to-smart-legal-contracts-part-1/> accessed 13 December 2016

function first verifies the person triggering the transaction (the "Message Sender") is actually the holder before verifying to see that the contract is still valid within the specified expiry date. If both conditions are met, then the contract immediately executes by transferring cash from the holder to the seller, and the assets (i.e. shares) from the seller to the holder, according to the terms of smart option contract.[40]

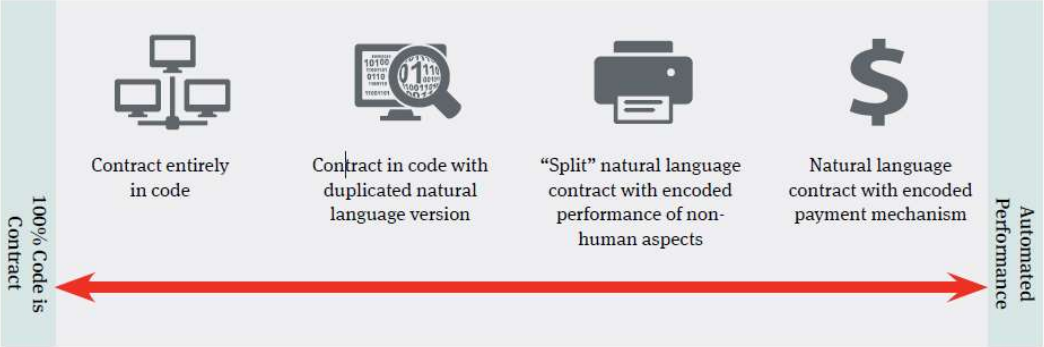
Szabo described that smart contracts could improve execution of the four basic contract objectives, i.e. observability, verifiability, privity and enforceability. Among other use cases to be discussed in the following sections, smart contracts according to Szabo would enable both parties to observe the other's performance under the contract, verify if and when a contract has been performed, guarantee that only necessary details required for completion of the contract are disclosed to both parties and be self-enforcing to disregard the time spent in monitoring the contract.[41]

2.3 Models of smart contracts

There is an extensive spectrum of possibilities in relation to types of smart contract, which vary by the level of code involvement. On one side of the spectrum, there is a smart contract that seeks to encode the entirety of a natural language contract so called a "code is the contract" model. It is worth noting that this model is the most challenging from a legal perspective particularly the issue as to its legally binding effect. On the other side, smart contract could be made in the form of natural language with the digitized performance of business logic (such as payment).[42] A range of intermediate possibilities in between these two schools is illustrated in the following figure.

Figure 2.3 Smart contracts lie on a spectrum[43]

[40]Ibid
[41]Michael Gord, 'Smart Contracts Described by Nick Szabo 20 Years Ago Now Becoming Reality' 26 April 2016 < https://bitcoinmagazine.com/articles/smart-contracts-described-by-nick-szabo-years-ago-now-becoming-reality-1461693751/> accessed 16 December 2017
[42]Norton Rose Fulbright (n36)
[43]Ibid



Intermediate positions of smart contract application include (a) a contract in code that is duplicated with separate natural language document; and (b) a "split" contract where the part that does not require human performance is enclosed into computer code while human obligations, remedial and other provisions are written in natural language, whereby both languages are integral parts of the other one. The issue as to which types of agreements and terms are best suited to code, or more suitable to be made in natural language, and the way to integrate both types in order to take advantages of each model must be taken into account among people in the legal industry.

2.4 How do smart contracts work on blockchain[44]

The below flow chart (Figure 2.4) illustrates step as to how a smart contract would work on blockchain as follows:

[44]Chamber of Digital Commerce and Smart Contracts Alliance& Deloitte (n13)

Figure 2.4 How smart contracts work

(1) Identify agreement

(i) Multiple parties identify a cooperative opportunity and desired outcomes.

(ii) Agreements potentially in scope could include business processes, asset swaps, transfer of rights etc.

(2) Set conditions

(i) Smart contracts could be initiated by the parties themselves or by satisfaction of certain conditions like financial market indices, natural disasters or event via GPS location.

In initiating a smart contract, the initiator wishing to participate in a smart contract hosted on, say, a permissionless[45] blockchain can:

(a) Download the software from publicly available sources;

(b) Use an address (an alphanumeric character uniquely allocated to it by the software) to generate a public key; or

(c) Publish the public key on the system publicly.

At the same time, the blockchain will also generate a corresponding private key for the initiator's address. This key is held securely by the software. If the initiator wishes to trigger a smart contract transaction on the relevant ledger, it uses its address to send an initiating message, encrypted with its private key, to the other participants. The message is picked up by the participants' computers (called "nodes"). Messages purporting to be from the initiator's address can only be signed off on by a person in possession of the initiator's private key. Participants with access to the public key (which they receive from the software) can use it to verify that the smart contract transaction was initiated by the initiator in possession of the private key and to authenticate the message contents.

(3) Code the business logic

(i) A computer program is written in a way that the arrangement will automatically perform when the conditional parameters are met. The fundamental logic of smart contract coding is "if-this-then-that".

[45]Blockchain is permissionless when anyone is free to submit messages for processing and/or be involved in the process of reaching consensus (for example, the Bitcoin blockchain). While a permissionless blockchain will typically use a consensus protocol to determine what the current state of the blockchain should be, a blockchain could equally use some other process (such as using an administrator or sub-group of participants) to update the ledger.

(4) Encryption & blockchain technology

(i) Encryption provides secure authentication and verification of messaging between the parties relating to the smart contract.

(5) Execution & processing

(i) In a blockchain iteration, when consensus is reached on authentication and verification, the smart contract is written to a block.

In a typical permissionless blockchain deployment, when a sufficient quantity of other participants or nodes, reach the same conclusion (more than 50 percent), the blockchain's applicable consensus protocol determines that the message relating to the smart contract should be added to the blockchain. Alternatively, such a determination might be reached by an administrator, in a permissioned[46] blockchain.

(ii) The code is executed, and the outcomes are memorialized for compliance and verified.

(6) Network updates

(i) After performance of the smart contract, all computers in the network update their ledgers to reflect the new state.

(ii) Once the record is verified and posted to the blockchain, it cannot be altered, it is appended only.

[46]A blockchain is permissioned when its participants are pre-selected or subject to gated entry based on satisfaction of certain requirements or on approval by an administrator. A permissioned blockchain may use a consensus protocol for determining what the current state of a ledger should be, or it may use an administrator or sub-group of participants to do so.

2.5 Distinctions between blockchain smart contract and other electronic contracts

Generally speaking, an electronic contract is any kind of contract formed in the course of e-commerce by the interaction of two or more individuals using electronic means, such as e-mail, the interaction of an individual with an electronic agent, such as a computer program, or the interaction of at least two electronic agents that are programmed to recognize the existence of a contract, sample of which is the end user-license agreements where the users generally accept the contact terms by using, downloading, installing or a software or service.[47] There are several ways in which electronic contracts are executed. The easiest form of electronic contract being executed is "click to agree" contract or click-wrap agreement, where the users only click an "I Agree" button to accept the terms of the agreement. The more complicated one will use "digital signature"[48] to replace the ink signature and hard copy contracts.[49] While smart contract is a contract which is stored in a software that automatically performs the obligations the parties have agreed under the agreement. It is actually a combination of a noun (contract) and a verb (the automatic execution).[50]

If one understands the concept of electronic contracts as simply being digital representations of a physical contract, then it does not offer many benefits over a blockchain smart contract. As with a paper contract, a digital representation (a scan of a signed document) does not offer any additional mechanisms for enforcement for breach or performance of duty, or fraud protection (i.e. verification of identity - as signatures may be easy to forge). The addition of e-signatures addresses this problem

[47]Attores Pte Ltd., 'Beginner's Guide to Smart Contracts on the Blockchain' (2017) <www.attores.com/blockchain/beginners-guid-smart-contracts-blockchain/>
[48]A type of electronic signature that encrypts documents with digital codes that are particularly difficult to duplicate. Currently, it is becoming standard to refer the term "digital signature" for cryptographic signature method also known as Public Key Infrastructure (PKI) which are now considered as the most secure and reliable method of signing contract online.
[49]Nolo, 'Electronic Signatures and Online Contracts' (2017) <www.nolo.com/legal-encyclopedia/electronic-signatures-online-contracts-29495.html>
[50]Attores Pte Ltd. (n 47)

of identity verification and digital offer/acceptance to some satisfaction, but this is in stark contrast to the benefits provided by a blockchain smart contract.

Blockchain smart contract is formed within an electronic ledger network; it is a living being that can be considered an application running on the network monitoring for conditions and fulfilling tasks, acting as a digital advocate of corporeal bodies. This is in contrast to a traditional electronic contract which is simply a document or image format that sits archived in digital storage forever, in this sense, it truly is dumb in that it is not aware of its surrounding and purpose and only exists as an artifact representation of human intention. A smart contract is an agent enforcing the logical transactions necessary to fulfill the terms of a contract. It removes some risk of fraud because the administration of the contract is left to the network itself, and not humans; it is codified in logic and unflinching and cold in its administration.[51]

Based on the above features, it is possible to define a smart contract as "a piece of software code, implemented on a blockchain technology, and having a self-enforcement and the autonomous nature of its terms, triggered by conditions defined in advance and applied to blockchain-titled assets."[52]

2.6 Potential legal issues relating to the use of the smart contract

Some people may conclude that, just because the name "smart contract" include the word contract, it will become a legally binding contract in the legal sense. This is not necessarily correct depending on the type of smart contract, ranging from contracts that are entirely written in code to contracts that merely automate implementation or performance of natural language contract (e.g. the release of

[51]Interview with Zachary Kominar (Jurisprudence Doctor and Bachelor of Computing (Hons), Platform Manager, Lawcadia Pty Ltd. (Brisbane, Australia 10 June 2017) Bringing over 10 years of experience in the Legal Technology industry, Zachary Komiar has been a catalyst of change for legal tech companies in Australia and Canada.
[52]Alexander Savlyev, 'Contract Law 2.0: 'Smart' Contracts as the beginning of the end of classic contract law' (2017) Information & Communications Technology Law 116

payment) (as earlier discussed in Section 2.3 Model of smart contracts), the factual matrix within which it operates, and the governing law determining the issue.[53]

In cases where the parties choose to simply use code to implement natural language contracts, it is rather straightforward to see how the law will be applied; however, smart contract code introduces a new facet to legal analysis. When the code becomes the contract, the application of contract law become more complicated. Smart contracts can automatically perform. In this respect, there are possible two scenarios in relation to this characteristic[54]:

First scenario: a smart contract initiated by the parties to it for which subsequent performance may not be relevant to question of contract formation of the smart contract.

Second scenario: a separate "follow-on" contract that has been entered into by performance of an earlier smart contract (that is, where the smart contract purports to enter the parties into the other separate follow-on contract).

Concluding remarks

Blockchain smart contract can be considered as a 'paradigm shifter' in the sphere of contracting. It allows not only automation of the process of contractual performance of both parties, but also the automatic process of contract conclusion, i.e. the contract can be concluded by electronic agents employed by the parties. An analysis of whether smart contract can give rise to legally binding contractual relation and whether the contract is contained in code is sufficient to serve certain specific formalities and written evidence requirement of contract under the laws of Thailand will be discussed in the next Chapter 3 and analysis of the same in the significant 2 jurisdictions, i.e. Australian and South African laws will be discussed in Chapter 4.

[53]Norton Rose Fulbright, 'Can smart contracts be legally binding contracts?' 15
[54]Ibid 16

CHAPTER 3
THE ENFORCEABILITY OF SMART CONTRACTS UNDER THAI LAW

In the example of smart options contract as illustrated in Chapter 2, the contractual process between the parties is done and executed electronically without human intervention. All messages that otherwise would have been written on paper and sent manually are replaced by the Internet and processed onto a distributed ledger (blockchain). In other words, they deploy within an electronic communications system. The above scenario however, raises several legal issues. One concern is regarding the formation of the contract. Another concern is whether the contract contained in code is sufficient to serve certain specific formalities and written evidence requirement of contract under Thai law.

The purpose of this chapter 3 is to explore the existing Thai legislative framework and the extent to which they can accommodate blockchain smart contracts in the area of contract formation and legal formality and written evidence requirement which are the Electronic Transaction Act B.E. 2544 (2001) and its amendment B.E.2551 (2008) as a specific law for electronic communication and the Thai Civil Commercial Code (the "CCC") as general law of the formation of contract.

3.1 Legislative Framework for Electronic Transactions

The realization, at a global level, of apparent benefit from electronic methods of communication eventually led to the enactment, in 1996, of the UNCITRAL Model Law on Electronic Commerce. The Thai Government, among other countries has also realized the importance of information technology and paperless method of transactions. Subsequently, as part of the National Information Technology Policy known as the "IT 2000 Policy", the Thai ETA, has been enacted along the lines of the UNCITRAL Model Law on Electronic Commerce 1996 and the UNCITRAL Model Law on Electronic Signatures 2001.[55]The Thai ETA promotes a regulatory environment

[55]Pinai Nanakorn, 'Electronic Transactions Law in Thailand' (2002) 7 Thammasat Review 52

in order to help to ensure the reliability of electronic transactions by providing legal recognition of data messages.[56] In this regard, the Thai ETA adopts the "functional equivalent approach" embodied in Article 5 of the UNCITRAL Model Law on Electronic Commerce[57] which provides that "information shall not be denied legal effect, validity or enforceability solely on the grounds that it is in the form of a data message"[58]. This provision is intended to be a general provision treating data messages used in transactions with equivalency in function and legal consequence as compared to paper documents.[59]In treating data messages as equally functioning as paper-based messages for fulfilling requirements in existing provisions of laws, Thai ETA sets specific rules applicable to varying matters, all of which are essentially drawn from the principles set out in the Model Law on Electronic Commerce. This thesis will only focus on those rules effecting the formation of contract and formality requirements

3.2 Formation of Contract under Thai Law

The Thai ETA does not provide the substantive rules for constituting a valid and binding contract, such as elements of contract for which the CCC as general law shall be applied.

Thai law does not provide for a clear definition of "contract". However, since contract is one kind of juristic acts, it is important to consider the meaning of juristic acts provided in Section 149 of the CCC that "juristic acts are lawful and voluntary acts, the immediate purpose of which is to establish juristic relations, between persons to create, modify, transfer, preserve or extinguish rights"[60].Under Thai law, the following four essential elements are required for the formation of contract:[61]

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[56]Reasons for promulgation of Electronic Transaction Act B.E. 2544 (2001) in its remark.
[57]Nanakorn (n55)
[58]See also Section 7 of the Thai ETA
[59]Nanakorn (n55)
[60]Section 149 of CCC
[61]Sanunkorn Sothipun, *Commentaries on Juristic Acts-Contract*, (14th edn, Winyuchon Publication 2009).

(1) Declaration of intention;

(2) Parties to contract;

(3) Objective of contract; and

(4) Form or method of declaration of intention.

3.2.1 Declaration of Intention

The typical approach in determining formation of contract is the offer and acceptance approach. In general, whether or not the parties have reached an agreement, the law looks for an "offer" by one party and an "acceptance" of the terms of that offer by the other.

Offer

An offer has been described as a proposition made by a person to another person of his or her willingness to enter into a legally binding contract.[62] Most importantly, the terms of an offer must be sufficiently clear to allow a contract to be formed by acceptance without further negotiation and the intention of the offeror to be bound by those terms must be clear and certain. An offer can be made either to a specific person or to public at large.[63]An offer can be made to a person who is present or at distance. An offer made to a person who is present takes effect once the recipient knows or should have known of the offer.[64] An offer made to a person at a distance takes effect from the time when it reaches the offeree.[65] An offer made to a person who is present

[62]Ibid
[63]Ibid
[64]Section 168 of CCC provides that

"A declaration of intention made to a person in his presence takes effect from the time when it becomes known to receiver of the intention. This also apply to the declaration of intention made by one person to the other through telephone, other communication devices or other means through which similar communication can be made."

[65]Section 169 of CCC provides that

without specifying a period for acceptance may be accepted only there and then.[66] An offer made to a person at a distance in which a period for acceptance is specified cannot be withdrawn within such a period.[67]An offer made to a person at a distance in which a period for acceptance is not specified cannot be withdrawn within a time which notice of acceptance might reasonably be expected.[68]

Acceptance

Acceptance, in the context of contract formation, means accepting the offer by the party to whom an offer is made in order to enter into a legally binding contract**.** Since acceptance is a kind of declaration of intention, the general rules regarding a declaration of intent made to a person at presence and a declaration of intention made to a person at a distance as discussed above will also be applied. In this regard, the acceptance will have to be made within time frame which varies upon circumstances as described below if it arrives out of time, it will be deemed to be a new offer.[69]

(1) If time period for acceptance is specified, it must be made within such period.[70]

(2) If time period for acceptance is not specified, it must be made within the reasonable time.[71]

(3) If the offer is made to a person who is present and there is no specified period for acceptance, it must be made there and then.[72]

"A declaration of intention made to a person not in his presence takes effect from the time when it reached the receiver of the intention. If does not become effective if a revocation reaches him previously or simultaneously.

[66] Section 356 of the CCC
[67] Section 354 of the CCC
[68]Section 355 of the CCC
[69]Section 359 of the CCC
[70]Section 357 of the CCC
[71]Section 355 of the CCC
[72]Section 356 of the CCC

In order to form a contract, the acceptance must correspond to the offer in all respects. The acceptance with additions, restrictions or other modifications is deemed to be refusal coupled with a new offer.[73]

Due to the rapid growth of technology, declarations of intention in today's world have been significantly changed from the traditional ones, which were typically made via post, telephone or face-to-face conversation, to be made in a form of electronic means particularly via Internet or "online communication". A large number of online transactions are carried out over the Internet, both in a B2B (business-to-business) or B2C (business-to-customer) cases. A potential purchaser can make a purchase order simply at a click on a designated icon after filling in a digital form provided on website ("click-wrap agreement") or by sending an order via e-mail or by similar modern devices.[74]In recognizing electronically made contracts, Section 13 of the Thai ETA provides that "the offer and acceptance in the context of contract formation by means of a data message shall not be denied legal effect of such contract solely on the ground that in forming contract the offer or acceptance was expressed by means of data message." This means that it is accepted that a contract may be formed by a variety of methods. This is evident in the broad definition of "data message", which could include but is not limited to communication via electronic data interchange (EDI), e-mail, telegramme, telex or facsimile.[75] The Thai ETA also permits the use of data message in declaring intentions or giving notices as between parties.[76]

A contract is formed when an acceptance becomes effective. Therefore, it becomes important to determine at which point the acceptance becomes effective. Under the framework of the CCC, there are two scenarios for when the acceptance

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[73]Section 359 Paragraph 2 of the CCC
[74]Nanakorn (n 55)
[75] Section 4 of the Thai ETA provides that
"data message" means information generated, sent, received, stored or processed by an electronic means such as electronic data interchange, electronic mail, telegramme, telex or facsimile".
[76]Section 14 of the Thai ETA

becomes effective, contingent on whether the acceptance is made in the presence of the offeror or not. If the acceptance is made in the presence of the offeror, the acceptance will become effective when, pursuant to Section 168 of the CCC, it is known to the offeror. However, if the acceptance is manifested not in the presence of the offeror, under Section 169 and Section 361 of the CCC, it takes effect upon receipt by the offeror. Nevertheless, in accordance with the declared intention of the offeror or in ordinary course notice of acceptance is not necessary, the contract takes effect at the time of the occurrence of fact which is considered as a declaration to accept.[77]

It is under this framework that the rule under Section 22 of the Thai ETA (that the time when the data message enters an information system of the addressee is the time of receipt) is to be examined.[78]

Although computer-based communications of certain types, such as a communication over Skype, Facetime, or an Internet chatroom, may clearly be categorized as being instantaneous and hence in the presence of the offeror,[79] categorization of other means of network communications have cause much debate. For instance, in the event that the parties communicate via e-mail, even though the message, once transmitted, can reach the other party within a few seconds regardless of the location that might be led to perceive that the communication is instantaneous, the receiver of such message may not, unlike in a normal telephone conversation, be in a position to actually have received it or to provide immediate feedback if such individual is not connected to the network at that time. There exists the possibility of a time lag between the transmission and the receipt of the message sent by e-mail. Consequently, an email communication is arguably a non-instantaneous communication which does

[77]Section 361 Paragraph 2 of the Thai ETA

[78]By way of comparison, in common law jurisdictions, an acceptance made in a non-instantaneous context takes effect when "posted" while an acceptance made in an instantaneous setting becomes effective when received by the offeror. Hence, the rules as to the time of 'receipt' and 'dispatch' come into play after it is already determined whether the communication in question is instantaneous or non-instantaneous.

[79] Electronic Transactions Development Agency (public organization) (n19)

not take place in the presence of the offeror, which according to the applicable provision of the CCC, takes effect when received by the other party.

The Thai ETA is silent in regard to when exactly the contract is formed. In this respect, the general provision of Section 356 of the CCC will govern the offer made via instantaneous communication, which may be considered akin to 'in the presence' of the offeror. The section provides that an offer made to a person who is present without specifying a period for acceptance may be accepted only there and then. Thus, in case of a contract made between persons in each other's presence, the contract is formed once the offeree knows the declaration of intention of the offeror and accepts such offer immediately. This is because the offeror is able to promptly know the acceptance.[80] Whereas for the contract made between persons at a distance which the offer is made by way of non-instantaneous communications, Section 361 paragraph 1 will be applied whereby the contract is formed when the notice of acceptance reaches the offeror.

In the case of a smart contract, although its performance is automated, such a contract still requires the presence of the intention of its parties in order to become valid. Such intention is manifested at the moment when an individual declares to enter into such an agreement on the terms specified in advance; or in case involving electronic agents, when an individual declares to appoint such agent for conclusion of certain contracts and agrees to be bound by its actions. Similar to the appointment of a natural person as an agent, there should be a kind of fiduciary relation in smart contract whereas the trust is put into the computer algorithm instead.[81] The person expresses his consent to the terms of the contract and mode of their performance at the moment of the conclusion of contract.

It is also possible to find offer and acceptance in the process of smart contract formation. The network (blockchain) as a system of enforcement and

[80]Ibid
[81] Savlyev (n52)

regulation (e.g. Ethereum[82]) of transactions are timestamped and verifiable by other entities in the network. One party would make an offer, a "smart contract" containing terms and conditions. (e.g. Give me X when Company Y shares equal value Z); the counterparty would accept the offer via a transaction on the network, (sending a unique, private message identifying the counter party and sending the message that they agree to the terms.)[83] Another example with a crowdfunding smart contract, its terms are predefined by the beneficiary (offer), and a person willing to contribute to the project by transferring his asset to the pool is making an acceptance of that offer of beneficiary by his conduct.

Considering the nature of blockchain smart contract, it is arguable that both rules of instantaneous communication as well as non- instantaneous communication could be applied to blockchain smart contract as nature of instantaneous communication and non- instantaneous communication are existed in this modern mode of communication. If a person sends an offer through blockchain and opposite party replies instantly particularly in the case of follow-on contract that has been entered into by performance of a preceding smart contract, it seems to be instantaneous communication. In contrast, if a person sends an offer through blockchain but opposite party does not reply instantly; then it seems to be non-instantaneous communication in nature. In this regard, an offer is made, and could sit waiting for any amount of time for the counterparty to agree and send their confirmation transaction so an offer could be made and never accepted by the other party.[84]

Given there exists the possibility of a time lag between the transmission and the receipt of the message sent through blockchain, in the writer's opinion, it could be implied that it is a non-instantaneous transaction similarly to the declaration of intention by way of email communication as mentioned earlier. Therefore, this kind of

[82]Ethereum is an open-source, public, blockchain-based distributed computing platform featuring smart contract (scripting) functionality, which facilitates online contractual agreements.
[83]Kominar (n51)
[84] Ibid

communication will become a declaration of intent made to a person at a distance under Section 169 of the CCC and, therefore, takes effect from the time the acceptance reaches the receiver of the intention.

3.2.2 Parties to contract

A contract must be entered into by a person (a natural person or entity juristic person) having capacity to do so. Theoretically, parties to the contract can be in two different ways: (a) party who enters into contract by himself; and (b) party who has to take the consequence of the contract regardless of whether or not such party has entered into the contract himself.[85]

Whereas the mechanics of the performance of a smart contract is automated, such a contract still requires the manifestation of the will of the parties in order to become effective. The person expresses his consent to the terms of the contract and mode of their performance at the moment of conclusion of the contract. In the case of electronic agent, this moment occurs when the individual agrees to be bound by the action of the electronic agent. Considering this, a certain 'fiduciary' relationship arises- however, the placement of this fiduciary relationship is not on person as in traditional contract, but rather falls on the computer algorithm. The term 'trustless trust' has been coined for such a relationship.[86]

[85]Sanunporn Sothipun (n61)
[86]Savlyev (n52)

3.2.3 Objective of contract

The contract objective must be mutually agreed between the parties. Contract objective can vary in accordance with the "Freedom of Contract" principle, provided that such objective shall not be expressly prohibited by law or is impossible, or is contrary to public order or good morals otherwise it will be void.[87]

Current applications of smart contract have tended to focus on transfer of digital assets. A common example of this is transfer of Blockchain based asset. Thus, the objectives of most Smart contracts have been in relation to governing economic relations between the parties.

However, there are numerous debates relating to the potential illegal uses of the Bitcoin cryptocurrency, which cast a shadow on Blockchain technology as well. For instance, in Russia, there are warning statements from the Central Bank of Russia, and the Committee of Financial Monitoring declaring that Bitcoin may be used for money laundering and financing terrorism.[88] Smart contracts can also be utilized for illegal purposes; for example, taking into consideration that smart contracts may be programmed for verification of certain facts based on information available on certain websites, it may verify the fact of accomplishment of certain illegal acts (terrorist acts, assassination, theft, etc.) and then release agreed remuneration for such acts. Though such kind of contract will be invalid as violating fundamental principle of Thai law (i.e. Section 150 of the CCC), it will still be executed by program code.[89]

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[87]Section 150 of the CCC provides that

"An act is void if its object is expressly prohibited by law or is impossible, or is contrary to public order or good morals."

[88]Statement of the Central Bank of Russia, 'On the Usage of Cryptocurrencies, including Bitcoin, for Performance f Transactions' of 27 January 2014; Statement of the Committee of Financial Monitoring of the Russia Federation, 'On the Usage of Cryptocurrencies' of 6 February 2014.

[89] Savlyev (n52)

3.2.4 Form or method of declaration of intention

A contract can be made in many forms, provided the parties have reached an agreement (i.e. offer and acceptance of the terms). However, certain types of contracts require formality, and these legal requirements vary. Details of legal formality requirement shall be further discussed in the next section.

3.3 Time of Dispatch and Receipt of a Data Message

The Thai ETA provides specific rules for determining the time of dispatch and receipt of electronic communication which will determine as to whether the electronic contract is formed or not. According to Section 22 of the Thai ETA, the dispatch of a data message is deemed to occur when it enters an information system outside the control of the originator, while pursuant to Section 23 of the Thai ETA the receipt of a data message is deemed to occur as from the time when the data message enters an information system of the addressee. It should be noted that these 2 sections will be applied to both offer and acceptance made by way of electronic means.

As earlier discussed above in Section 3.2.1 (Declaration of Intention), smart contracts should be classified as a non-instantaneous communication in the same manner as a communication through email (or letter in the traditional way) which according to the applicable provision of the CCC, takes effect when received by the other party. Thus, the abovementioned Section 22 and Section 23 will be applied.

3.4 Place of Dispatch and Receipt of a Data Message

With respect to the place where a data message is deemed to be dispatched or received, the Thai ETA disregards a physical venue at which the data is actually dispatched or received and treats a data message as “dispatched” at the place of business

of the addressee.[90] Nevertheless, the Thai ETA also provides for the place of business in case the originator or the addressee has more than one place of business, reference shall be made to the place of business which has the closest relationship to the underlying transaction or, in the case where the place of business of the originator or of the addressee does not exist, his habitual residence shall be treated as the place of dispatch or receipt of the data message.

3.5 Use of Automated Information System for contract formation

Currently, several automated message systems or electronic agents are being used increasingly in electronic commerce business industry, including among others a smart contract performed by purporting to enter the parties into other separate "follow-on" contracts. This growing trend has caused debates among the scholars and legal practitioners in various legal jurisdictions to re-examine traditional theories of contract formation to evaluate their sufficiency to contract being generated and executed without human intervention.[91] To accommodate this proliferating form of contractual formation, the United Nations Convention on the Use of Electronic Communications in International Contracts 2005 (hereinafter referred to as "UN Convention on Electronic Communication or Convention") provides a specific provision which states that a contract formed "shall not be denied validity or enforceability on the sole ground that no natural person reviewed or intervened in each of the individual actions carried out by the automated message systems or the resulting contract".[92] In certain countries, a provision along the lines of Article 12 of the Convention might be considered as simply stating the obvious, namely that an offer and an acceptance can be communicated by any means, including automated message system. However, the provision is needed in view of the remaining uncertainties in a considerable number of countries as to whether contracts can validly be concluded by computers without immediate human intervention, thus raising doubts as to the

[90]Section 24 of the Thai ETA
[91]Explanatory note by the UNCITRAL secretariat on the United Nations Convention on the Use of Electronic Communications in International Contracts para 208
[92]Article 12 of the UN Convention on Electronic Communication

expression of intent by the parties.[93] In the context of Thai law, despite the specific provision for such outspoken recognition is absent under the Thai ETA, nothing in the existing provisions seems to preclude the use of fully automated message systems. The closest application may be found in Section 13 of the Thai ETA together with the general rule on attribution in Section 15 paragraph 2(2)[94] which could be interpreted to allow for the validity and enforceability of contracts formed through automated message systems in Thai law, However, for clarity and to be in line with the UN Convention on Electronic Communication, it is recommended that a specific provision be added to address this.[95]

3.6 Required specific formalities and written evidence of contract under Thai law

3.6.1 Types of formality and written evidence requirements of contract under Thai law

In relation to the formation of an enforceable contract as discussed above, certain laws in Thailand also impose 'formalities' in several specific types of contracts, for which the formality requirements vary depending on the type of transactions and the relevant laws. In sum, the formalities under Thai law can be categorized as follows:

(1) A juristic act which is required to be executed in writing and registered by the competent official e.g. a contract for the sale or other disposition of an interest in immovable properties and certain

[93]UNCITRAL Model Law on Electronic Commerce with Guide to Enactment 1996 with additional article 5 bis as adopted in 1998 para 76

[94]Section 15(2) of the Thai ETA

> When any person sent a data message by any means, it shall be deemed that the data message is that of such person.
>
> As between the originator and the addressee, a data message is deemed to be that of the originator if it was sent by: (1)……; or (2) an information system programmed, by the originator or a person who had the authority to act on behalf of the originator, to operate automatically.

[95]Pinai Nanakorn, 'The Future of Electronic Transactions Law in Thailand: an Appropriate Approach to Amendment' (2016), Thammasat Law Journal 166

movable properties,[96] a contract for sale with right of redemption of immovable properties and certain movable properties[97] or an exchange contract,[98] a gift contract for immovable properties and certain movable properties,[99] a mortgage contract,[100] an acquisition by juristic act of immovable or of real right appertaining thereto;[101]

(2) A juristic act which is required to be registered by the competent officer e.g. marriage[102], divorce[103], child adoption[104], company registration[105];

(3) A juristic act which is required to be executed in writing in presence of the competent official e.g. will made by a public document,[106] bill of exchange objection[107];

(4) A juristic act which is required to be made in writing e.g. hire purchase contract,[108] agency contracts,[109] a transfer of obligation;[110]

(5) A juristic act which is required to be executed according to specific laws e.g. cheque issuance; and

[96]Section 456 of the CCC
[97]Section 491 together with Section 456 of the CCC
[98]Section 456 of the CCC
[98]Section 519 of the CCC
[99]Section 525 of the CCC
[100]Section 714 of the CCC
[101]Section 1299 of the CCC
[102]Sections 1458 and 1457 of the CCC
[103]Section 1515 of the CCC
[104]Section 1598/27 of the CCC
[105]Section 1111 of the CCC
[106]Section 1658 of the CCC
[107]Section 961 of the CCC
[108]Section 572 of the CCC
[109]Section 798 of the CCC
[110]Section 306 of the CCC

(6) A juristic act which is required to be evidenced in writing with the signature of defaulting party e.g. a loan contract in an amount over than THB 2,000.[111]

These various formalities requirements could impede the smart contract deployment in certain contexts. For smart contracts, the issue then arises as to whether an encoded smart contract, where the contractual terms are rendered in the form of computer code, would be considered to have been "made in writing" for the purposes of such required legal formality.

Fundamentally, Section 7 of the Thai ETA states that any information shall not be denied legal effect and enforceability solely on the ground that it is in the form of a data message. Under Section 8 of the Thai ETA, "in the case where the law requires that any transaction be made in writing or evidenced by writing or supported by a document which must be produced, if the information is generated in the form of a data message which is accessible and usable for subsequent reference without its meaning being altered, it shall be deemed that such information is already made in writing, evidenced by writing or supported by the produced document". However, documents containing e-signatures (i.e. data message) must also satisfy the characteristics prescribed in Section 9.[112] It also can be illustrated in the Supreme Court Decision No.

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[111]Section 653 of the Civil and Commercial Code

[112]Section 9 of the Thai ETA

> In the case where a person is to enter a signature in any writing, it shall be deemed that a data message in question bears a signature if: (1) a method is used which is capable of identifying the signatory and indicating that the signatory has approved the information contained in the data message as being his own; and (2) such method is as reliable as was appropriate for the purpose for which the data message was generated or sent, having regard to surrounding circumstances or an agreement between the parties. In determining a reliable method under (2), regard shall be had to: a. the security and strictness of the use of methods or equipment in the identification of persons, the availability of alternative methods of identification of persons, signature requirements set forth in the law, the security level of the use of the electronic signature, the compliance with authentication procedures set forth by intermediaries, the degree of acceptance or non-acceptance of the method of identification of

8089/2556 in the Quick Cash card case where the Supreme Court held that given the fact that the defendant (borrower) brought the cash card to withdraw money from an automated teller machine (ATM) by pressing password and pressing confirmation to continue the drawdown transaction, such actions of the defendant has satisfied the requirement of a loan agreement to be evidenced in writing with the signature of defaulting party according to Sections 7, 8 and 9 of the Thai ETA.

For the contracts which require registration with the Government officials or execution in presence of the government official, Section 35 of the Thai ETA provides the legal framework in relation to the transaction or information which are required under the law to be applied or registered with a State agency or by a State agency. If such transaction is made in a form of a data message in accordanc with the rules and procedures prescribed by the Royal Decree, it would fall within the application of the Thai ETA to which it shall be deemed to have the same legal effect as the act performed pursuant to the rules and procedures described by the law on that particular matter.[113] In this regard, the Royal Decree on the Rules and Procedures of Electronic Transactions in the Public Sector B.E. 2549 (the "Royal Decree") was enacted by virtue of Secton 35, which stipulates that in implementing electronic transactions in the public sector, the state agency shall make available a system for the documents in the form of data message where certain criteria will have to be met.[114] For instance:

(1) the electroic document must be generated in an appropriate form and the information must be capable of being subsequently displayed or

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persons in making transactions and the method of identification of persons at the time of making the transaction and the communication; b. the nature, kind and size of the transaction, the number of occasions on which or the frequency at which transactions take place, trade customs or practice and the importance and the value of the transaction made; or c. the strictness of communication systems. 3 The provisions of paragraph one shall apply mutatis mutandis to the affixing of seals of juristic persons by an electronic means.

[113]Sectison 35 of the Thai ETA

[114]The Royal Decree on the Rules and Procedures of Electronic Transactions in the Public Sector B.E. 2549

referred to while assuring the integrity of the information in the form of electronic message,

(2) There must be a specified period for submission of electronic documents applicable for the Public Sector;

(3) There must be procedures of identification of the signature's owner, as well as the type, feature or form of the e-signature, and authentication of the e-signature and the signor.

Currently, only a few state agencies have issued their internal regulations in accordance with such Royal Decree mainly to facilitate the filing or submission of required documents via electronic means, also known as "e-filing", for example tax e-filing of Revenue Department and financial statement e-filing of Department of Business Developent, Ministry of Commerce. Nevertheless, such e-filing is only application to certain registration matters and does not cover every type of required registration by the Revenue Department and Department of Business Development. In respect of the implementation of blockchain smart contracts for the transactions which require by law to be made in writing and duly registered with the competent authority, such as sale and transfer ownership of land and trademark licensing, it seems impossible that a smart contract would meet the required legal formality and thereby have the legal binding effect under the Thai law at this juncture. This is because the Land Department and the Department of Intellectual Property as the respective competent authorities for such transactions have no available procedures to accommodate the online registration of the aforementioned matters.

Thus, although Section 35 of the Thai ETA tends to facilitate the use of electronic transactions for matters requiring registration with the Public Sector, there remains the issue for business operators whether they would be able to complete such electronic transaction in practice. This is because, although the law provides the required criteria for Public Sector's electronic documentation system, it does not enforce the Public Sector to produce and implement the system for all of the matters or contracts that requires registration.

3.6.2 Requirement of e-signatures

In this respect, the analysis that takes into account the matter of the proof of an electronic signature is also required to determine whether the technology supports the entering into a smart contract would satisfy the requirement of e-signatures under Section 9 of the Thai ETA.

Section 9 of the Thai ETA recognizes the legal effect of all types of electronic signatures provided that they are created by a reliable method that is capable of identifying the signatory and indicating the signatory's approval of the information to which that electronic signature is affixed.[115] The Thai ETA added a specific Chapter 2 on Electronic Signatures which elaborates upon the general rule established by Section 9 in 2 principal respects, i.e. the legal presumption of reliability[116] and duties of parties concerned.

An electronic signature that meets the requirements set out by Section 26 is deemed to be reliable. In other words, the person invoking legal effect of the signature need not prove that it has been created by a reliable method, for the law presumes that it is reliable. The significant features of an electronic signature that triggers the legal

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[115]Section 9 of Thai ETA

[116]Section 26 of Thai ETA

"An electronic signature that meets the following features shall be deemed to be a reliable electronic signature:

(1) the signature creation data are, within the context in which they are used, linked to the signatory and to no other person;

(2) the signature creation data were, at the time of creating the electronic signature, under the control of the signatory and of no other person;

(3) any alteration to the electronic signature, made as from the time of its creation, is detectable; and

(4) in the case where a purpose of the legal requirement for an electronic signature is to provide assurance as to the integrity of the information, any alteration made to that information as from the time of signing is detectable.

The provisions of paragraph one does not imply any limitation that no other method exists for establishing the reliability of an electronic signature or does not limit the adducing of any evidence of the non-reliability of an electronic signature.

presumption of reliability lie in the "uniqueness" and "sole control" elements.[117] Available and widely used technology already caters to these requirements, i.e. signatures which are created by the public-key cryptography technology (commonly known as the "PKI" method).[118] PKI-based electronic signatures, called 'digital signatures', have long been recognized as very secure and are in common usage in developed jurisdictions.[119]

In this connection, a smart contract by its nature requires the use of electronic digital signatures, based on PKI encryption technology. "But instead of running a certificate authority (CA) software on a computer, which requires backups, maintenance, etcetera, the CA will be run on a blockchain instead. When the single computer is replaced by a group of connected computers and when the code is accessible to anyone, PKI will be even more robust and trustworthy", says Mohammad Alhaj Ali, who has done his master's thesis on blockchain.[120] Therefore, it could be concluded that the technology supports the entering into a smart contract would satisfy the requirement of e-signatures under Section 9.

[117] Nanakorn (n55)

[118]The PKI method involves the use of a key pair-the private key and the public key. These secret keys are assigned by a computer and bear an algorithm association. The message to be digitally signed will be encrypted by the private key to constitute a digital signature, which will then be affixed to the original message. In effect, to generate enhanced security and enable the original message to be smaller in size, a *hash function* may also be employed before the encryption by the private key. The counterpart key-the public key- is to be used in the process of verification of the signature and the digitally signed message.

[119] Nanakorn (n55)

[120]'Public key infrastructure (PKI) will soon run on blockchain technology' (2017) <https://www.nexusgroup.com/blog/public-key-infrastructure-pki-blockchain-technology/> accessed 20 June 2017

Concluding remarks

Given the above analysis, it is not yet clear whether smart contracts will be legally binding under Thai law. Although it is reasonable to assume that the contract is formed under the CCC, which is a substantive law governing the principle of the formation of a contract as the offer and acceptance can be found, and validity of electronic transaction by any electronic means is recognized under the ETA, there is the lack of specific legal provisions to directly deal with contracts formed by the automated message system or electronic agent and that may leave uncertainty regarding the validity and enforceability of smart contracts under Thai law.

CHAPTER 4
THE ENFORCEABILITY OF SMART CONTRACTS UNDER FOREIGN LAWS

This Chapter will provide comparative studies on enforceability of smart contracts under foreign laws. It will aim to analyze and evaluate the existing legislations, and developments, if any, and their impact on facilitating blockchain smart contracts with emphasis on contract formation and legal formality requirements.

For this Chapter, the writer chooses to do a comparative study on laws of the Commonwealth of Australia ("Australia") and the Republic of South Africa ("South Africa") as the writer has found through various research that the laws of both jurisdictions are substantially advanced and aim to encourage the business community to engage via smart contracts and electronic transactions. Similar to Thailand[121], Australia has expressed intention to adopt the UN Convention on Electronic Communication, a treaty that aims at facilitating the use of electronic communications in international trade.[122] Even though it is neither a signatory state nor a contracting party to the UN Convention on Electronic Communication, Australia has already implemented the provisions of the Convention into its domestic legislations, namely, Electronic Transactions Amendment Act of 2011. Thus, in the writer's opinion, this law is one of the most interesting law that should be analyzed as it is the law of a country which has not yet become the contracting party to the UN Convention on Electronic Communication but has amended and updated its electronic transactions regime to align with the Convention.[123]

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[121] Jirapan Boonnoon, 'ICT Ministry Amending ACT' (2012) The Nation

[122] Australian Government, Attorney-General's Department, 'Australian e-commerce review-UN Convention on Electronic Communications'<http:www.ag.gov.au/Copyrigt/Pages/AustralianEcommercereviwUNconventionElectronicCommunications.aspx.>

[123] 2010-2011 The Parliament of the Commonwealth of Australia & The House of Representative, 'Electronic Transaction Amendment Bill 2011 Explanatory Memorandum' (Circulated by authority of the Attorney-General, the Hon Robert McClelland MP)<http://www.austlii.edu.au/au/legis/cth/bill_em/etab2011346/memo_0.html>

While South Africa has not officially shown the intention to adopt such UN Convention on Electronic Communication, the writer has found that it has incorporated the concept of the use of an automated message system in electronic transactions, which is one of default rules of the Convention, in its own legislation, namely the Electronic Communications and Transactions Act 25 of 2002.[124] Moreover, although this legislation essentially recognizes the same concept as the Electronic Transactions Amendment Act of 2011 of Australia, the pattern of language used is different from that of the Australian Act. Accordingly, it is interesting to learn the legal status of smart contracts from the South African perspective.

4.1 AUSTRALIA – Legal formation of smart contract under Australian law

4.1.1 Legislative Framework for Electronic Transactions

The main national legislation governing electronic transaction is the Electronic Transactions Act 1999 (Cth) as amended by Electronic Transactions Amendment Act 2011 ("Australian ETA"), which was passed as part of the "strategic framework for the development of the information economy in Australia".[125] The aim of this legislation is to enable electronic commerce to operate on the same footing as traditional, paper-based commerce. The Australian ETA is based on the United Nations Commission on International Trade Law Model Law on Electronic Commerce of 1996[126] and applies all the changes proposed by the Convention the UN Convention on Electronic Communication. To a large extent, the Australian ETA simply clarifies certain existing Common Law principles as they apply to electronic transactions, rather than considerably departing from the established rules of Australian contract law. The Australian ETA also clarifies the traditional rules on contract formation to address the needs of electronic commerce, including the recognition of automated message

[124]Guide to the ECT Act in South Africa <https://www.michalsons.com/blog/guide-to-the-ect-act/81>

[125]Revised Explanatory Memorandum, Electronic Transaction Bill 1999 (Cth)

[126]Ibid.

systems, updating the electronic signature provisions and default rules for time and place of dispatch and receipt.[127]

4.1.2 Formation of Contract under Australian Law

The Australian legal system is based on the English legal system. With respect to smart contracts, the general Common Law principles of contract formation still apply. English law stipulates the general elements of a legally binding contract although there is no specification of any particular method or form; unless it is a statutory requirement, which will be discussed subsequently.[128] Thus, it is generally acceptable that a contract may be formed through an exchange of electronic data, such as correspondence of emails or completion of a document or a click of a button on the internet by a party which is then submitted to another party electronically, whether it be a sale of good, licensing of a product, or supply of service.

In terms of contract formation, Section 8 of the Australian ETA establishes the essential rule that a transaction is not invalid merely because it took place by means of electronic communication. A requirement to give information in writing is satisfied if it is given electronically, provided that it will be reasonably accessible in future and the recipient has consented to electronic provision.[129] The Australian ETA also sets out the requirements for a valid signature by electronic means[130] and clarifies when electronic communications are deemed to be sent and received.[131]

It is important to also take into account the "automated features" of smart contacts. With blockchain technology, parties may conclude and execute contracts without any human involvement. In this respect, Section 15C of Australian ETA stipulates that a contract formed by the interaction of an automated message system and

[127]2010-2011 The Parliament of the Commonwealth of Australia & The House of Representative (n 123)
[128]Refer to section 4.1.5
[129]Section 9 of the Australian ETA
[130]Section 10 of the Australian ETA
[131]Section 14 of the Australian ETA

a natural person, or the interaction of automated message systems,[132] such as computer programs initiated or generated by the systems, is not unenforceable purely for the reason that no natural person was involved in the contract execution process. Thus, any contract executed via an electronic agent is not invalid or unenforceable even though there were no natural persons involved in the transaction.[133]

Therefore, the Australian ETA essentially recognizes that as long as the Common Law elements of contract formation are met, smart contracts constitute as binding and valid contracts. Under the common law principles, there are 4 key elements of contract that must be satisfied to establish a binding and valid contract as follows:

(1) Offer and acceptance

(2) consideration

(3) intention to create legal relations

(4) certainty / completeness of terms.

Nevertheless, some of the common law elements create certain issues for smart contract formation; in particular the offer and acceptance.[134] Each of the element will be examined below.

[132]Under the Australia ETA, "*Automated message systems*" is defined as "a computer program or an electronic or other automated means used to initiate an action or respond to data messages in whole or in part, without review or intervention by a natural person each time an action is initiated or a response is generated by the system."
[133]Norton Rose Fulbright (n36)
[134]Norton Rose Fulbright (n8)

4.1.2.1 Offer and Acceptance

Under English law, offer and acceptance are assessed objectively[135]. The reason for this objective approach is that it is not possible to ascertain a person's private or subjective intention when bargaining for a contract.[136]In the earlier form electronic transactions, email messages have been presumed by the English courts to be capable of establishing offers and acceptances.[137] There should be no theoretical objection to using any form of electronic message for this purpose. Smart contracts, for instance, are typically initiated by messages sent using public key infrastructure (PKI) over the Internet.

The Australian ETA, and its State equivalents, do not affect the application of common law principles in relation to making an offer. In Common Law systems, an offer is an expression of willingness, either by word or conduct, to enter in to a contract in specified terms.[138] The terms of an offer must be sufficiently clear to allow a contract to be formed by acceptance without further negotiation and the intention of the person making the offer to be bound by those terms must be clear.[139] An offeror will be bound if his offer terms are able persuade the counter party or a reasonable third party, as the

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[135]*Centrovincial Estates v Merchant Investors Assuarance Co., Ltd.* [1983] Com LR 158 the court held that the contract was not rendered void by the mistake, as an objective approach was taken. The reasoning behind this decision is that, if the law were to take into consideration whether there was reliance on promises, then this would result in depriving contractual agreements of stability until they are actually relied upon. This would undermine the essential predictability, contractual stability and certainty that are advanced by the objective approach in its existing state. The objective test here would be, what would have been the intentions of a reasonable person and in this case, mistake was not interpreted as mistake by the offerees.

[136]Laurence Koffman, Elizabeth Macdonald, '*The Law of Contract'* (6thedn, Oxford University Press 2007) 9.

[137]J *Pereira Fernandes SA v Mehta* [2006] EWHC 813; and *Thomas v BPE Solicitors* [2010] EWHC 306. In *Golden Ocean Group Ltd v Salgaocar Minining Industries PVT Ltd* [2012] EWCA Civ 265 the Court of Appeal found that the exchange of a number of emails could lead to the conclusion of an agreement.

[138] As defined in Butterworths's Concise Australian Legal Dictionary, 2nded, 2003.

[139]Sharon Christensen, 'Formation of Contract by Email – Is It Just the Same as Post?', Queensland University of Technology Law and Justice Journal, 2001, Vol. 1, No.1, p 26.

case may be, to believe that he intends to be bound, even if in fact he has no such intention.[140] In case an offer fails to meet the aforementioned elements, it will be considered as an 'invitation to treat', which cannot become a binding contract through acceptance of its term as it merely demonstrates a party's willingness to negotiate a contract.[141] This is often seen in the case of advertisements. In a more modern example, consumers can now access to various automated interactive websites on the internet in order to purchase goods or service. In this regard, Section 15B of the Australian ETA stipulates that a proposal to form a contract made though electronic communications which is not addressed to specific parties and is generally accessible to everyone is to be considered as an invitation to treat.[142] Thus, the placement of goods or service on the interactive sites are merely invitation to treat[143] and the offer and acceptance would have been made in case where the party decides to make purchase of the goods/service by entering his/her credit card details on the site (an offer to buy), which the computer program will automatically process the order and payment (an acceptance to sell) and deliver the goods to the consumer.

With respect to acceptance, the method of acceptance is not prescribed under common law and it substantially depends on the fact and situation. A contract may be formed once a corresponding acceptance is communicated to the offeror.[144]In

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[140]In *Stover v Manchester City Council* [1974] 1 WLR 1403, a new city council refused to proceed with the sale of a dwelling and premises to a sitting tenant, the plaintiff. The sale had been arranged by the previous council. The plaintiff had signed the form sent to him by the council, and only the date when lease would be regarded as having ceased and mortgage payments would commence was left open on the form. The Court had decided that intention to bind was there, and that filling in the date was a mere administrative formality and, therefore, there was a firm offer made.

[141] *Partridge v Crittenden* [1968] 1 WLR 1204.

[142]Section 15B of the ETA defines an invitation to treat as (1) A proposal to form a contract made through one or more electronic communications that:(a) is not addressed to one or more specific parties; and (b) is generally accessible to parties making use of information systems; is to be considered as an invitation to make offers, unless it clearly indicates the intention of the party making the proposal to be bound in case of acceptance.

[143]Section 15B extends to proposals that make use of interactive applications for the placement of orders through information systems.

[144]Provided also that other elements, such as consideration, intention to be bounds and certainty of terms, are presented.

the context of electronic transactions, in *Brinkibon v Stahag Stahl Und Stahlwarenhandelsgessellschaftmbh,*[145]the House of Lords held that an agreement is concluded when and where communication of acceptance is received in relation to instantaneous modes of communication acceptance is deemed to be received when it is given to the offeror. In case of non-instantaneous communications, acceptance may then be subject to the postal acceptance rule,[146] which deems a contract to be complete and binding at the time the acceptance is posted, rather than at the time the acceptance is actually received.[147]This aged Common Law principle creates several issues in modern day electronic transaction. For instance, if we apply the postal acceptance rule to email communication, an email contract would be formed when the acceptor sent the acceptance by pushing the send button on his/her computer, as opposed to being formed when the offeror receives the acceptance.[148]

In terms of smart contracts, which is essentially an automated-computer program, the establishment of the point of offer and acceptance is often debatable. Smart contracts allow users to identify the rules relevant to the transaction on the Blockchain platform. For instance, users could specify particular timeframes and the requirement of multiple signatures in order for execution. The agreement is subsequently implemented by a computer in correspondence with defined inputs and will be enforced on its specific terms. In such scenario, there must existing a prior-arrangement or prerequisites of the transaction between the contracting parties (users), and once the electronic communication has been engaged to a specific party, it is assumed that such communication is deemed as an offer that is open for acceptance by the counterparty in order to create legally binding rights and obligations.[149]

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[145]*Brinkibon v Stahag Stahl Und Stahlwarenhandelsgessellschaftmbh*[1983] 2 Ac 34.
[146] Ibid
[147]The postal acceptance rule was adopted because of the time delay between posting and receipt of a letter and because having posted a letter, the person who has posted it loses all control over it.

[148]Hill Simone, Hill, Simone W. B, '*Email Contracts - When is the Contract Formed?*' [2001] JlLawInfoSci 4; (2001) 12(1) Journal of Law, Information and Science 46

[149]Norton Rose Fulbright (n36)

4.1.2.2 Consideration

While consideration is not a required element under Thai contract law, it is an essential element of contract formation under the English law. Fundamentally, consideration is the price or value that is asked by the promisor in return of their promise, i.e. the promisee must provide a payment or an exchange of some kind for a contract to be binding.[150] It should be noted that the Australian courts do not concern themselves with the question whether "adequate" value has been given, and in many circumstances, they readily find consideration for commercial arrangements made in a purportedly contractual context. Consideration can even be constituted by mutual promises where neither party is obliged to do anything at the date of signing but at some future date. In the absence of express smart contract terms providing for consideration, an Australian court is likely to look to see if there is an exchange of value, or mutual benefit and burden, in considering whether a smart contract's consideration is met.[151]

As previously stated, consideration concerns the price or value determined by the promisor for promise made. In this regard, the "price" under this common law principle does not necessarily have to be of monetary value and can be in any form as long as it is not illegal.[152] However, consideration must be in some form of value and constitute either a "detriment" to a promisee or a benefit to a promisor.[153] The detriment to be suffered means the promisee is required to give up something or undertake an obligation in exchange of a promise, which in turn constitutes the benefit received by the promisor.[154] In some cases, it is not necessary for the promisor to receive any direct benefit from the promisee's detriment. In the landmark case of *Carlill v Carbolic Smoke Ball,*[155] the Plaintiff, Mrs**.** Carlill, purchased the **'**carbolic smoke ball**'** manufactured by

[150]Koffman and Macdonald (n136)
[151]Norton Rose Fulbright **(**n36**)**
[152]*Dunton v Dunton*(1892) 18 VLR 114.
[153]Paterson, Robertson & Duke, *Principles of Contract Law (*Lawbook Co, 3rd ed, 2009), pp 74
[154]*Currie v Misa* (1875) LR 10
[155]*Carlill v Carbolic Smoke Bal* QB 256; [1892]

the Defendant**.** The Defendant**'**s advertisement claimed that their product can prevent its users from contracting influenza and that the Company will pay rewards to those who manages to contract the said disease or similar illness**.** The Plaintiff purchased and used the product as advertised then contracted the flu and subsequently sued the Defendant to claim the reward**.** The Court established that there was a valid offer made by the Defendant through its advertisement, which was duly accepted by the Plaintiff in purchasing and using the product, and further deemed there was valid consideration in that(i) the Defendant received a benefit from the sales directly beneficial to them by advertising the products and (ii) the direct inconvenience (i.e. the detriment suffered by the Plaintiff) of specific performance required by the person who uses the products as directed by Defendant.

For smart contracts, the terms and conditions of the transaction (i.e. the promise) would be pre-defined using computer codes by the contracting parties. Such data will then be stored and simulated on a platform, e.g. a blockchain such as Ethereum, where the pre-defined terms will automatically be executed by a network of computers.[156] By applying the common law principle regarding consideration to such an operating process, it is deemed that there is valid consideration as the automated execution of the terms will originate from consideration of precise actions to be taken by the contracting parties in performing the contract.[157]

4.1.2.3 Intention to create legal relations

Even if a transaction is supported by consideration, it will not be a legally binding contract under English law if it the parties did not have an intention to create legal relations. Under English law, an intention to create legal relations is measured objectively. In most circumstances, the existence of consideration will prove the

[156]https://bitsonblocks.net/2016/02/01/a-gentle-introduction-to-smart-contracts/ (1 February 2016) retrieved on 5 July 2017.
[157]C.D.Clack, V.A.Bakshi and L.Braine; 'Smart Contract Templates: essential requirements and design options' December 2016<http://www0.cs.ucl.ac.uk/staff/C.Clack/SCT2016.pdf>

parties' intention to create legal relations, that is, once the promisor has specified the price for the promise it would often convey an intention that the parties be bound. As discussed in *Merritt v Merritt*, the objective test that the Court implement is whether the party manifested or appeared to have manifested, as could be reasonably perceived, an intention to be legally bound, not whether it actually had the intention to be so.[158]If an agreement is being prepared in a commercial context, there is a common law presumption that the parties automatically has the intentional to be legally bound.[159] However, in 2002 the High Court of Australia in *Ermogenous v Greek Orthodox Community of SA Inc*,[160] dismissed the general rule of presumption and that the parties' intention to create legal relations should be considered based on the facts of each case instead.

If the other requirements for a legally binding contract are satisfied in the case of a smart contract, it may be difficult for a party to assert, as against the other party who acted in reliance on it, that there was no intention to create legal relations in relation to the smart contract.[161] As smart contracts are generally made in business contexts, it is objectively understood by relevant parties that they have an intention to be legally bound.

4.1.2.4 certainty / completeness of terms

Where contractual intention is expressed in such imprecise terms that no clear meaning can be given to it, there will be no binding agreement.[162]For these reasons smart contracts that operate purely to digitize processes may, in the absence of contractual terms relating to them, simply lack contractual force on the basis that their terms are incomplete, too vague or too uncertain. On the other hand, where a smart contract's terms are embodied in code alone (in the absence of a natural language

[158]*Merritt v Merritt* [1970] 1 WLR 1211, 1213.
[159]Ibid
[160]*Ermogenous v Greek Orthodox Community of SA Inc* (2002) 209 CLR 95.
[161]Norton Rose Fulbright **(**n36**)**
[162]Koffman and Macdonald (n136)

rendering), if there is a lack of certainty relating to them, an Australian court may be willing to admit expert evidence as to the meaning of the code.[163]

4.1.3 Time of Dispatch and Receipt of Data Message

Under the Australian ETA, the time of dispatch of the electronic communication is the time when the electronic communication leaves an information system under the control of the originator or the time when the electronic communication is received by the addressee in case where the parties exchange electronic communications through the same information system.[164] For time of receipt, Australian ETA provides that if the electronic transaction is communicated by the originator through a designated electronic address then the time of receipt of the electronic communication is the time when the electronic communication becomes capable of being retrieved by the addressee.[165] However, if such designated electronic address does not exist, the time of receipt is deemed to be the time when the electronic communication has become capable of being retrieved and the addressee has become that it has been sent to that address.[166]

4.1.4 Place of Dispatch and Receipt of Data Message

In respect of the place of dispatch and receipt, the Australian ETA provides that the place of dispatch of an electronic communication will be deemed to have taken at the place of business of the originator and receipt of such will be deemed to have taken at the place of business of the addressee.[167]

Notwithstanding the foregoing, this legal provision under the Australian ETA also states that the time of receipt, and place of dispatch and receipt could also be

[163]Norton Rose Fulbright (n36)
[164]Section 14(1) of the Australian ETA
[165] Section 14A(1)(a) of the Australian ETA.
[166] Section 14A(1)(b) of the Australian ETA.
[167] Section 14B of the Australian ETA.

agreed otherwise between the contracting parties (i.e. the originator and addressee of the electronic communication).[168]

4.1.5 Use of Automated Information System for Contract Formation

Section 15C of the Australian ETA provides that "a contract formed by the interaction of an automated message system and a natural person, or the interaction of automated message systems, is not unenforceable purely for the reason that no natural person was involved in the contracting process[169]". An "automated message system"[170] includes a computer program, without review or intervention by a natural person each time an action is initiated or a response generated by the system.

Accordingly, a contract concluded between a natural person and an "electronic agent" (as discussed above), or even between two "electronic agents", is not unenforceable purely for the lack of human involvement. This means that, even in cases where an agreement is reached through the interaction of two smart contracts, such an agreement will not be unenforceable purely because no natural persons were involved.

However, it should be noted that, in some cases, where a natural person is involved in electronic contracting, there is a right to withdraw certain electronic communications where an error has been made by the natural person. This is achieved by contact with the system, as long as that is done as soon as possible and no material benefit has been received by that time by the party who made the error.[171]

4.1.6 Required specific formalities of legal contract under Australian Law

[168] Ibid
[169]Section 15C of the Australian ETA
[170]Section 5 of the Australian ETA
[171]Section 15D of the Australian ETA

Legal contracts under Australian law can be formed without compliance of required formalities. Therefore, while it is more difficult to prove the validity of contracts, such as in case where a contract is made entirely or partly orally or not in writing, the formality is a matter of evidence and procedure only and is not relevant to the validity of a contract.[172] Nevertheless, some Australian statutes do impose special form requirements for specific types of contracts, which may require the contracts to be written, signed, sealed and delivered, or that a certain number of witnesses see the contracting party sign the document. A classic piece of legislation that imposed form requirements was the Statute of Frauds 1677 (UK) which was principally designed to reduce fraudulent contractual claims; it made certain contracts unenforceable unless they were in writing, or in some cases, there was some written evidence of the contract. The Statute of Frauds has since influenced Australian laws on the required formality of contracts, e.g. the Electronic Transactions Act 1999 (Cth) and each Australian State law has remnants of the Statute of Frauds in their own legislation, e.g. the Electronic Transactions Bill 2011 of the State of Western Australia (WA) and the Electronic Transaction Act 2000 (NSW).

4.1.6.1 Types of formality requirements of contract under Australian law

In sum, the required contract formalities under Australian law can be categorized as follows:

(1) Instruments or contracts which are required to be executed in writing and registered by the competent official e.g. an instrument for transfer of any estate or interest inland, mortgage or charge of land.[173]

(2) Instruments or contracts which are required to be made in writing e.g. contracts for disposition of an interest in land, a disposition by a

[172]Julie Clarke, 'Australian Contract Law' (2013) <https://www.australiancontractlaw.com> accessed 20 January 2017
[173]Transfer of Land Act 1893 (WA) s. 58

person of an equitable interest or trust and a declaration of trust by a person in relation to an interest in land.[174]

(3) Instruments or contracts which are required to be evidenced in writing and signed by the person against whom the action is brought. e.g. contracts for the sale or other disposition of an interest in land,[175] contracts of sale of goods that are valued above a specified amount[176]and certain consumer contracts.

(4) Other types of contracts that have special form rules include – bills of exchange, cheques, wills, contracts of insurance, requests for credit cards, guarantees and loan documents.

It is worth noting that, Sections 9 and 10 of the Australian ETA in the case where the law requires or permits a person to give information[177] to the authority (Commonwealth entity), it is deemed the entity's requirement has been met if it is done by way of electronic communication. In other words, it is now the possible to satisfy this requirement electronically. As such, these provisions could facilitate and get rid of potential obstacles to the operation of a smart contract in terms of formalities requirement which dealing with the competent authorities.

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[174]Civil Law (Property) Act 2006 s. 201
[175]Instruments Act 1958 (Vic) s. 126, Conveyancing Act 1919 s. 54a, Law Of Property Act S.62, Property Law Act 1974 S. 59, Law Of Property Act 1936 S. 26
[176]Sale of Goods Act 1896 (TAS) s.9 and Sale of Goods Act 1895 (WA) s.4
[177]Giving information includes but not limited to the following:
(a) Making and application;
(b) Making or lodging a claim;
(c) Giving, sending or serving a notification;
(d) Lodging a return;
(e) Making a request;
(f) Making a declaration;
(g) Lodging or issuing a certificate;
(h) Making, varying or cancelling an election;
(i) Giving a statement of reason.

4.1.6.2 Requirement of electronic signatures

As mentioned previously, the Australia ETA provides the general rule that formation and execution of an agreement by electronic means shall be recognizable and valid if all of the elements under the Australian law, including common law precedents, as well as international guidelines are satisfied.[178] In addition to the common law requirements for a normal contract, a contract formed electronically is legally valid if:

(1) the contract is stored appropriately and can be accessed after execution; and

(2) there has been consent between the parties, expressly or impliedly, to receive information electronically.[179]

The problem with a commercial transaction conducted through electronic means is the verification of each parties' identities and, thereby, ascertaining the consent between the parties to execute and complete the transaction; particularly in circumstances where parties to transactions are not dealing with each other face-to-face. Thus, electronic signatures, a signature that is used on electronic transaction, have since been developed and utilized with the attempt to minimize such problem. Section 10 of the Australian ETA stipulates specific requirement of a valid electronic signature:

(1) there must be consent by the recipient to receive information electronically;

(2) the method of signing must identify the person sending the information, and indicate that this person approves of the content of the electronic document signed; and

[178]Articles 8 and 9, *United Nations Convention on the Use of Electronic Communications in International Contracts (Electronic Communications Convention) (2005) GA res 60/21*; Section 8(1) of Electronic Transactions Act 1999 (Cth)
[179]Section 9(2) of the Australian ETA

(3) having regard to all of the circumstances of the transaction, the method of signing must be as reliable as is appropriate for the purposes for which the electronic document was generated. Alternatively, evidence of the identity of the signatory and their approval of the contents of the electronic document must be self-evident in the document or otherwise available in some other manner.[180] This reaffirms the need as stated above to ascertain the identity of the signatory and concretely prove the same.[181]

Nevertheless, the problem with electronic signature still lies with the proof of identity of the signatory in a setting where the signature is not witnessed by another person. In addition, there is also another problem that the content of the document could be amended after being signed. Therefore, digital signatures have been introduced to try and minimize these risks.[182]Digital signature is a form of electronic signature that uses a cryptic mathematical function and private key verification scheme in order to determine the identity of a person. The use of a simple mathematical algorithm to authenticate the identity of a sender of electronic communication ensures greater security in electronic transactions. The parties agree upon an equation that may appear at first to be a random set of numbers, but is in fact a means of identification and approval.

4.2 SOUTH AFRICA - Legal formation of smart contract under South African Law

[180]Section 10(1) of the Australian ETA
[181]Hayden Delany and Briar Francis;
<http://www.hopgoodganim.com.au/page/Publications/HG_IP_IT_Alert_Electronic_signatures_and_their_legal_validity_in_Australia_%E2%80%93_13_July_2015/>
[182]Ibid

South African law is a 'mixed legal system'[183], a combination of different legal systems, with its origins deriving from both the European continent and Great Britain. The foundation of South African law is Roman-Dutch law, which is itself a blend of indigenous Dutch customary law and Roman law. South African law in general, comprises 'Common Law' and statutory law.[184]

4.2.1 Legislative Framework for Electronic Transactions

After several years of legal uncertainty as to whether a data message is a valid form of contract that could have legal obligations on the person using it, the South African parliament assented to and brought into force the Electronic Communications and Transactions Act, Act 25 of 2002 ("ECTA") on 2nd August 2002. The preface of the ECTA clearly indicates that this is a pioneer legislation, which has managed to fill in a legal loophole to bring the law in line with the advance of technology. Prior to the enactment of ECTA, the South African Court in *Council forScientific and Industrial Research v. Fijen*[185] expressed the view that this new type of means of negotiation, communication and correspondence was a valid means of expressing intent in an action for termination of an employment contract in terms of the Labour Relations Act 28 of 1956. The Court further stated that the mode of dismissal by way of e-mail was regarded as a coherent form of communication of which a printout could form sufficient basis for the plaintiff's action.[186] The recognition of data messages has now been entrenched into legislation by virtue of Section 11 of the ECTA. It correspondingly shadows

[183]University of Ottawa, 'World Legal Systems', < http://www.juriglobe.ca/eng/sys-juri/class-poli/sys-mixtes.php>
[184]DocuSign, Inc. 'eSignature Legality in South Africa'<https://www.docusign.com/how-it-works/legality/global/south-africa> accessed 19 June 2017
[185]*Scientific and Industrial Research v. Fijen* 1996 (2) S.A.(A)
[186]Sizwe Snail, 'Electronic Contracts in South Africa – A Comparative Analysis', (2008)2 Journal of Information, Law & Technology (JILT) <http://go.warwick.ac.uk/jilt/2008_2/snail> accessed 12 June 2017

Articles 4 and 11 of UNCITRAL Model Law on E-Commerce[187] as well as Article 8(1) of UN Convention on Electronic Communication.[188]

4.2.2 Formation of Contract under South African Law

The South African law of contract requires that the following elements of a contract must be present to be a legally binding agreement between any parties: consensus, contractual capacity, certainty, lawfulness, physical possibility and formalities:[189]

4.2.2.1 Consensus

Consensus requires that in order for a contract to be concluded that an offer created by one party must be unequivocally accepted by another resulting in the creation of consensus amongst the parties. As a general rule once a contractual party develops a will or intention which concurs with the will or intention of the other contractual party consensus is said to have been reached, therefore an acceptance of an offer constitutes consensus.[190]

Offer

[187]Article 4(1) and (2) read together with Article 11 (1) which reads "As between parties involved in generating, sending, storing otherwise processing data messages, and excepts as otherwise provided…..the provisions of may be varied by agreement…it does not affect any right that may exist to modify by agreement any rule of law" an "In the context of contract formation, unless otherwise agreed by the parties, an offer and acceptance of the offer may be expressed by means of data messages. Where a data message is used in the formation of a contact, that contract shall not be denied validity or enforceability on the sole ground that a data message was used for that purpose."

[188]A communication or a contact shall not be denied validity or enforceability on the sole ground that it is in the form of an electronic communication.

[189]Saambou-Nasionalebouvereiningv. Friedman 1979 (3) SA 978 (A)

[190]Thobile Viola Mbhele, 'The South African Law of Contract as Influenced by the National Credit Act 34 of 2005: An Evaluation', (Master in Mercantile Law Thesis, the University of Pretoria, Faculty of Law)

The requirements for a valid offer are: the offer must contain sufficient information to enable the other person to whom it is addressed to form a clear idea of exactly what the offeror has in mind[191]; and the offer must be a form offer; a tentative statement with possible agreement in mind is not sufficient.[192]

An offer has a certain set of requirements as follows:[193]

(1) An offer must be firm with the intention that acceptance thereof would create a binding contract.
(2) The offer must be completed in the sense that all of its material terms are included in the offer itself.

(3) The offer must be clear and certain for the other party to only accept by answering with a positive statement.

(4) The offer must be in a plain and understandable language that an ordinary person in the class of persons for whom the notice, document or representation is intended, with average literacy skills and little experience as a consumer of particular goods or services, could be expected to understand the content, significance and import without undue effort.

Acceptance

[191] *Humphreys V. Casells* 1923 TPD 280
[192] *Efroiken v. Simon* 1927 CPD 367
[193] Rulich Pretorius, 'Law of Contract: Comparison between the South African and English Law of Specific Contracts', (Master in Mercantile Law Thesis, Faculty of Law, University of Pretoria)

Acceptance can be done expressly or by implication.[194] The requirements for a valid acceptance are:[195]

(1) the acceptance must be unconditional/unequivocal;

(2) the offer must be accepted by the person to whom it was addressed;

(3) the acceptance must be in response to the offer;

(4) the acceptance must comply with formalities, if applicable *(Brand v Spies 1960 (4) SA 14*, where a contract of sale of land that failed to satisfy statutory requirements in terms of sec 2 (1) of Land Alienation act was deemed in valid)

Acceptance, as a general rule takes place at the time and where the offeror learns of the acceptance.[196]

With respect to the formation of electronic agreements, Section 22 of the ECTA states that "an agreement concluded between parties by means of data message is concluded at the time and place where the acceptance of the offer was received by the offeror". Section 23 of the ECTA deals with the time and place of communication, dispatch and receipt, and states that a data message must be regarded as having been received by the addressee at the addressee's usual place of business or residence and when the complete data message enters an information system designated or used for the purpose by the addressee as is capable of being retrieved and proceeded by the addressee, for instance, when an email arrives in an inbox.

[194]Ibid
[195]Snail (n 186)
[196]Pretorius (n 193)

In relation to smart contracts, the writer views that the contract may be concluded when party A's information system receives a notification that party B has accepted the offer, and is concluded at party A's usual place of business.

4.2.2.2. Contractual Capacity

Capacity comprises of two key elements namely: the competence to articulate a will and the competence to act with sound mind with respect to that will.[197] In order to ascertain as to which persons possess contractual capacity it is worth to first understand the definition of the term "person" under South African law. "Person" is the carrier of the rights and obligations and accordingly, processes legal capacity.[198] The law presumes that every living person and/or juristic person has contractual capacity. However, this may be restricted due to age.[199] Only a person who is above the age of 18 years has full contractual capacity. Minors (who have not yet reached the age of 18 years) have limited contractual capacity and they may only conclude contracts with the assistance of their guardians.[200] In the case of infant[201]and intoxicated person, they have no contractual capacity whatsoever which means that their capacity to act are fully prohibited even in concluding contracts which benefit them.[202]

4.2.2.3. Certainty

A contract must create certainty regarding its legal consequence and performance.[203] Under the common law principle, the terms or conditions of an

[197]Mbhele (n 190)
[198]Chris Nagel, *Business Law*, (LexisNexis South Africa 2016)
[199]Section 17 of the Children's Act 38 of 2005
[200]Nagel (n198)
[201]Under the term of South African Law, a person who is below the age of 7 years
[202]Christie RH and Bradfield GB, *Christies Law of Contract in South Africa*, (7thedn, LexisNexis South Africa 2016)
[203]Van Der Merwe S, Van Huyssteen LF, Reinecke MF and Lubbe GF, *Contract General Principles* (4thedn, Juta Cape Town 2012)

agreement must be certain or ascertainable.[204] A term in a contract will be certain if there is no doubt about the execution or performance of the term in the contract[205] and it will be ascertainable if it is capable of being found with certainty.[206] In the event that the terms in the contract are vaguely described to the extent that it is not clear what are the parties' agreement, the contract will be declared null and void. Nevertheless, in some cases, instead of the whole contract being declared void for uncertainty the courts will endeavor to interpret the contract as being valid by overlooking the unclear terms if such terms can be severed from the remaining parts.[207]

[204]Bhana D, Bonthuys E and Nortje M, *Student's Guide to the Law of Contract* (3rd edn, Juta Cape Town (2013).
[205]ibid
[206]Fouche´MA, *Legal Principles of Contract and Negotiable Instruments*, (5thedn, LexisNexis Butterworths Durban 2002)
[207]Bhana, Bonthuys and Nortje (n 204)

4.2.2.4. Unlawfulness

A contract must be lawful and not contrary to the common law, any statue, public policy or good morals. A contract which does not meet the requirement of legality may be void and unenforceable.[208] The decision in *Sasfin (Pty) Ltd v Beukes*[209]has been the leading case in terms of contracts contrary to public policy holding that agreements clearly inimical to interests of the community, whether contrary to law or morality or social or economic expedience, not enforceable on grounds of public policy.

4.2.2.5. Physical Possibility

It is a general requirement that performance of a contract must be determined or determinable at the time of its conclusion.[210] If the terms of the contract are such that it is empirically impossible to render the performance of such contract, it does not create any legal obligation and therefore renders the contract void[211].

4.2.2.6. Formalities

In the contract law context, the formalities of a contract are the invisible appearance of the contract, for example whether or not the contract is in writing and signed by the relevant parties.[212] Generally, there are no formalities that need to be complied with for the conclusion of a valid contract.[213] A contract can either be verbal, in writing or even implicit.[214] However, certain types of contracts require formality, and

[208]Mbhele (n190)
[209]*Sasfin (Pty) Ltd v Beukes* 1989(1) SA 1(A)
[210]Bhana, Bonthuys and Nortje (n 204)
[211]Van Der Merwe, Van Huyssteen, Reinecke and Lubbe (n 203)
[212]Nagel (n 198)
[213]Fouche´MA (n 206)
[214]Van Der Merwe, Van Huyssteen, Reinecke and Lubbe (n 203)

these legal requirements vary. Details of legal formality requirement shall be further discussed in the next section.

4.2.3 Time of Dispatch and Receipt of a Data Message

The time and place of conclusion of electronic contacts are regulated by Section 22 (2) of the ECTA[215], which places the time and place of conclusion at the time and place where the originator receives the addressee's message. Since the transmission of data messages usually occurs in the manner of the sender's computer sending small data packets that eventually arrive at the recipient's computer in order to form the original message, it could become rather technical in certain instances when trying to establish the exact time when the messages is deemed to have been sent or received.[216]

The ECTA provides specific rules for determining the time of dispatch and receipt of electronic communication.[217] It is interesting to note that Section 23 of the

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[215]Section 22(2) of the ECTA states the following:

"An agreement concluded between parties by means of data message is concluded at the time and place where the acceptance of the offer was received by the offeror.'

[216]Snail (n 186)

[217] Section 23 of the ECTA states the following:

"A data message

(a) used in the conclusion or performance of an agreement must be regarded as having been sent by the originator when it enters an information system outside the control of the originator or, if the originator and addressee are in the same information system, when it is capable of being retrieved by the addressee;

(b) must be regarded as having been received by the addressee when the complete data message enters an information system designated or used for that purpose by the addressee and is capable of being retrieved and processed by the addressee; and

ECTA suggests two different possible scenarios of data message communications. The first part of Section 23(a) deals with electronic data messages that are sent by persons who are either sending them via Internet or other long-distance communication platform, for which the dispatch of a data message is deemed to occur when it enters an information system outside the control of the originator. Whilst the second part Section 23 (a) seems to have specific attention to the receipt of messages by person on a local intranet via a server or local area network, for which a data message is regarded as having been sent when it is capable of being retrieved by the addressee. While pursuant to Section 23 (b) of the ECTA, the receipt of a data message is deemed to occur as from the time when the complete data message enters an information system designated or used for that purpose by the addressee and is capable of being retrieved and processed by the addressee.

4.2.4 Place of Dispatch and Receipt of a Data Messages

The ECTA also provides specific rules for determining the place of dispatch and receipt of electronic communication. According to Section 23(c) of the ECTA, a data message must be regarded as having been sent from the originator's usual place of business or residence and as having been received at the addressee's usual place of business or residence.

4.2.5 Use of Automated Information System for contract formation

"Automated transactions" are defined by Section 1 of the ECTA as "an electronic transaction conducted or performed, in whole or in part, by means of data messages in which the conduct or data messages of one or both parties are not reviewed

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(c) must be regarded as having been sent from the originator's usual place of business or residence and as having been received at the addressee's usual place of business or residence."

by a natural person in the ordinary course of such natural person's business or employment"[218].The principles of contract law, as briefly outlined above also apply to this type of contract. In this connection, Section 20 of the ECTA sets out the requirements when an electronic agent performs some of the actions that are required by law for an agreement to form,[219] for instance, accepting an offer.

Electronic agent is defined broadly enough to include the use of distributed ledger technology (like blockchain) and smart contracts.[220] This is because it allows for a situation where all parties to a contract are using an electronic agent. A party that selects to use an electronic agent to form an agreement is presumed by the ECTA to be bound by the terms of that agreement, irrespective of whether such person reviewed the

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[218]Section 1 of the ECTA

[219]Section 20 of the ECTA states the following:

"In an automated transaction –

(a) an agreement may be formed where an electronic agent performs an action required by law for agreement formation;

(b) an agreement may be formed where all parties to a transaction or either one of them uses an electronic agent;

(c) a party using an electronic agent to form an agreement is, subject to paragraph (d), presumed to be bound by the terms of that agreement irrespective of whether that person reviewed the actions of the electronic agent or the terms of the agreement;

(d) A party interacting with an electronic agent to form an agreement is not bound by the terms of the agreement unless those terms were capable of being reviewed by a natural person representing that party prior to agreement formation.

(e) no agreement is formed where a natural person interacts directly with the electronic agent of another person and has made a material error during the creation of a data message and—

(i) the electronic agent did not provide that person with an opportunity to prevent or correct the error;

(ii) that person notifies the other person of the error as soon as practicable after that person has learned of it;

(iii) that person takes reasonable steps, including steps that conform to the other person's instructions to return any performance received, or, if instructed to do so, to destroy that performance; and (iv) that person has not used or received any material benefit or value from any performance received from the other person.

[220] "Electronic agent" is defined as a computer program or an electronic or other automated means used independently to initiate an action or respond to data message or performances in whole or in part, in automated transactions.

actions of the electronic agent or the terms of the agreement. However, if the terms are not capable of being reviewed by a natural person prior to the agreement forming, a party interacting with an electronic agent is not bound by the terms of this agreement. In other words, the option to review the terms needs to be available to a natural person before conclusion of contract. If a party elects not to review the terms, that party will be bound by the terms through the electronic agent.[221]

Nonetheless, due to its distinctive nature of the automated transaction, protection for the parties needs to be deliberately provided for where an error has occurred.[222] Accordingly, Section 20 (e) of the ECTA provides that an agreement will not be formed where a natural person (Party A) interacts directly with the electronic agent of another person (Party B) and has made a material error during the creation of a data message and— (i) the electronic agent did not provide that person (Party A) with an opportunity to prevent or correct the error; (ii) that person (Party A) notifies the other person (Party B) of the error as soon as practicable after that person (Party A) has learned of it; (iii) that person (Party A) takes reasonable steps, including steps that conform to the other person's (Party B) instructions to return any performance received, or, if instructed to do so, to destroy that performance; and (iv) that person (Party A) has not used or received any material benefit or value from any performance received from the other person (Party B).[223]

However, the writer is of the opinion that the above requirements may be unlikely applicable in a smart contract scenario, as both parties should normally be participating through electronic agents rather than as natural persons. But if smart contracts are coded in a manner that allows for natural persons to interact with the electronic agent, the above requirements for the availability of opportunities to correct

[221]Norton Rose Fulbright (n 8)
[222]Caroline B Ncube, 'Electronic Transactions Law Course Material' (2012), Department of Commercial Law, University of Cape Town<http://www.etransactionslaw.uct.ac.za/elaw/lectures/e-contracts/essentalia> accessed 20 June 2017
[223]ibid

a material error made by the natural person will need to be met in order for the contract to become legally binding under the South African law.

4.2.6 Required specific formalities of legal contract under South African Law

Although South African law of contract generally does not require formalities, various South African statutes have prescribed formal requirements for certain types of agreements such as the purchase and sales of land and suretyships.[224] In addition to the formalities set forth by South African laws, the parties themselves may agree to establish certain formalities for the conclusion of a contract (A common reason for this is to have proof of an agreement in case of a dispute or enforcement of a contractual right).[225] These formalities are generally known as self-imposed or agreed formalities, which may be required depending on the intention of the parties.[226]

4.2.6.1 Types of formality requirements of contract under South African Law

In sum, the formalities under South African law can be categorized as follows:

(1) A transaction which is required to be reduced to writing in order to be enforceable e.g. contracts for sale of land, contract of suretyship[227] and credit agreement;[228]

[224]Franziska Elizabeth Myburgh, 'Statutory Formalities in South African Law' (Doctor of Laws dissertation, the Faculty of Law, Stellenbosch University 2013)
[225]Pretorius (n 193)
[226]Nagel (n 198)
[227]Sections 4 and 17 of the Statute of Frauds
[228]Section 93 of the National Credit Act 34 of 2005 provides for a credit provider must provide the consumer with a written copy of the credit agreement

(2) A transaction which is required to be reduced to writing and signed by the parties thereto or by their agents acting on their written authority e.g. a deed of alienation[229] and contract of lease[230];

(3) A transaction which is required to be reduced to writing and registered e.g. contracts where property is leased for a period longer than 10 years;[231]

(4) A transaction which is required to be executed in writing and be attested by a notary public e.g. contract for any lease or sublease of land or of any rights to minerals in land, and any cession of such a lease or sublease intended or required to be registered in the Deeds Registry.[232]

Where the communications are made in a form of data messages, the question arises as to whether such data messages have legal validity equal to messages written on paper. In this respect, Section 12 of the ECTA[233] recognizes data message as the functional equivalent of writing or evidence in writing by guaranteeing data messages same legal validity equal to messages written on paper.[234]

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[229]Section 2(1) of Alienation of Land Act 68 of 1981 stating that no alienation of land after the commencement of this section shall, subject to the provisions of section 28, be of any force or effect unless it is contained in a deed of alienation signed by the parties thereto or by their agents acting on their written authority.

[230]*Woods v Walters* 1921 AD 303. The contract of lease is not binding until it has been reduced to writing and signed.

[231]Section 1 (2) of the Formalities in Respect of Leases of Land Act states that a long lease entered into after the commencement of the Act—that is, after January 1, 1970—shall not be valid against a creditor or a successor under onerous title of the lessor for a period longer than ten years after having been entered into, unless it has been registered against the title deed of the leased land.

[232]Section 77(1) of the Deeds registration of leases and subleases

[233]Section 12 of the ECTA reads as follows:

"A requirement in law that a document or information must be in writing is met if the document or information is,

(a) in the form of a data message; and

(b) accessible in a manner usable for subsequent reference."

[234]Snail (n 180)

The question also arises as to whether signatures expressed or communicated in the form of data messages are valid and satisfy the formality requirement in applicable circumstances. Here, the wording of Section 13 of the ECTA[235] is most closely applicable to this question. Section 13 of the ECTA provides for three different expressions of digital signatures. The most stringent of this is as provided for under section 13 (1), being an advanced electronic signature to be provided by the South African Department of Communications. The second level of signatures, as governed by section 13 (2), is any electronic signature or a distinct electronic mark, the existence of which could signify a valid digital contract. Lastly, section 13 (3) also provides for the situation where no electronic signature or analogous mark has been used, but the intention to be bound the contractual terms has been clearly manifested. This would be especially applicable in the case of click-wrap or shrink-wrap agreements, where the user simply assents their agreement by the click of a button. In the context of e-commerce and vendor/buyer relationships, this provision goes a long way in validating such purchases made online, where the contractual relationship rests on the click of a button.

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[235]Section 13 of the ECTA stating that:

"(1) Where the signature of a person is required by law and such law does not specify the type of signature, that requirement in relation to a data message is met only if an advanced electronic signature is used.

(2) Subject to subsection (1), an electronic signature is not without legal force and effect merely because it is in electronic form.

(3) Where an electronic signature is required by the parties to an electronic transaction and the parties have not agreed on the type of electronic signature to be used, that requirement is met in relation to a data message if:

a) a method is used to identify the person and to indicate the person's approval of the information communicated; and

b) having regard to all relevant circumstances at the time the method was used; the method was as reliable as was appropriate for the purposes for which the information was communicated.

(4) Where an advanced electronic signature has been used, such signature is regarded as having created a valid electronic signature and to have been applied properly, unless the contrary is proved.

(5) Subsection (4) does not preclude any person from – a) establishing the validity of an advanced electronic signature in any other way; or b) Adducing evidence of the non-validity of an advanced electronic signature.

Moreover, with respect to the notarization requirement, Section 18 of the ECTA provides that "where a law requires a signature, statement or document to be notarized, acknowledged, verified or made under oath, that requirement is met if the advanced electronic signature of the person authorized to perform those acts is attached to, incorporated in or logically associated with the electronic signature or data message. In addition, ECTA provides a catch-all provision in Section 19 to cover all possibilities in the context of legal requirements. Section 19 (2) of the ECTA states that "An expression in a law whether used as a noun or verb, including terms "document", "record", "file". "submit", "lodge", "deliver", "issue", "publish", "write in", "print" or words or expressions of similar effect, must be interpreted so asto include or permit such form. format or action in relation to a data message unless otherwise provided for in this Act."

However, the ECTA specially excludes four different instances where and electronic writing or signature would not be valid. The four excluded acts are:[236]

(1) Concluding an agreement for the alienation (disposal) of immovable property as provided for in the Alienation of Land Act, Act 68 of 1981;

(2) Concluding an agreement for a long-term of immovable property in excess of 20 years as provided for in the Alienation of Land Act, Act68 of 1981;

(3) The execution of a bill of exchange as defined in the Bills of Exchange Act, Act 7 of 1953;

(4) The execution, retention and presentation of a will or codicil as defined in the Wills Act, Act 34 of 1964.

[236]Section 4(4) of the ECTA

A South African court decision, *Spring Forest Trading v Ecowash*,[237] potentially allows contracting parties to sign their electronic contracts by way of a data message (which was broad enough to include emails and other communication platform such as WhatsApp and Facebook messenger) by typing their name at the end of a message. In this case, the contract was subject to a non-variation clause saying that no variation or consensual cancellation would be valid unless reduced to writing and signed by both parties. A person's name at the end of an email was held to satisfy the signature requirement. Thus, it might similarly be easy for a smart contract to meet these ordinary electronic requirements as well.

4.2.6.2 Requirement of e-signatures

"Advanced electronic signature" means "an electronic signature which results from a process which has been accredited by the competent authority as provided for in section 37".[238]

Under the ECTA, a broad spectrum of electronic signatures is recognized. This can range from simple options such as signatures with password protection or the digital image of handwritten signature, to more high-tech biometric solutions. Provided that the signature is rendered in a reliable manner, suffices to identify the person's identity and express the person's acceptance of the terms, it will be deemed acceptable. Nonetheless, the South African government has developed a mechanism to provide for certainty in the matter of e-signatures. By vesting the authority on the Department of Telecommunications as the chosen accreditation authority to issue advanced electronic signatures, the government has provided a method of security which provides certainty to e-signatures and lessens the chance of dispute about the validity of the said advanced electronic signature.

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[237] *Spring Forest Trading 599 CC v Wilberry (pty) Ltd t/a Ecowash and Another* [2014] ZASCA 178.
[238] Section 1 of ECTA

Moreover, in the case where a law requires an electronic signature an advanced electronic signature would have to be used.[239]

Concluding remarks

As discussed above, the electronic nature of contracting is unlikely to be problematic in both jurisdictions in relation to establishing contractual formation of smart contracts as these two legal systems have already put in place legislations to clarify aspect of contract formation by means of automated message system which is very helpful in analyzing the legal status of smart contracts. Although their relevant legislations use totally different wording in referring to a computer program that operates without review or intervention by a natural person which will be further emphasized in the next chapter, both legal systems recognize that this system may be used in contracting process.

[239]Section 13 (1) of the ECTA

CHAPTER 5
COMPARISON BETWEEN THE RELEVANT AREAS OF THAI LAW AND FOREIGN LAWS

This Chapter will focus on the comparative analysis between the relevant areas of Thai law and foreign laws, namely Australian and South African laws, in particular those governing the formation of a contract, including time and place of dispatch of the electronic message, as well as the contract formality and other requirements, through electronic communications. Through this analysis, the feasibility of the utilization and execution of smart contracts under the current Thai legal system will be examined.

5.1 Rules on Contract Formation

Rules on contract formation often distinguish between "instantaneous" and "non-instantaneous" communications of offer and acceptance; analogously, as discussed earlier in this Thesis, between communications exchanged between parties present at the same place at the same time and communications made at a distance. In both cases, a contract will be formed when an "offer" has been expressly or tacitly "accepted" by the party or parties to whom the offer was addressed.

In the case of smart contracts which are non-instantaneous messages[240], the point of import for contract formation is the analysis around which point the acceptance of the offer becomes effective.[241] According to the "mailbox rule", which is traditionally applied in most common law jurisdictions including Australia, but also in some countries belonging to the civil law tradition,[242] acceptance of an offer is effective upon dispatch by the offeree (for example, by placing a letter in a mailbox). In turn,

[240]See discussion in 3.2.1 Declaration of Intention of Chapter 3
[241]Stefan Vogenauer and Jan Kleinheisterkamp, *Commentary on the UNIDROIT Principles of International Commercial Contracts (PICC)* (1st edn, Oxford University Press 2009)
[242]For instance, Argentina (Código Civil, art. 1154) and Brazil (Código Civil, art. 434)

under the "reception" theory, which has been adopted in several civil law jurisdictions including Thailand, the acceptance becomes effective when it reaches the offeror. South Africa adopts the "information" theory,[243] which requires knowledge of the acceptance for a contract to be formed. Of all these theories, the "mailbox rule" and the reception theory are the most commonly applied for business transactions.[244]

5.2 Time and Place of Dispatch and Receipt of Electronic Communications

5.2.1 Time of Dispatch and Receipt of Electronic Communications

The laws of all three selected jurisdictions analyzed in this thesis provide rules for both time of dispatch and receipts of electronic communication which are very significant provisions since they will indicate whether the contract is formed or not with the exact time, and also help allocate the risks of the proposed transaction. It should be noted that the Thai ETA and the ECTA use the term "data message" in relation to this rule which is slightly different from the Australian ETA that uses the term "electronic communication".

For the time of dispatch of electronic communication, the Australia ETA follows the principles set out in the UN Convention on Electronic Commerce with the identical wording that the time of dispatch is "the time when [the communication] leaves an information system under the control of the originator or of the party who sent it on behalf of the originator"[245] It also contain the provisions for the situation where the electronic communications has not left an information system under the

[243]Pretorius (n 193)
[244]United Nations Commission on International Trade Law, 'Legal aspects of electronic commerce Electronic contracting: background information' (2003) Working Group IV (Electronic Commerce) Forty-second session Vienna, 17-21 November 2003, A/CN.9/WG.IV/WP.104/Add.2 < https://documents-dds-ny.un.org/doc/UNDOC/LTD/V03/878/97/PDF/V0387897.pdf?OpenElement> accessed 20 June 2017
[245]Section 14(1)(a) of the Australian ETA

control of the originator or of the party who sent it on behalf of the originator, in such case, the time of dispatch is "the time when the electronic transaction communication is received by the address[246]."

On the other hand, the ECTA of South Africa and the Thai ETA share the same concept based on the UNCITRAL Model Law, with a similar wording that "the dispatch of a data message is deemed to occur when it enters an information system outside the control of the originator".[247] But the ECTA also provides for the consequence in the scenario that the originator and addressee are in the same information system for which the time of dispatch is when the data message is capable of being retrieved by the addressee.[248]

With respect to the time of receipt of electronic communication, both Australian ETA and ECTA define a concept of receipt in a similar manner. Australia ETA uses the exact wording as provided in the UN Convention on Electronic Commerce. Despite certain discrepancies in the terms used in those two laws, they contain the rules of the Convention between delivery of message to a specially designated electronic address, the time of an electronic communication is "the time when the electronic communication becomes capable of being retrieved by the addressee" under Section 14A(a) of the Australian ETA and Section 23(b) of ECTA. While pursuant to Section 23 of the Thai ETA, the time of receipt is the time when a data message enters the addressee's information system. Moreover, Section 23 also provides a rule for designated electronic address. It states that a data message shall be deemed to be received at the time when it enters the designated information system. In addition, this provision shall apply notwithstanding that the place where the information system of the addressee is located in different from the place where the data message shall be deemed to be received by the addressee.

[246]Section 14(1)(b) of the Australian ETA
[247]Section 22 of the Thai ETA and Section 23 of the ECTA
[248]Section 23 of the ECTA

In case of non-designated electronic addresses, the Australian ETA provides that the time of receipt of an electronic communication is "the time when the electronic communication becomes capable of being retrieved by the addressee at that address and the addressee becomes aware that the electronic communication has been sent to that address."[249] The law also lays down the presumption that an electronic communication is "capable of being retrieved by the addressee when it reaches the electronic address of the addressee."[250] Conversely, under Thai ETA, in case of the data message is sent to a non-designated address, it shall be deemed as having been received by the addressee when the data message is retrieved from that information system.[251]

Although the Thai ETA lays out the main principle of time of dispatch and receipt of data message, it is still lacking in terms of some key issues, compared to provisions of the Australian ETA and ECTA. For instance, for the time of dispatch, Section 22 does not indicate a rule for the situation where the data message has not left an information system because the parties exchange data messages through the same information system e.g. the originator and the recipient are within the same intranet. The similar situation may occur in case of smart contract as the communications will be sent in the same system environment that is blockchain network.

With reference to the Working Group of the UN Convention on Electronic Communication, the new principle for the determination of time of dispatch of electronic communication was initiated in order to clarify the element of "control" of the message sent by the originator in particular.[252] In effect, the rule set forth in the Model Law which the Thai ETA adopted stated that the data message is dispatched when it enters a system outside the originator's control. This rule causes difficulties in terms of evidence availability for the originator to prove whether or not an electronic communication has already entered an information system outside the control of the originator. This is because the originator's knowledge of sending the message is limited

[249]Section 14A(b)(i)(ii) of the Australian ETA
[250]Section 14A(2) of the Australian ETA
[251]Section 23 of the Thai ETA
[252]United Nations Commission on International Trade Law (n 244)

to only when it left his/her system. Thus, the Working Group decided to set new rules in Article 10 of the Convention[253] to specifically cope with these practical problems and in order to suit with the innovative electronic context. This Article 10 has been adopted by Section 14 and 14A of the Australian ETA. Thus, in order to be more comprehensive regarding time of dispatch and receipt of data message, it would be suitable for Thailand to consider adopting Article 10 of the Convention in its provision similarly to the Australian ETA.

5.2.2 Place of Dispatch and Receipt of Electronic Communications

Except in the definition of "place of business", all three legislations incorporate the principle regarding the place of dispatch and receipt of electronic communications. Generally, in the case where the parties' place of business can be determined, the originator's place of business is the place where the electronic communication is dispatched whereas the recipient's place of business is the place where the electronic communication is received pursuant to Section 14B(1) of the Australian ETA, Section 23 of the ECTA and Section 24 of the Thai ETA. It is worth

[253]Article 10 of the UN Convention on Electronic Commerce
Time and place of dispatch and receipt of electronic communications
1. The time of dispatch of an electronic communication is the time when it leaves an information system under the control of the originator or of the party who sent it on behalf of the originator or, if the electronic communication has not left an information system under the control of the originator or of the party who sent it on behalf of the originator, the time when the electronic communication is received.
2. The time of receipt of an electronic communication is the time when it becomes capable of being retrieved by the addressee at an electronic address designated by the addressee. The time of receipt of an electronic communication at another electronic address of the addressee is the time when it becomes capable of being retrieved by the addressee at that address and the addressee becomes aware that the electronic communication has been sent to that address. An electronic communication is presumed to be capable of being retrieved by the addressee when it reaches the addressee's electronic address.

noting that the ECTA also provides the option of the originator's residence and the addressee's residence, as the case may be, as an alternate to the place of business.

However, the detailed rules on determining place of business are different. Section 14B (2)(3)(4) of the Australian ETA which are in line with the UN Convention on Electronic Commerce, set a rule applying in the case where a party does not specify his/her place of business. It states that the location of the parties themselves or in case the party has more than one place of business, the place of business is that which has the closest relationship to the underlying transaction. The same rule also applies under Thai ETA, while Section 23 of the ECTA is silent on this point.

5.3 Use of Automated Message System for Contract Formation

Presently, the actions of automated information systems are deemed to be a mere representation or manifestation of the intentions of a person or legal entity. This is based on the assumption that an automated information system is capable of performing only within the technical structures of its preset programming. However, given the proliferation in the advent of artificial intelligence in recent times, the possibility that this assumption is false grows increasingly possible, as systems are able to function with greater autonomy. That is, through developments in blockchain technology and artificial intelligence, a computer may be able to "learn through experience, modify the instructions in their own programs, and even devise new instructions".[254]Blockchain smart contract is one of the recent example of how advance of technology can be brought into use for securing real-world transaction, for example, where it is used for securing payments for leased equipment by disabling the equipment in case of default. This begs the question as to how far and how much liability is to be attributed to the machines themselves; that is, whether they are the functioning agent or merely instruments through which the contracting parties function. There is a split in academic discussion as to this point. Some commentators have encouraged the

[254]T. Allen and R. Widdison, 'Can computer make contracts?' (1996) 9 Harvard Journal of Law and Technology 25

attribution of at least some elements of legal personality to automated computer systems,[255] or to at least to the application of agency theory to computer transactions.[256] Others, however, instead look to establishing the relationship between the computer and the person, through principles of law such as "reliance" and "good faith", rather than attributing any elements of liability to the machine itself.[257]

The recognition of the use of an automated message system for the contract formation appears in both the Australian ETA[258] and the ECTA[259]. Even though the Australian ETA uses the word "automated message systems" and "interaction of automated message systems" whereas the ECTA uses the word "electronic agents" and "automated transaction" respectively, both of them concern with a computer program that operates without review or intervention by a natural person and both of them recognizes that these systems may be used in contracting process.

Additionally, both laws confirm the rule that the contract formed though such automated message system or electronic agent shall not be denied its validity or binding solely on the ground that such systems are used and that no natural person reviewed or intervened. It is worth noting that, the Australian ETA slightly varies from the UN Convention on Electronic Commerce in the definition of the automated message systems. The Convention provides that automated message system means "a computer program or an electronic or other automated means used to initiate an action or respond to data messages or performances in whole or in part, without review or intervention by a natural person each time an action is initiated or a response is generated by the

[255]Leon E. Wein, 'The responsibility of intelligent artifacts: toward an automated jurisprudence', (1992) 6 Harvard Journal of Law and Technology 103
[256]David D. Wong, 'The emerging law of electronic agents: e-commerce and beyond', (1999) 33 Suffolk University Law Review 83
[257]Jean-François Lerouge, 'The use of electronic agents questioned under contractual law: suggested solutions on a European and American level', (1999) 18 John Marshall Journal of Computer and Information Law 403. Similarly, from a common law perspective, C. C. Nicoll, 'Can computers make contracts?', (1998) The Journal of Business Law42
[258]Section 15C of the Australian ETA
[259]Section 20 of the ECTA

system." Specifically, the Australian ETA omits the term "or performances". This is because during consultation for drafting the amendment to Australian ETA this issue was raised as to the practical examples which could not be identified.[260]

The Thai ETA does not provide the provision of the automated message system or electronic agent. It merely recognizes that between the originator and the addressee, a data message is deemed to be that of the originator to operate automatically according Section 15 of the Thai ETA. Even though no amendment appeared to be needed in respect of the validity of electronic transaction as the law is already recognized the contracts formed by any electronic means, the writer considers that it would be useful to make it clear in the Thai ETA that the absence of human review or intervention in a particular transaction does not impede contract formation. Therefore, it is advisable to embody a specific provision to directly deal with the result of a contract that is formed by the automated message system or electronic agent in the Thai ETA.

With respect to the principle concerning error in communication, both Australian and South African laws have included this principle in their legislations. The Australian ETA which based on the UN Convention on Electronic Commerce sets forth in Section 15D the rule where an input error is made. For example, in the event that a person enters the wrong price or quantity of goods on the purchase order, such person will be entitled to withdraw that part of electronic communication which contains error. However, this withdrawal entitlement is available only if such error is made by a natural person in an exchange with an automated message system, and an opportunity to correct the error is not given. Moreover, the right to withdraw will be available on the condition that this person notifies the order party of the error as soon as practicable after that person has learned of the error, and he/she has not used or received any material benefit or value from any goods or services received from the other party. The ECTA of South Africa also provides the similar principle to the Australian ETA with minor differences of terminology.

[260]Hon Robert McClelland MP, Explanatory Memorandum Electronic Transactions Amendment Bill (2011)

The Thai ETA does not provide any specific provisions dealing with the error in electronic transactions like those model laws. Then the CCC as the general substantive law governing juristic acts applies to this matter. The CCC provides Section 156 of the CCC a similar principle concerning the mistake as to an essential element of the juristic act stating that "a declaration of intention is void if made under a mistake as to an essential element of the juristic act".[261] With reference to the above example case where the mistake occurs when a person entering the wrong price on purchase order via automated message system and the automated program responds to his/her order by which a contract is formed, the question arise as to whether such situation can be regarded as a mistake to an essential of the juristic act to which the provision of Section 156 will be applied. In this connection, principle could be drawn from many decisions of the Thai Supreme Court that the price of the property being an object of the sale contract is an essential of the sale contract.[262] Hence, a mistake as to the price of the sale contract makes this contract void according to Section 156 of the CCC.

However, such person is unable to avail him/herself of such invalidity of contract due to his/her gross negligence for making such declaration of intention.[263] The person who made mistake by gross negligence cannot raise the exception from the law under Section 156, which intends to provide protection to the person acting in good faith only,[264] according to Section 158 of the CCC.

Nevertheless, the principle as to the error of electronic communication may be unlikely applicable in a smart contract scenario, as both parties should normally be participating through automated message systems rather than as natural persons. But if smart contracts are coded to allow for natural persons to interact with automated

[261]Section 156 of the CCC
[262]*See* Decisions of the Supreme Court numbers 751/2543, 6103/2545
[263]*See* Decisions of the Supreme Court numbers 357/2548, 3360-3410/2543
[264]Sak Sanongchard, *Commentaries of CCC: Juristic Act and Contract* (9th edn. 2006) Nitibunnagarn Publishing House 184

message system, the abovementioned principle shall be applied in case of the occurrence of error.

5.4 Form requirements

Generally, most legal systems follow the general principle of freedom of form and extend it to all contracts falling within its sphere of application including electronic contracting[265]. However, it is recognized that form requirements may exist under the applicable law as writing and signature or registration requirements, for example the sale of immovable properties contract. Even where form requirements as such do not exist, obstacles to the use of data messages may derive from rules on evidence that expressly or implicitly limit the parties' ability to use data messages as evidence to demonstrate the existence and content of contracts.

The Australian ETA, ECTA and Thai ETA adopt the basic principle contained in the UNCITRAL Model Law concerning the criteria for establishing functional equivalence between electronic communications and paper documents including "writing" "signature" and "original" documents as well as between electronic authentication methods and handwritten signatures as specified in Sections 9 and 10 of the Australian ETA, Sections 12, 13 and 14 of ECTA and Sections 8, 9 and 10 of the Thai ETA. However, the terms used in relation to the formality requirements in those three legislations are tremendously different in many aspects.

Section 9 of the Australian ETA[266] deals with providing information in writing and is based upon Article 6 of UNCITRAL Model Law. Subsections (1) and

[265]United Nations Commission on International Trade Law (n 244)

[266]Section 9 of the Australian ETA states as follows:

Writing

Requirement to give information in writing

(1) If, under a law of the Commonwealth, a person is required to give information in writing, that requirement is taken to have been met if the person gives the information by means of an electronic communication, where:

(a) in all cases--at the time the information was given, it was reasonable to expect that the information would be readily accessible so as to be useable for subsequent reference; and

(b) if the information is required to be given to a Commonwealth entity, or to a person acting on behalf of a Commonwealth entity, and the entity requires that the information be given, in accordance with particular information technology requirements, by means of a particular kind of electronic communication--the entity's requirement has been met; and

(c) if the information is required to be given to a Commonwealth entity, or to a person acting on behalf of a Commonwealth entity, and the entity requires that particular action be taken by way of verifying the receipt of the information--the entity's requirement has been met; and

(d) if the information is required to be given to a person who is neither a Commonwealth entity nor a person acting on behalf of a Commonwealth entity--the person to whom the information is required to be given consents to the information being given by way of electronic communication.

Permission to give information in writing

(2) If, under a law of the Commonwealth, a person is permitted to give information in writing, the person may give the information by means of an electronic communication, where:

(a) in all cases--at the time the information was given, it was reasonable to expect that the information would be readily accessible so as to be useable for subsequent reference; and

(b) if the information is permitted to be given to a Commonwealth entity, or to a person acting on behalf of a Commonwealth entity, and the entity requires that the information be given, in accordance with particular information technology requirements, by means of a particular kind of electronic communication--the entity's requirement has been met; and

(c) if the information is permitted to be given to a Commonwealth entity, or to a person acting on behalf of a Commonwealth entity, and the entity requires that particular action be taken by way of verifying the receipt of the information--the entity's requirement has been met; and

(d) if the information is permitted to be given to a person who is neither a Commonwealth entity nor a person acting on behalf of a Commonwealth entity--the person to whom the information is permitted to be given consents to the information being given by way of electronic communication.

Certain other laws not affected

(3) This section does not affect the operation of any other law of the Commonwealth that makes provision for or in relation to requiring or permitting information to be given, in accordance with particular information technology requirements:

(a) on a particular kind of data storage device; or

(b) by means of a particular kind of electronic communication.

Giving information

(4) This section applies to a requirement or permission to give information, whether the expression ***give***, ***send*** or ***serve***, or any other expression, is used.

(5) For the purposes of this section, ***giving*** information includes, but is not limited to, the following:

(a) making an application;

(2) allow a person to satisfy a requirement or permission to give information in writing under a law of the Commonwealth by providing that information by means of an electronic communication, subject to the general condition that, at the time the information was given, it was reasonable to expect that the information in the form of an electronic communication would be readily accessible so as to be useable for subsequent reference. In addition, where a person must provide the information to a Commonwealth entity the person must comply with any information technology requirements in relation to the particular type of electronic communication to be used and any requirements relating to the verification of the receipt of the information. Finally, where the information is required or permitted to be given to a person who is not a Commonwealth entity, that person must consent to the information being given by means of an electronic communication.

Subsection (4) extends the meaning of giving information, as used in subsections (1) and (2), to include the concepts of giving, sending or serving information, or any other like expression. In this context, the concept of service is intended to include administrative service requirements. For example, it would include serving of a notice of change in entitlements. Subsection (5) extends the meaning of giving information to ensure that it applies to a wide range of situations. For example, it should be read to include within its meaning giving a statement of reasons. This list, while it contains many of the common terms used when a person is required or permitted to give information, is not intended to be comprehensive. It is a non-

(b) making or lodging a claim;
(c) giving, sending or serving a notification;
(d) lodging a return;
(e) making a request;
(f) making a declaration;
(g) lodging or issuing a certificate;
(h) making, varying or cancelling an election;
(i) lodging an objection;
(j) giving a statement of reasons.

exhaustive list and is clearly expressed as not being limited to the examples given within the list.[267]

Where necessary Section 9 is intended to be read in conjunction with Section 10, which deals with signature requirements. Where a law of the Commonwealth requires or permits a person to provide information in writing and to sign that document, both elements must be satisfied. While a person could use an electronic communication to satisfy the writing requirement, they will not comply with the law unless they also sign the electronic communication. This can only be done by complying with the requirements of Section 10 which deals with signature.

In sum, in the case where the law requires or permits a person to give information to the authority (Commonwealth entity), it is deemed that the entity's requirement has been met if it is done by way of electronic communication. In other words, by virtue of these Section 9 and 10, people may satisfy the legal requirements of filing or registering with the competent authority electronically. As such, these provisions could facilitate and get rid of potential hindrances to the operation of a smart contract in terms of formalities requirement which require dealing with the competent authorities, such as in the case of the registration of the sale or other disposition of lands.

Under the ECTA, a requirement in South African laws concerning written document or information is met if the document is in the form of a data message and accessible in a manner usable for subsequent reference.[268] Moreover, in the case where the law requires a signature, statement or document to be notarized, acknowledged, verified or made under oath, that requirement is met if the advanced electronic signature of the person authorized to perform those actions is attached to, incorporated in or

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[267]The Parliament of The Commonwealth of Australia Senate, 'Electronic Transactions Bill 1999Revised Explanatory Memorandum' (Circulated by authority of the Attorney-General, the Hon. Daryl Williams, AM QC MP)<https://www.legislation.gov.au/Details/C2004B00505/Revised%20Explanatory%20Memorandum/Text>

[268]Section 12 of the ECTA

logically associated with the electronic signature or data message.[269] Unlike the Australian ETA which specifically determines criteria for satisfying form requirements by means of an electronic communication in separate subsections because the nature of the provisions are fundamentally different, ECTA provides a catch-all provision in Section 19 to cover all possibilities in the context of legal requirements. Section 19 (2) of the ECTA states that "an expression in a law whether used as a noun or verb, including terms "document", "record", "file". "submit", "lodge", "deliver", "issue", "publish", "write in", "print" or words or expressions of similar effect, must be interpreted so as to include or permit such form, format or action in relation to a data message unless otherwise provided for in the ECTA. In this regard, the terms under Section 19 is defined rather broadly, which the writer believes may be interpreted to cover the registration requirement under the law and; thus, the registration with the competent authority e.g. contracts where property is leased for a period longer than 10 years under the ECTA is likely possible under the existing legislation.

For the Thai ETA, in satisfying legal requirements of written documents or evidenced by writing or supported by a document which must be produced if the information is generated in the form of a data message which is accessible and usable for subsequent reference without its meaning being altered, it shall be deemed that such legal requirement has been met.[270] However, documents containing e-signatures (i.e. data message) must also satisfy the characteristics prescribed in Section 9 of the Thai ETA. With regard to the form requirement concerning actions to be done with the competent authority, the Thai ETA provides the legal framework in relation to this matter that if such transaction is made in a form of a data message in accordance with the rules and procedures prescribed by the Royal Decree, it would fall within the application of the Thai ETA to which it shall be deemed to have the same legal effect as the act performed pursuant to the rules and procedures described by the law on that particular matter. The Royal Decree states that the state agency shall make available a system for the documents in the form of data message where certain criteria will have

[269]Section 18 of the ECTA
[270]Section 8 of the Thai ETA

to be met. The samples of the critera are: (1) the electroic document must be generated in an appropriate form and the information must be capable of being subsequently displayed or referred to while assuring the integrity of the information in the form of electronic message; (2) there must be a specified period for submission of electronic documents applicable for the Public Sector; and (3) there must be procedures of identification of the signature's owner, as well as the type, feature or form of the e-signature, and authentication of the e-signature and the signor.

Although the law provides the required criteria for Public Sector's electronic documentation system, it does not enforce the state agencies to produce and implement the system for all of the matters or contracts that requires registration. Currently, only a few state agencies have made available the said system. While the relevant competent authorities such as the Land Department and the Department of Intellectual Property who are incharge of the registrations of the sale and transfer ownership of land and trademark licening which is likely possible to be the underlying subject matter of smart contracts, still have no available procedures to accommodate the online registration of the aforementioned matters.

5.5 Summary Table - Comparative study on the Thai ETA, the Australian ETA and the ECTA

Legal issues	Thai ETA	Australian ETA	ECTA
1. Time of dispatch and receipt of electronic communication in the situation where the data message has not left an information system	A rule for this situation is absent under Thai ETA.	In such situation, the time of dispatch is the time when the electronic transaction communication is received by the address (Section 14(1)(b) of the Australian ETA)	ECTA provides for the consequence in this scenario that the time of dispatch is when the data message is capable of being retrieved by the addressee (Section 23 of the ECTA)
2. recognition of contract made by automated message systems	Specific rule on this matter is absence.	Contract formed by automated message system is recognized in Section 15c of the Australian ETA	Contract formed by electronic agent is recognized in Section 20 of the ECTA provided that the terms of contract are capable of being reviewed by natural person
3. Impossibility to meet legal	Although the Thai ETA makes	Section 9 and 10 of the Australian ETA	ECTA provides a catch-all provision

Legal issues	Thai ETA	Australian ETA	ECTA
formality requiring contract to be made in writing and registered with the competent officials	available the principle regarding the electronic transaction or information which are required to be executed or registered by competent officials, the implementation of the law seems to be impracticable due to the relevant competent authorities still have no available procedures to accommodate the online registration of the aforementioned matters as required by Thai ETA and the Royal Decree.	provides that it is deemed that the formality requirement has been met if a person gives information to the authority by way of electronic communication.	in Section 19 to cover all possibilities in the context of legal requirements. Section 19 (2) of the ECTA states that "an expression in a law whether used as a noun or verb, including terms "document", "record", "file". "submit", "lodge", "deliver", "issue", "publish", "write in", "print" or words or expressions of similar effect, must be interpreted so as to include or permit such form, format or action in relation to a data message unless otherwise provided for in the ECTA

5.6 Recommendations

The above analysis has shown that Thai ETA will have to be amended by comparing with laws and regulations of foreign jurisdictions to facilitate the full implementation of smart contract in Thailand. The principles that should be incorporated in this specific law are: (1) the default rule to determine the time of dispatch and receipt of electronic communication; (2) the use of an automated message system; and (3) the relevant competent authorities should be compulsory to make available systems in accordance with the law for fulfilling the required formality for the contract to be registered with the competent authority electronically.

First, for the principle of the time of dispatch and receipt of electronic communication, the Australian ETA which shares the same principle with the UN Convention on Electronic Commerce is suitable to use as a model law for the amendment. It sets up new rules in accordance with the said Convention that are more practical and reasonable than other model laws. For instance, in the part of the time of dispatch, there are two key additional rules as follows: (i) a message was deemed to be dispatched when it "left" the originator's sphere of control; (ii) in the event the electronic communication has not left an information system under the control of the originator because the parties exchanged electronic communications via the same information system, the time of dispatch is the time when the electronic communication is received. In the part of the time of receipt, there is one additional rule regarding the non-designated electronic address. It provides that the time of receipt of an electronic communication is the time when the electronic communication becomes capable of being retrieved by the addressee at that address, and the addressee becomes aware that the electronic communication has been sent to that address.

It is significant to note that the Australian ETA adds certain specific details which directly deal with its own domestic law; this is signified by the wording which states "for the purposes of a law of the Commonwealth". In this regard, Thailand should adopt the UN Convention on Electronic Commerce which is the model law of the Australian ETA as follows:

"Time of dispatch and receipt of electronic communication

(1) The time of dispatch of the electronic communication is:

(a) the time when the electronic communication leaves an information system under the control of the originator or of the party who sent it on behalf of the originator; or

(b) if the electronic communication has not left an information system under the control of the originator or of the party who sent it on behalf of the originator—the time when the electronic communication is received by the addressee.

(2) The time of receipt of the electronic communication is the time when the electronic communication becomes capable of being retrieved by the addressee at an electronic address designated by the addressee; or

(3) The time of receipt of the electronic communication at another electronic address of the addressee is the time when the electronic communication has become capable of being retrieved by the addressee at that address; and the addressee has become aware that the electronic communication has been sent to that address;

(4) For the purposes of subsection (3), an electronic communication is presumed to be capable of being retrieved by the addressee when it reaches the electronic address of the addressee;

(5) Subsections (1), (2), (3) and (4) applies even though the place where the information system supporting an electronic address is located may be different from the place where the electronic communication is taken to have been dispatched or received under section …. (that

provide principle of dispatch and place of receipt of electronic communication)"

Second, for the principle of the use of an automated message system, there are two patterns of wording that should be evaluated in order to find the most appropriate one in the context of Thai law. The first one is Australian ETA which has almost identical wording to the UN Convention on Electronic Commerce, and the second one is South African ECTA. The main difference between these two model laws is with the wording describing a computer program that operates without review or intervention by a natural person. The Australian ETA uses the word "automated message system" and "interaction of automated message systems" whereas the ECTA uses the word "electronic agents" and "automated transactions", respectively. Nevertheless, both of them address the use of these systems in the contract formation process.

The Australian ETA confirms the validity and enforceability of the contracts formed by the computer program without having a natural person review or intervene by stating them explicitly in the provision. While ECTA sets out that an agreement may be formed when an electronic agent performs some of the actions that are required by law for an agreement to form. A party that elects to use an electronic agent to form an agreement is presumed by the ECTA to be bound by the terms of that agreement, irrespective of whether such person reviewed the actions of the electronic agent or the terms of the agreement. However, if the terms are not capable of being reviewed by a natural person prior to the agreement forming, a party interacting with an electronic agent is not bound by the terms of this agreement.

Although both patterns seem to render the same consequence, the writer views that Thailand should base on the pattern of the Australian ETA because its arrangement of the conditions of the principle is easier to follow and is in alignment with the UN Convention on Electronic Commerce. However, the concept of the ECTA with regard to the attribution of actions of automated message systems subject to the capability of the contract terms for being reviewed by a natural person should be added.

Therefore, the principle regarding the use of an automated message system should be provided in a hybrid manner as follows: [271]

> "Use of automated message systems for contract formation
>
> (1) A contract formed by: (a) the interaction of an automated message system and a natural person; or (b) the interaction of automated message systems; is not invalid, void or unenforceable on the sole ground that no natural person reviewed or intervened in each of the individual actions carried out by the automated message systems or the resulting contract.
>
> (2) *A party using an automated message system to form a contract is, subject subsection (3), presumed to be bound by the terms of that contract regardless of whether that person reviewed the actions of the automated message system or the terms of the contract.*
>
> (3) *A party interacting with an automated message system to form a contract is not bound by the terms of the contract unless were capable of being reviewed by a natural person representing that party prior to contract formation.*"

It is important to note that, currently, there is a draft Electronic Transaction Act (No…) B.E. .... (the "Bill") which has been revised and approved by the Council of State. According to the Bill, there is a proposal to add a provision concerning the use of an automated message system as section 13/2 of Thai ETA with an aim to make it in alignment with the UN Convention on Electronic Commerce. The proposed wording is exactly the same as provided in the UN Convention on Electronic Commerce that is "a contract formed by the interaction of an automated message system and a natural person, or by the interaction of automated message systems, shall not be denied validity

[271] For the purpose of clarity, the portions of texts which are the writer's own drafting will appear in italics while those which duplicate the model law will appear in roman (non-italics) type.

or enforceability on the sole ground that no natural person reviewed or intervened in each of the individual actions carried out by the automated message systems or the resulting contract." This proposed addition in the Bill confirms the writer's opinion that the rule on the use of an automated message system for contract formation is significantly required to make available in this digital era. However, as suggested above, the issue of attribution of actions of automated message systems should also be taken into consideration to be appended to this provision of the Bill.

Lastly, for the legal requirement in relation to filing, register or signing in presence of the competent official, in order to enable the full implementation of smart contract, therelevant competent authorities should be compulsory to make available systems in accordance with the law for fulfilling those requirements electronically.

5.7 Summary Table - Recommendations

Legal issues/problems	Recommendations
1. Time of dispatch and receipt of electronic communication in the situation where the data message has not left an information system	Amend Thai ETA by adding a new rule to provide legal consequence in the event the electronic communication has not left an information system under the control of the originator because the parties exchanged electronic communications via the same information system, the time of dispatch is the time when the electronic communication is received. (Use Article 10 of the Convention and Section 14(1)(b) of the Australian ETA as model laws)

Legal issues/problems	Recommendations
2. Recognition of contract made by automated message systems	Amend Thai ETA by adding a new provision directly affirming that lack of direct human review or intervention does not preclude contract formation and a contract so formed shall not be denied validity or enforceability on the sole ground that no natural person reviewed or intervened in each of the individual actions carried out by the automated message system or the resulting contract. (Similar to Article 12 of the Convention and Section 15c of Australian ETA) Also, the concept of the ECTA with regard to the attribution of actions of automated message systems subject to the capability of the contract terms for being reviewed by a natural person should be added. (Section 20 of the ECTA)
3. Impossibility to meet legal formality requiring contract to be made in writing and registered with the competent officials	The relevant competent authorities should be compulsory to make available systems in accordance with the law for fulfilling those requirements electronically.

Concluding remarks

After having analyzed and evaluated the relevant areas of legislations and developments of those two legal systems in comparison with the existing Thai legislations, it seems to be that the laws of those two jurisdictions are well equipped in facilitating blockchain smart contracts as opposed to the Thai legislations in many aspects, particularly the principle concerning the use of automated message systems for contract formation. Therefore, as the use of smart contracts is unavoidable in the near future, Thailand should amend its laws with respect to contract formalities by pointing

out the problems in practice and using these two model laws as the guideline to facilitate the full implementation of smart contracts in Thailand as suggested in the recommendation section.

CHAPTER 6
CONCLUSIONS

The beginning of the twenty-first century made available multiple innovative technologies which have created a substantial impact on the new data-driven economy. One of the most notable of these technologies is blockchain technology, which was first became eminent as the underlying technology of the cryptocurrency Bitcoin and later has started to have an important role of its own. Governments and companies all over the world are contemplating the possible implementation of blockchain technologies in many fashions. One of the most promising areas of implementation of blockchain technology is its use of producing fully automated contracts – agreements which are performed without human involvement, namely smart contracts. It cannot be denied that the use of smart contracts is inevitable in the modern day's business in the proximate future. The existing legal systems need to accommodate the rapid change of technology.

Through the comparative studies on enforceability of smart contracts under two different jurisdictions, namely the Commonwealth of Australia and the Republic of South Africa, the writer has found that the laws of both jurisdictions are substantially developed to accommodate the utilization and execution of blockchain smart contracts under their legal systems. For instance, those two legal systems provide the principle of the use of an automated message system which is necessarily required to determine the legal status of the smart contracts. They also make available the mechanism for submission of the electronic information to the competent officials in order to minimize the obstacles arisen from the legal formality requirements.

After having analyzed the legislation concerning electronic commerce in Thailand, at present, Thai law provides certain provisions dealing with the formation of contracts by the electronic communications, namely the CCC, which is a substantive law governing the principle of the formation of a contract, i.e. offer and acceptance; and the Thai ETA, which provides the rules for the electronic communications that govern the effectiveness of offer and acceptance for purposes of contract formation,

such as rules for time and place of dispatch and receipts of electronic communication. In the case of a smart contract, as a non-instantaneous communication, a contract will be formed when an acceptance reaches the offeror. However, under the existing rule for the time of dispatch and receipt, a rule for the situation where the data message has not left an information system under the control of the originator is absent under Thai law unlike in the case of Australian or South African law as earlier discussed. In the case of smart contract, where the communications will be sent through the same system environment (blockchain network), it is rather difficult to determine as to when the contract is actually formed.

Moreover, a lack of rules for the use of automated electronic communications may leave uncertainty to the smart contract as to its validity and enforceability under Thai law. Although some commentators may view that Section 13 of the Thai ETA together with the general rule on attribution in Section 15 paragraph 2 (2) could be interpreted to cover a contract concluded by automated message systems or electronic agents, the writer is of the opinion that specific provisions to directly deal with the result of a contract that is formed by the automated message system or electronic agent are crucially required to eliminate the uncertainty and unnecessarily interpretation.

Additionally, for the contracts which require registration with the Government officials or execution in the presence of the government official such as sale and transfer of ownership of land, it seems impossible that a smart contract would meet such required formality and, thus, have legally binding effect under the Thai law. In this regard, although the Thai ETA makes available the principle regarding the electronic transaction or information which are required to be executed or registered by competent officials, the implementation of the law seems to be impracticable due to the relevant competent authorities still have no available procedures to accommodate the online registration of the aforementioned matters as required by Thai ETA and the Royal Decree.

Therefore, as innovation would often come before regulations, providing recommended solutions to amend the Thai law with respect to contract formalities by pointing out the problems in practice and comparing with proceedings in foreign countries will be the guideline to facilitate the full implementation of smart contracts in Thailand. If successful, the comprehensive amendment of laws and regulations on smart contracts will play a significant role in raising and modernizing the standard of the ease of doing business in Thailand as well as attract investments, both local and foreign, in Thailand and improve the country's economy growth as a whole.

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