HOW BLOCKCHAIN AND SMART CONTRACTS IMPACT BUSINESS IN THAILAND

BY

MR. EMIL VOEHLERT

AN INDEPENDENT STUDY SUBMITTED IN PARTIAL FULFILLMENT OF
THE REQUIREMENTS FOR THE DEGREE OF
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(INTERNATIONAL PROGRAM)
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ABSTRACT

This research has the objective to study the impact that blockchain and smart contracts have on the financial and logistic sectors in Thailand. The objectives are divided into two; 1) commercial implementation in Thailand, and 2) perception towards blockchain and smart contracts. To reach these objectives, an extensive literature review of books, academic papers, new articles, technological development white papers, and actual use-cases have been analyzed. This secondary research has defined and framed the questions, as well as setting the boundaries for the qualitative in-depth interviews. The interviews has been conducted with industry leaders, executives and senior managers, which are the decision-makers in such implementations, as well as strategic company directions. Some areas could not be covered in this research due to time constraints, or because they require a full research on their own. The biggest surprise discovered in the research was the lack of understanding the technology as a whole, instead of putting it equal to Bitcoin, and Bitcoin's price volatility.

Keywords: Blockchain, Smart Contracts, Thailand, Financial Sector, Logistics Sector, Regulations, Commercial Implementation, Feasibility, Perception.

ACKNOWLEDGEMENTS

First and foremost I would like to express a sincere “thank you” to all of the interviewees, advisors and professors that have made this research possible, and to all of the previous studies and materials published in the field of blockchain technology. This has built a solid foundation, and assisted in setting the boundaries for my research. Technology, and blockchain in particular, is field that is very close to me, both in terms of my current work as Commercial Manager at aCommerce (Thailand), as well as my passion for technology and optimization of business processes.

It is an honor to be able to explore this interesting technological development in greater depth, and how this can be taken from theory and test cases, to actual commercial implementation. I firmly believe that we have only discovered the tip of the iceberg of the possibilities and impact that blockchain brings to the way we do business around the world today, and tomorrow. Thailand is a country in rapid growth, especially in the technology sector, which has a large impact on a wide array of other business sectors across the country. Now a days technology is at the convergence of most sectors.

This research will focus solely on the financial and logistics sector in Thailand, but will provide suggestions to further research for academics and business professionals in Thailand and Southeast Asia. I hope that this research will provide additional insights and knowledge to you, the reader, and whom you might share this with. Should you have any further questions or have comments or corrections to any data provided, I will appreciate your feedback either to Thammasat University or directly to myself.

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LIST OF ABBREVIATIONS

Listed in alphabetical order, not in the order of appearance.

Symbols/Abbreviations	Terms
AI	Artificial Intelligence
AML	Anti-Money Laundering
AR	Augmented Reality
BaaS	Blockchain-as-a-Service
DLT	Distributed Ledger Technology
ICO	Initial Coin Offering
IOT	Internet of Things
KYC	Know Your Customer
SaaS	Software-as-a-Service
SEC	Securities Exchange Commission
SME	Small-Medium sized Enterprises
SWIFT	Society for Worldwide Interbank Financial Telecommunication
TCP/IP	Transmission Control Protocol / Internet Protocol
VR	Virtual Reality

CHAPTER 1
INTRODUCTION

1.1 What is Blockchain?

Blockchain is a relatively new technology used to link and consolidate information and data on a secure and transparent ledger or "chain", which is distributed across all participating parties throughout a public or private network. The mathematical algorithms make the data in the blockchain immutable, with unique hash ID's and timestamps. Due to the technology being rather new, many people associate blockchain with Bitcoin, even though these two have similarities, they are two very different things.

1.1.1 The Difference Between Bitcoin and Blockchain

Blockchain is the technology that underlies Bitcoin, actually Bitcoin was the first application to utilize and adopt the blockchain technology. Bitcoin is used to transfer value between two or more parties, and all of these transactions are captured and stored on an immutable and open-sourced blockchain, used for only Bitcoin transactions. This blockchain is also knows as the Bitcoin Blockchain. Since the inception in 2008 up until this very moment, every single Bitcoin transaction that has ever been executed is stored publicly in a mathematical algorithmic chain of data, where each of such "block" in the chain (representing 10 minutes' worth of Bitcoin transactions) is chronologically placed with an unique hash. In fact, every single Bitcoin transaction also got its unique hash, which is linked to the hash of a particular block.

1.1.2 Why Bitcoin was Important for Blockchain

Without the development and deployment of Bitcoin, there would questionably not have been other commercial or real-life use cases of the blockchain technology. Bitcoin showed the small group of technology enthusiasts that their experiment of transferring value between two or more parties, without any central clearing house or regulator was possible. Once this was proved, Bitcoin went from being a social experiment among

cryptographers, to becoming a globally adopted technology, upon where real businesses was being built. The vision for Bitcoin and its core developers, was to build a truly global currency resistant to inflation due to its limited and known supply, without any government being able to regulate it.

1.1.3 The Birth of Ethereum, the Programmable Blockchain

In late 2013, five years after the Bitcoin Whitepaper (Nakamoto, Bitcoin.org, 2018) has been released, the young Bitcoin enthusiast Vitalik Buterin discovered the potential of making the blockchain available to other uses that just peer-to-peer payments. Buterin developed a computing language called Solidity (Buterin, Solidity.io, 2018), in where programmers could create blockchains on their own in a very convenient fashion. This sparked innovation among the cryptography community, and soon the technology was being adopted widely across the world, for people that was working in the blockchain industry. Bitcoin is the simplest form of a blockchain which only serves a single purpose, to transfer Bitcoin to other Bitcoin addresses, hence not being programmable. But this is where the Ethereum blockchain is truly a version 2.0 of the blockchain development. The programmability of commands on a blockchain opened up a whole different spectrum of possibilities to execute scheduled actions. These are knows as smart contracts.

1.2 What is a Smart Contract?

A smart contract is a contract between two or more parties, put onto the blockchain, to be automatically executed with full transparency, at minimal costs, without the need for third party authentication, as this will be obtained by network consensus. For this to put into perspective, a simplified fictive example will be used from Thai Airways:

Today, Thai Airways is buying futures for its jet fuel through the commodity exchange in Thailand. These barrels of fuel will have a specific delivery date, at a price agreed upon. But in the process a lot of approvals are needed from executives, bankers, logistic companies, customs, regulators, and auditors – just to name a few stakeholders

in that supply chain. For this, different software systems need to be integrated, and the amount of paperwork and signatures are plentiful, before the barrel of jet fuel actually reaches the Thai Airways terminal at Suvarnabhumi Airport in Bangkok, Thailand.

To make this process more lean and effective, blockchain technology could dramatically assist Thai Airways and its partners in the ecosystem. This would mean to create a private blockchain between Thai Airways and the partners in the ecosystem. Every time an order was being broadcasted to the blockchain by Thai Airways, the smart contract would then be programmed to start the next step in the authorization process. Then the order would be passed on to the commodity exchange upon the digital signature of Thai Airways executives, bank approvers, and potential auditors. All of these steps would be executed automatically in the programmed chronological order specified in the smart contract, and either there would be no or very minimal fees, and no manpower needed to verify the validity, because this is done through algorithms and consensus across the parties, according to the pre-defined criteria. And most importantly, once locked in the blockchain the data are immutable, and can always be traced back by parties with authorization. To summarize the Thai Airways example, the implementation of blockchain solutions are not done over-night, and cannot be completed solely by a single player in the ecosystem, it need to be a choice and direction made in consensus toward a more transparent and efficient business environment.

1.3 Regulative and Legislative Landscape

Since the Bitcoin Whitepaper was released, there have been a lot on focus on the technological development, but what is also crucial to adoption and innovation is the regulative and legislative aspect. Companies are reluctant to allocate budget and invest if the environment is not regulated.

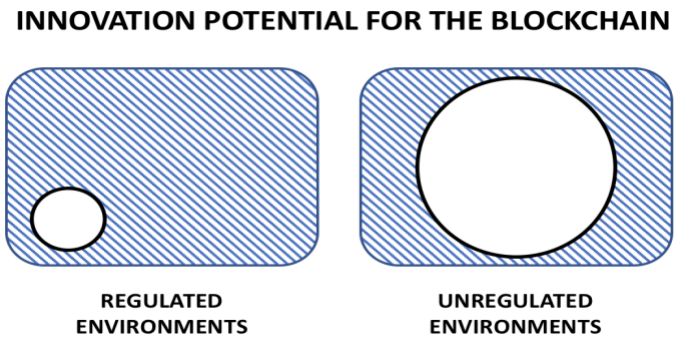

Figure 1 (Mougayar, 2016): Comparing the innovation potential for blockchain solutions between environments that are regulated, and those that are not.

William Mougayar's theory that the innovation potential for blockchains increase significantly when the environment is regulated, compared to an unregulated environment. When there are clear regulations in place, it is less likely there will suddenly come unexpected changes, from a regulative stand-point. Governments across the world have taken very different stands on blockchain and cryptocurrency regulation. Some countries classify the cryptographical assets as barter goods, some a currency, some an investment vehicle, and some have outright made it illegal to own or trade.

1.3.1 The Current Situation in Thailand

At the time of writing, Bitcoin and other crypto assets are considered legal in Thailand to hold and to use as a payment tool. However, the Bank of Thailand stated in 2013 that they discouraged the usage of Bitcoin, and stated in 2017 that they would like to see proper controls in place, as they are suspicious of the KYC (Know Your Customer) and AML (Anti Money Laundering) processes currently in place.

Depending on the structure of the blockchain being build, the parties can effectively be owners of the assets on the blockchain, represented by a tokens created for that specific blockchain. This structure is a very different discussion than Bitcoin and other crypto assets that is solely used as a currency or investment vehicle. These tokens are seen as shares, compared to a currency, as the token holder owns a stake in that blockchain that could represent a company.

Due to that, a discussion is currently on-going from the Securities and Exchange Commission of Thailand (SEC) that tokens issued as shares need to be regulated by the same laws that applies to public companies listed on the stock exchange. There is still no final verdict to the discussion.

1.4 Research Scope

This contemporary exploratory research in applied marketing will be composed of both primary and secondary research. The secondary research will provide an overview of the market, as well as identifying the boundaries. Thereafter, the primary research will be composed of qualitative in-depth interviews with industry leaders, supported and compared to the already published secondary data. As previous research on this area, conducted by Thailand and Southeast Asia, is rather limited, qualitative in-depth interviews will provide insights into each industry, at a local level.

Besides the Ethereum blockchain which has been the clear frontrunner, other alternatives are now starting to show up, and Thailand is among the most advanced countries in Southeast Asia to explore these innovative solutions. Previous studies in this area, including already published materials, have yet to provide deep insights into the companies and providers in Thailand that actually makes the decision to implement these solutions. This research aim to provide insights from the financial sector and the logistics sector, which is highly likely to be disrupted and benefit from the commercial implementation of blockchain and smart contract solutions. As these two sectors are some among many, this research will provide suggestions for further research to be conducted by academics or professionals working in this area or find it fascinating.

1.5 Conceptual Framework

The three main stakeholders in the research are; 1) the Financial Sector, 2) the Logistics Sector, and 3) the Government. Among these stakeholders, five main areas are to be studies using various research methods. This Conceptual Framework can also be referred to as the ecosystem.

Figure 2: Conceptual Framework for how blockchain and smart contracts impact business in Thailand

CHAPTER 2
REVIEW OF LITERATURE

2.1 Books

2.1.1 The Business Blockchain

William Mougayar explains two interesting concepts in his book The Blockchain Business, namely the "Framework for Focusing: Blockchain's Success" and the "Table of Challenges". Drawing on his 34 years of experience in the technology industry, Mougayar has deep insights in working with both small and large companies as a blockchain consultant.

With the implementation comes challenges. These challenges can be split into two areas, business and technology. These are challenges that are generic for any technological adoption, hence not specific to blockchain only.

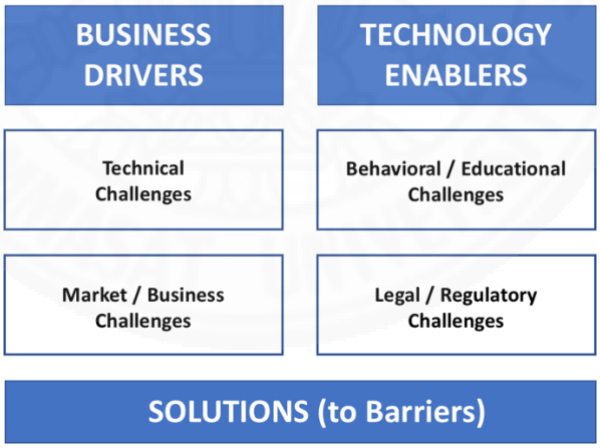

Figure 3: Framework for Focusing: Blockchain's Success (Mougayar, 2016)

TECHNICAL	MARKET / BUSINESS
• Underdeveloped ecosystem infrastructure • Lack of mature applications • Scarcity in developers • Immature middleware and tools • Scalability • Legacy systems • Tradeoffs with databases • Privacy • Security • Lack of standards	• Moving assets to the blockchain • Quality of project ideas • Critical mass of users • Quality of startups • Venture capital • Volatility of cryptocurrencies • Onboarding new users • Few poster applications companies • Not enough qualified individuals • Cost issues • Investors dilemma
BEHAVIORAL / EDUCATIONAL	**LEGAL / REGULATORY**
• Lack of understanding of potential value • Limited executive vision • Change management • Trusting a network • Few best practices • Low usability factor	• Underdeveloped ecosystem infrastructure • Lack of mature applications

Table 1: Table of Challenges (Mougayar, 2016)

One of the most notably challenges specific to Thailand is the two lower quadrants, Behavioral / Educational and Legal / Regulatory. As the implementation needs to made at a high level in the organization, it is crucial that the executive vision is on blockchain solutions, otherwise no progress and initiatives will be taken towards implementation.

2.2 Academic Papers

2.2.1 IDS: Blockchain for Development - Hope or Hype? (IDS, 2017)

The Institute of Development (IDS) studies has published the model called Grounded Innovation, a model that explains the components for successful innovation.

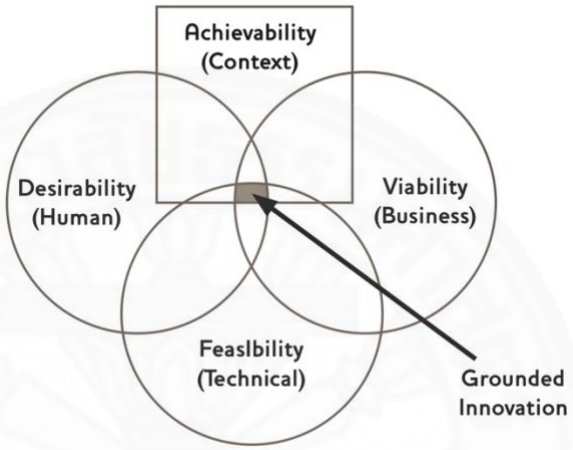

Figure 4: Components for Successful Innovation (IDS, 2017)

In order for a new technology to be widely adopted and to provide sustainable innovation, four key components need to be fulfilled; 1) Technical, 2) Human, 3) Business, and 4) Context. All of these need convergence in order for the innovation to have sustainable impact. At this stage, IDS has a difficult to say whether blockchain technology is hope or hype, but analyzed using the Grounded Innovation framework it surely fulfills all four components, but it is still early to conclude until a larger scale of commercial implementations has taken place.

2.2.2 Berkley Engineering: Blockchain beyond Bitcoin (Berkley, 2018)

In the "Blockchain beyond Bitcoin" Berkley Engineering provides an easy to digest step-by-step infographic on how a transaction on the blockchain works.

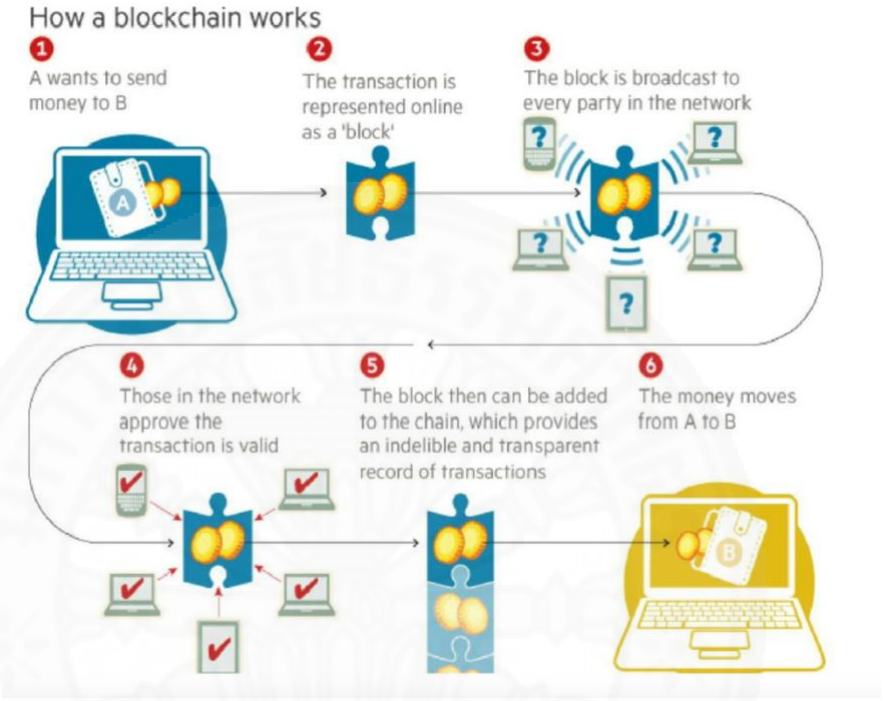

Figure 5: Financial Transaction Using Blockchain Technology (Berkley, 2018)

Furthermore, the section on Risk for Adoption explains six factors that is hindering or slowing down the adoption of blockchain solutions: 1) Behavior change, 2) Scaling, 3) Bootstrapping, 4) Government regulations, 5) Fraudulent activities, and 6) Quantum computing. The study shows that many companies are reluctant to implementation due to the uncertainty in government regulations and amendments to the current framework already in place. In the United States, the Federal Trade Commission is very active with communication regarding new initiatives, whereas in China, and most part of the developing world, new regulations will come more suddenly, hence having a more direct and unexpected impact on the business environment.

2.2.3 MIT: Some Simple Economics of the Blockchain (MIT, 2018)

In the research titled "Some simple economics of the blockchain", professor Christian Catalina from MIT and professor Joshua S. Gans from the University of Toronto explain the concept of costless verification. Digitalization has already pushed verification costs close to zero, but now with blockchain technology entering the space, this can not only be done without any costs, but can also be done in customized layers. Instead of showing ones identification card when entering a nightclub, it is possible to scan a card, in where it will only allow certain data to be transmitted to the nightclub. Age would be the information passed on, other information like address will remain in the power of the card holder. This process has no cost incurred, except the development of the applicable blockchain system needed to perform this.

2.2.4 Maastricht School of Management: The Blockchain Technology: Some Theory and Applications (Dimitri, 2017)

Professor of Economics at The Maastricht School of Management Nicola Dimitri express in her Working Paper "The Blockchain Technology: Some theory and applications", that the digitalization of contracts on a blockchain could be relevant for both the private and the public sector. Especially the field of procurement would be great benefits of such technologies, as it would decrease a lot of the steps involved in purchasing. Professor Nicola Dimitri is hoping to see the coding of the EDIFACT (Electronic Data Interchange For Administration, Commerce and Transport) into smart contracts as a set of rules between governments and economic commissions.

2.3 Thailand Related News Articles

2.3.1 Thai Regulators Seek Appropriate Rules for ICO's (CoinDesk, 2018)

With Initial Coin Offering's (ICO's) being a groundbreaking technology for individuals or SME's to raise funds, the popularity increases rapidly. This concept has already seen large adoption across the world, and already surpassed the funds raised by venture capitalists in 2017. In the article, the Security Exchange Commission of Thailand state the following: "The SEC Thailand encourages access to funding for businesses, including high potential tech startups, and realizes the potential of ICO in answering startups' funding needs. In cases where an ICO constitutes offering of securities, the issuer will need to comply with applicable regulatory requirements under the SEC Thailand's purview."

2.3.2 Bank of Thailand Heralds Blockchains Impact (CoinDesk, 2018)

Dr. Veerathai Santiprabhob, the deputy chairman of the central bank's 14-member board states that the emerging blockchain technology and distributed ledger technology both provides "opportunities" and "challenges", but also noting that the domestic financial institutions need to embrace this rapid change. Many jurisdictions are providing cautions towards the implementation, but the fact that Bank of Thailand got an open mind soften up the discussions, and welcoming investments.

2.3.3 SET Building a Blockchain Market (CoinDesk, 2018)

The Stock Exchange of Thailand is looking to build a market where SME's can raise funds, hereby capitalizing on the development of ICO's, but regulated by the SEC. "Thai Deputy Prime Minister Somkid Jatusripitak encouraged the exchange to consider new tools for startups to access capital, leading to the reported plan." This will not be a replacement of the stock market, but merely a substitute for Thai SME's to obtain funding.

2.3.4 Over 100 migrant workers test Thai developed remittance blockchain application (CoinDesk, 2018)

The Thai founded company Everex recently launched their blockchain-based remittance service, and are currently testing it among 100 Burmese migrant workers based in Thailand, sending remittances back to Myanmar. This solution enables them to send funds back home instantly, with a cost reduction of 7%. Currently the platform got 500 active users, and the platform is built upon the Ethereum blockchain. It is estimated that between two and five million Burmese workers are living in Thailand.

2.3.5 Ethereum Founder Vitalik Buterin Discuss Future of Financial Sector with Thai Central Bank (Cointelegraph, 2018)

In mid-August, the Thai Central Bank held a meeting with Ethereum founder Vitalik Buterin, to discuss topics such as the future of the Thai economy and its financial sector. Vitalik serves as an advisor to the Thai founded blockchain payment provider OmiseGO, which embraces transparency and a cashless society. Vitalik sees Thailand as a pioneering market in Southeast Asia due to the high mobile penetration, and developed online infrastructure already in place.

2.3.6 Digital Passport OmiseGo (BitLex, 2018)

The Ministry of Digital Technologies Thailand has already signed a partnership with Omise, which is proposing a digital citizen ID build on top of the Ethereum blockchain. The purpose of this implementation, is to reduce fraudulent activity, and to protect consumer data. This partnership is coming after the Ethereum founder Vitalik Buterin visited and had a discussion with the Thai Central Bank on a possible solution for a cashless society, using OmiseGo.

2.3.7 Blockchain to Help the Supply Chain (TH) (Techsauce, 2018)

The supply chain is a process involving a large numbers of stakeholders. In this process there are many different steps that a product goes through, before it actually being consumable in the hands of the consumer. With various

Distributed Ledger Technologies, companies and stakeholders in the supply chain are able to track the goods, its authenticity and origin before accepting it into the next link of the supply chain. If there is any alteration to the data from any computer in the entire network, all stakeholders will be notified of such change. Even information on how many degrees a certain cold-storage container had at a given time during the shipping, can be traced and is transparent for the related parties to see. Walmart is currently testing a solution for its pork transportation in China, and Everledger is building a blockchain-based tracking system of African diamonds, to fight the inflow of blood diamonds.

2.3.8 Blockchain Game Changer (Nation, 2018)

In 2017, Kasikorn Business Technology-Group (KBTG) announced a partnership with IBM to work on a solution for Bank of Thailand's "Regulatory Sandbox", which is a blockchain application to manage letters of guarantee. This solution will effectively decrease the processing time of a letter of guarantee from currently nine working days, to just half a day. In this trial period is KBTG partners including, Metropolitan Electrical Authority, Provincial Electrical Authority, PPT Polymaker and PPT Global Chemical. The partnership is visioning to elevate Thailand's competitiveness in the long term.

2.3.9 Rail and Post to use Blockchain (BangkokPost, 2018)

Sirima Hiruncharoenvate, the Chief Information Officer at the State Railway of Thailand (SRT), said that the SRT will invest over one billion Thai baht over the next three years, in order to upgrade and improve their information and communication technology. The majority of this investment will be in Internet of Things (IoT) and blockchain technology. These new technologies could have a significant impact on train arrival times, preventive maintenance, parcel delivery and payments.

2.3.10 Thai Banks are Implementing Blockchain Solutions (Nation, 2018)

Siam Commercial Bank has entered a partnership with Ripple. Ripple is a company providing a blockchain solution to banks, on how they can transfer

funds across boarders instantly and with fees not even being a cent on the dollar. This is a direct competitor to the current SWIFT system the vast majority of banks use today. Ripple got alliances and partnerships with already over 100 banks worldwide, including Santander, Standard Chartered, UBS and Mizuho, just to name a few. Furthermore, Bank of Ayutthaya here in Thailand has entered a partnership with IBM on the implementation of Distributed Ledger Technology (DLT) to make their Contract Management System more transparent and efficient (Froeslings, 2017).

2.4 Technological Development

2.4.1 Bitcoin White Paper (Nakamoto, 2008)

The Bitcoin White Paper was released in late 2008, which described a method to use cryptography for doing electronic payments peer-to-peer without the need of a central authority to verify the payment, that would be done through the network consensus and the described Proof-of-Work algorithm, governed by digital signatures. All transactions will be time stamped and locked in blocks, connected to a chronological chain. Cryptography is not a new technology, but it has always had the issue of the double-spending problem, and nobody before Satoshi Nakamoto's release of the Bitcoin White Paper had solved this issue.

2.4.2 Ethereum White Paper (Buterin, 2013)

In late 2013, Vitalik Buterin released the Ethereum White Paper, following the concepts laid out by Satoshi Nakamoto. The purpose of Ethereum compared to Bitcoin was the possibility to create decentralized applications, backed by the benefits of blockchain technology. What Buterin created from the Bitcoin philosophy was a programming language or platform, similar to what the World Wide Web is to TCP/IP – it functions as a layer, which is operating with its own programming language called Solidity. Most remarkable with the

Ethereum blockchain is, that it enables smart contracts to be build, a thing that is significantly different from the Bitcoin blockchain.

2.4.3 Ripple White Paper (RippleLabs, 2014)

In 2014, Ripple Labs released their consensus algorithm called The Ripple Protocol. The main purpose of Ripple is to enable near-instant payments with fractional fees associated, targeting banks and financial institutions for cross-border transactions. This platform is backed by blockchain technology and having their own decentralized cryptocurrency token called XRP. But one thing that is important to notice is, that Ripple Labs and their token XRP are two very different things. Ripple Labs is looking to take on the SWIFT network as their main competitor, transferring various fiat currencies between institutions. The XRP token is merely a tool to make these transactions more cost efficient, and allow the XRP token holders to own a stake in the XRP network, not Ripple Labs. Ripple has extensive partnerships with over 100 financial institutions worldwide, including a handful of banks in Thailand, and Ripple work very close with governments to comply with KYC and AML processes.

2.4.4 IOTA White Paper (Soenesteboe, 2017)

One of the newest Distributed Ledger Technologies is IOTA and their Tangle. Tangle is a different consensus algorithm from what most other solutions are currently using. Tangle promotes itself on being completely fee-less, and the most scalable solution on the market. IOTA is focusing on the Internet of Things, and on making micro-transactions possible. The most remarkable partnership IOTA has formed is with Volkswagen and Microsoft, which is currently testing our various solutions before commercial implementation.

2.4.5 Hyperledger Sawtooth White Paper (IBM, 2018)

Hyperledger is a project backed by the Linux Foundation with heavy support from IBM. Hyperledger provides different plug-and-play solutions, also known as Blockchain-as-a-Service (BaaS) for companies that would like to build serious commercial blockchain solutions. Prior to launching Sawtooth, Hyperledger's most known solution was Fabric, which is also a BaaS, supporting business applications build on the Ethereum blockchain. Sawtooth now enables BaaS across various Distributed Ledger Technologies, hence aiming for a broader market and less limitations. Many companies choose to partner up with Hyperledger due to their industry expertise and extensive experience, and also due to them being backed by IBM, which is one of the pioneers in Software-as-a-Service (Saas) solutions.

2.4.6 Deloitte Evolution of Blockchain (Deloitte, 2017)

Deloitte got an extensive blockchain-consultancy department which is providing industry insights through published materials. In the Deloitte Insights research report for Financial Services, a comparison and ranking of the top 10 cities with most blockchain development projects, and notably two Asian cities are among the top 5. Deloitte says: "We cannot predict exact trajectory and impact of blockchain technology. But we should also not ignore it early stages of development and successes along with failures. Tracking young technology's development could potentially maximize its potential to best serve us".

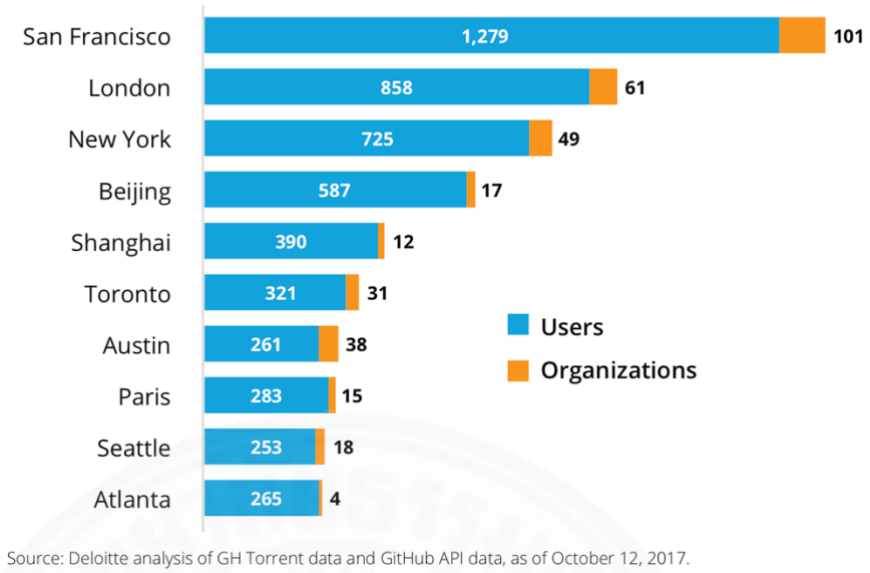

Figure 6: Top 10 Cities for Blockchain Development Projects (Number of Projects)

2.4.7 Understanding the Web 3.0 (OutlierVentures, 2017)

New ground-breaking technologies are emerging quicker than ever, in a pace that is difficult to keep up with. The most popular new technologies include Blockchain, Artificial Intelligence (AI), Virtual Reality (VR), Augmented Reality (AR), Robotics, and 3D Printing. All of these are interesting and worth studying each by its own, but a whole new dimension to the technological development opens when Blockchain becomes the convergence, connecting them all. Blockchain is basically a way to distribute information across all participating parties in the network, through consensus and cryptography. This will ensure that the data is genuine and transparent, which eliminates any central authority, thus giving each party rights through mathematical algorithms. Outlier Ventures Research explains this development in great details throughout the forty-page research they have conducted across multiple industries. Conclusively, today blockchain is a buzz word overused with to broad a definition, but managers across the world need to understand how it impacts their business, and how it can be used as a competitive advantage to stay ahead of competition.

2.5 Use-Case Studies

2.5.1 Maersk and IBM to Launch Trade Platform (Reuters, 2017)

Maersk, the world's largest container shipping firm, is partnering up with IBM to create an industry-wide trading platform. The platform can help speed up trades, and save billions of dollars at the same time. The vision, and also its biggest challenge, is to bring standards across the entire ecosystem. Vincent Clerc, Chief Commercial Officer at Maersk said, that a single shipment of refrigerated goods can go through around 30 people or organizations, before reaching its destination, and documentation can account for as much as one fifth of the total costs associated with moving a container. Last year Maersk was victim to a large cyber-attack, hence an increased focus on cyber-security and improvements on their technological development.

2.5.2 Deutsche Borse Case Study: Hyperledger Fabric (Hyperledger, 2017)

The Deutsche Borse Group (DBG) is one of the world's leading global exchange groups, and serving as one of the largest clearing houses as well. Together with four other global exchange groups (TMX/CDS from Canada, Clearstream from Luxembourg, Strate from South Africa, and VPS from Norway), they have formed the "Liquidity Alliance Ledger" (LA Ledger), which is a prototype to facilitate a faster and more cost effective way to allocate fragmented securities. The technical prototype was completed in April 2017, and was built on the Hyperledger Fabric platform. The next step is to bring the prototype in production in cooperation with its global partners.

2.5.3 Dubai Smart City (UnlockBlockchain, 2017)

Dubai has the vision of being the first city "on the blockchain", a vision set out in early 2017. Dubai is highly focused on trust and law enforcement, and sees blockchain as the ultimate trust machine, which will focus on mainly three areas; 1) Government efficiency, 2) Industry creation for business opportunities, empowering startups and cooperation, and 3) Thought leadership, aiming for

regional and international leadership, which will be able to share the knowledge to other countries and consortiums.

2.5.4 Taipei IOTA Transformation to Smart City (Technode, 2018)

In January 2018, the IOTA Foundation signed a partnership agreement with the city of Taipei, Taiwan. The partnership has the purpose for Taipei to explore how IOTA and its Tangle and create a linkage between IoT and the Taiwan citizen TangleID. With the billions of IoT devices already around, it is possible to go to very granular levels in terms of data, for example, taxation can be calculated based on small areas, how much street light is being used, how much salt is used on the roads, just to name a few. A flipside to this, is very data privacy conscious individuals, which do not want their data to be collected by a central authority on that detailed a level.

2.6 Summary of Literature Review

Due to the limited published material in Thailand, the majority of the literature review is coming for overseas, but since this is a technology with a global perspective, and in some countries similar to Thailand, the information is still highly relevant where many parallels can be drawn. The knowledge and information obtained during the literature review phase as helped form questions and direction for the qualitative in-depth interviews. To cover the full spectrum of material, review of books, academic papers, news articles, technological development, and case studies has been used. The published materials shows that Thailand put a lot of focus on blockchain solutions in the financial sector, and have already started to implement smaller scale solutions. This is mainly solutions from two providers; Ripple Networks and IBM's Hyperledger. These solutions are the once paving and leading the way in innovative companies around the globe, so it is no surprise that this is also the case in Thailand. One key question that this research has the objective to shed light on, is why companies choose, and not choose, to commercially implement these solutions. What is holding them back, and what kind of evidences or proofs are needed to change these opinions and perceptions.

CHAPTER 3
RESEARCH DESIGN

The design of this exploratory research is set to answer the key research objectives. The boundaries set on sectors and depth have mainly been formed through the secondary research of already published materials. Therefore, the decision has been to narrow the focus on two specific sectors that are poised to be disrupted and gain benefits of blockchain solutions upon commercial implementation.

3.1 Research Objectives

1) Commercial implementation in Thailand

a. Study two sectors in-depth; the financial and logistics sector
b. Examine the challenges and obstacles across the sectors
c. Determine the current blockchain and smart contract adoption in Thailand
d. Discover the most attractive and lucrative sector for implementation with the highest impact on the business landscape in Thailand

2) Perception towards blockchain and smart contracts

a. Study the general perception across industry leaders, and examine how the company culture and management perception influence the strategic company direction
b. Study the Thai regulative and legislative landscape

3.2 Research Methodology

In order to fulfill the research objectives, and stay within the research scope set out for this research, the decision has been to conduct a large amount of secondary data research, then followed by the primary research of qualitative in-depth interviews. The reason that the secondary research was done first, was to set the research boundaries, and shape the interview questions in the best possible fashion.

3.2.1 Secondary Research

The secondary research consisted of literature review across different media sources of already published material. The sources included; books, academic papers, local new articles, global news articles, technological development (white papers), and use-case studies.

3.2.2 Primary Research

For the interviews there was a fixed list of questions (Appendix A), but depending on the knowledge of specific areas from the interviewee, off-script and probing into a specific areas was more fruitful, and provided greater insights, and get more clear answers according to the key research variables set:

- Likelihood of adoption
- Perception towards the technological change
- Possibilities in each sector
- The impact of legislation and regulation
- Comparison of business cases with/without blockchain and smart contracts
- The understanding and knowledge about blockchain technology and smart contracts on a strategic level

3.3 Sampling Plan

For this research, the primary research consisted of 10 qualitative in-depth interviews with industry leaders and stakeholders. The interviewees were grouped into the following groups:

1. Financial Sector (n = 4)
2. Logistics Sector (n = 3)
3. Providers & Consultants (n = 3)

An important point to this research is the choice of key informants which has significant impact of the final outcome and recommendations. Due to the whole blockchain and smart contract development being in its early stages, the implementation decisions need to be taken at the highest level in the organization as a strategic long-term direction. Not all industries are ripe for the implementation, and certainly not all management teams are. With this in mind, the target population for this research was C-level executives.

3.4 Data Collection

Data has be collected between January 08, 2018 until the research finished on April 06, 2018. In-depth interviews have be recorded and transcribed for analysis, and most interviews were done face-to-face, but for the convenience of some interviewees, and the distance for interviewees in Singapore and Hong Kong, these were conducted over Skype. Each interview was roughly 60 minutes, with around 120 minutes of preparation for each interview, to study the interviewees background and shape questions accordingly, with the research objectives in mind. Most interviewees have requested to stay anonymous with name and company, but allowed position and age to be published.

3.5 Data Analysis

Once the in-depth interviews was completed, it was then transcribed, and the analysis phase started. First the data was analyzed and the findings broken into meaningful parts, thereafter synthesizing it and rebuilding a useful value proposition for further investigation or action. This ensured that all answers are not taken for face value, but looked at as a whole, across multiple interviews. The main objective was to take the unstructured data, apply framework, and generate output.

3.6 Limitations of the Study

Initially there was going to be a section on the Bangkok Blockchain Conference that took place in Bangkok on December 04, 2017. The section would include Big Data analysis from Twitter reviews, that would measure the sentiment and perception towards blockchain prior to the event, and in the days shortly after. This would give

insights into “the voice of the crowd”, which is a powerful measure. But due to time constraints, this was unfortunately not possible to accomplish within this research.

It has been more difficult than expected to get a quality interview with a government officials, and a legal person, to discuss more about regulations and the legislative landscape. Therefore, in this area, the majority of the data and information stipulated in this research are derived from the secondary research. The number of interviewees is not high either, that is partly due to the time constraints, as well as the accessibility of people with enough knowledge in this area to have an in-depth discussion.

CHAPTER 4
RESULTS AND DISCUSSION

4.1 Secondary Research Key Findings

4.1.1 In-Depth Interviews in the Financial Sector

a) Lack of Understanding the Bigger Picture

Most interviews started out with a comment in the like of "oh, so you want to talk about the price of Bitcoin?", and then it would take at least 5 minutes to direct the conversation back onto the track of what really matters; the technological development, the awareness, and the barriers to adoption. The fact that key informants this high in the decision making process and hierarchy, mostly focus on the cryptocurrency price towards fiat currency is alarming, and gives a feeling that a lack of understanding of the technology and its impact is a reality among very capable business professionals.

During interviews with senior management positions in multiple of the major Thai banks, they expressed fear that blockchain and digital currencies could signal a decline of the banks. But to argue on this point, the bank will only see a decline if they fail to keep up with the innovation, and if they stop investing in talent with expertise in this field. The investment in talent can be expensive in Thailand as the supply of manpower in the blockchain field is rather limited.

One executive with over 30 years of experience in the Thai banking industry compared this new technological development to when the Web was introduced for mainstream adoption back in 1994, and available for the banks and financial institutions to use, most pushed back and did not buy in on the idea. The same picture

is now being painted with blockchain technology and its implementation journey.

b) Bitcoins Volatility

Another discussion point that appeared in all the interviews, was the volatility of the Bitcoin price. A lot of media attention is drawn to Bitcoin and other cryptocurrencies during a Bull Market, which catches the radar of financial business executives. But on the flipside, when the price goes south, a lot of credibility towards digital currencies, and blockchain solutions in general, vanishes. Among the interviewees there were a strong correlation between the Bitcoin volatility and the sustainability of blockchain solutions.

c) Need Additional Use-Cases

An experienced consultant, that have been working in financial consulting in different countries across Asia, answers as following to the question on main obstacles and challenges in the financial industry: “We are being challenged on how much we are willing to bend our business models in order to implement and accommodate blockchain technology”. This is a fair point that all executives need to take into consideration, when weighing the pros and the cons of experimenting with possible solutions.

d) Ripple Networks: The New Kid on the Block

Interviewees with greater-than-average knowledge about blockchain and Distributed Ledger Technology mentioned partnerships Ripple Networks, to test cross-border settlement. A handful of the major Thai banks have already entered such partnerships where they are beta-testing solutions. As mentioned during the literature review of the Ripple White Paper, Ripple are targeting banks and put very serious emphasis on conducting business according to global banking laws and regulations. Not one

interviewee agreed to the statement that Bitcoin and Ripple served the same purpose.

e) Risk vs. Reward

Especially financial institutions that are publicly listed on the stock exchange tends to be more cautious with regards to risk. Should any solution be implemented and show to have a profound impact on the security of customer data or other security breaches, this could be fatal for the bank. Therefore all respondents puts the risk factor before the potential reward, and would like to see more real-world use-cases before they embark on any commercial implementation. When probing into this, two senior managers referred to the Regulatory Sandbox project explained in the literature review 2.3.8.

f) Concerned About Regulations

There are two major factors that scares all interviewees, the lack of clear regulations and guidelines in the blockchain and FinTech industry, and the fact that Thailand is still under military control, since the latest military coup. With these two critical roadblocks a lot of investment are held back until the landscape is more transparent and less risky. This is less of a concern for financial institutions with operations based outside of Thailand, referring to a respondent based with a regional bank in Hong Kong.

4.1.2 In-Depth Interviews in the Logistics Sector

a) Main focus is Ethereum

When interviewing executives in the logistics sector, the focus is very different from the financial sector. There is very little focus on Bitcoin and the cryptocurrency aspect, and most is on information sharing, transparency, and security. One global shipping company

with extensive operations in Thailand expressed great in-depth knowledge about the usage of the Ethereum blockchain during test projects with IBM's Hyperledger Fabric. But this project is still in its test phases, because if launched with flaws it could have fatal consequences for the company, not only on a local Thailand scale, but for the whole global organization.

b) Digital Currency vs. Infrastructure Development

Among the interviews conducted, there is consensus that a digital currency is needed to serve as the medium of exchange between the parties involved, but whether this is Bitcoin, another cryptocurrency or token, or even digitalized fiat currencies, is less of a concern. The focus is more on building the infrastructure, and welcoming innovation. One executive of a large warehouse operator in Thailand commented, that*:* "innovation will eventually happen at a startup level before showing that the model is actually working. Once it can be proved, and it has been de-risked, larger organizations with larger scale tend to buy into the vision".

c) The Importance of the Ecosystem

In conjunction with the infrastructure development, with the infrastructure the ecosystem cannot be expanded. Except for one interviewee that has already started to implement the beta-testings, others are more reluctant, and are waiting for more clear evidence. "we [company] would rather keep an eye on the development of key players in our space, and we are willing to accept a slower uptake and potential slower gains, by de-risking the choice as much as possible, without missing the opportunity to implement before the masses". One key issue here is, that if all the important players in an ecosystem is waiting, then there will be no innovation taking place, sort of like Prisoners Dilemma game theory.

d) Less Concerned About Regulations

Compared to the respondents from the financial sector, the logistics sector is less concerned about government regulations, because their perception towards the regulations is mainly for payments and digital currencies. But on the contrary, a digital currency or token is needed for the infrastructure to be feasible, so these regulations cannot be fully overlooked. However, the main concern is how law enforcement will handle smart contracts. Currently a smart contract is smart, but is it really a contract? If taken to court, a smart contract is not legally enforceable, hence making it not really a contract. No country has yet to acknowledge a smart contract to be legally enforceable, and neither has Thailand. For this to be feasible, there have to be a convergence of lawyers and practitioners with increased knowledge on programming languages that understand both the technological and legislative implications.

e) Skepticism

Even for senior managers with extensive knowledge in the area, there is a tone of skepticism underpinned when probing into the actual implementation. The skepticism seems to be anchored in whether blockchain can effectively and successfully be implemented in their ecosystem. There is a heavy consensus that the technology indeed is interesting, but whether it can really solve the issue and challenges is an uncertainty, and the elephant in the room.

4.1.3 Patterns

Following the interviews, there are two main patterns that has been present in the vast majority of them: The Knowledge Journey and The Agenda.

1. **The Knowledge Journey**

This concept will explain how the interviewee has obtained information, and in which direction this has taken him/her:

Figure 7: The Knowledge Journey

In slightly different forms, this is the main information obtain and decision processing flow that shined through when probing into the question of "Have you ever heard about blockchain?", "How are you connected to blockchain or smart contracts?", and "When was the first time you heard about this technology?". During the first phase, Media Influence, the individual is most likely to form a first-hand opinion and perception towards Bitcoin. Thereafter the most important steps are the Additional Research and the Form Opinion steps. The sources for the Additional Research will determine the opinion that is being formed. Bad experiences can shift the opinion 180 degrees, hence resulting in the discard of the idea, instead of exploring it further.

2. The Agenda

This concept will explain the agenda that each interviewee has towards blockchain, there can be two possible agendas driving their perception:

Personal Agenda	Professional Agenda
• The individual is driven from a personal drive to explore the technology, and is a believer. This translates into professional actions, and directions that is made by him/her.	• The individual does not have any personal experience or attachment to the technology, but is solely interested from a business point of view, because of the promises handed over by his executives or peers.

Table 2: The Personal vs. Professional Agenda

4.1.4 Key Similarities Between the Financial and Logistics Sector

Key Similarities Between the Financial and Logistics Sector
• The main decision maker on implementation is the Chief Executive Officer, but the proposal are in most cases proposed by the Chief Technology Officer, or imposed as a global movement from the regional office.
• Most senior managers are more concerned on the associated risks, than the potential rewards.
• The Thailand regulatory and legislative frameworks are still being a barrier for investment budgets and resource allocation.
• Want to see an increased number of actual use-cases to prove the technology and de-risk the solution.

Table 3: Key Similarities Between the Financial and Logistics Sector

4.1.5 Key Differences Between the Financial and Logistics Sector

Financial Sector	Logistics Sector
• Heavy focus on Bitcoin, its price and volatility.	• Less focus on Bitcoin, and more focus on blockchain providers like Ethereum.
• Highly concerned about regulations, KYC and AML laws.	• Less concerned on regulations, KYC and AML laws, but more on the law enforcement.
• More local oriented.	• More global/regional oriented.

Table 4: Key Differences Between the Financial and Logistics Sector

4.2 Segments

From the information gathered and the sentiments analyzed during the interviews, as well as the secondary research through literature reviews, the following five segments has been identified:

a) Non-Believers

These are individuals that does not believe that blockchain solutions can solve any real-world problems. To apply The Knowledge Journey framework, they have formed an opinion and then discarded the idea, hence blocking further additional research.

b) Blockchain Equals Bitcoin

These are individuals that most likely only know Bitcoin, and believes that Bitcoin and blockchain are the same thing. They have formed a quick opinion from the Media Influence, but have not invested the time and done proper Additional Research.

c) Interesting, but Need More Evidence

These individuals have done a fair share of Additional Research, but are still not convinced that such solutions will work. They are keeping a close eye on the development, but need more clear evidence to back a possible decision. They accept to not be a part of the rapid initial growth phase of a new technology, in order to de-risk their decision.

d) Waiting for the Ecosystem

These individuals are similar to the c) segment, but have invested more into research, on how a possible solution could be implemented. They are able to move faster once a decision is made. They watch the other players in the landscape very closely.

e) Small Scale Implementation

These are the most innovative and front running individuals in the blockchain space. They have already taken the decision to implement small scale solutions on a test stage. Instead of relying solely on other players to do the research and testing, these are paving the way in their respective industry.

4.3 Surprises

Throughout the primary research, two things appeared really surprising:

1. **Difficulty in Acquiring Blockchain Talent in Bangkok**

When asked about what the key challenges for blockchain adoption was in their respective industry, whether it being financial, logistics, consultancy, or IT service provider, every single interviewee made a comment, that hiring blockchain talent in Bangkok is extremely difficult. There is demand for such talent, but difficult to find locally, hence companies recruit expats from mainly Japan, China, Singapore and San Francisco. The main reason why the talent supply is low, is due to the limited material available to study. For example, Oxford University has already released their blockchain oriented curriculum to support this demand coming from organizations.

2. Academic vs. Practitioner

Many of the studies and researches that have been published worldwide comes from academics from renowned universities, but when business professionals are being presented to these research they tend to question the feasibility. There seems to be a skepticism from some individuals to the published material, these people can in most cases be classified in the "Interesting, but need more evidence" segment. They are skeptic by nature, and need real-world examples to be convinced. Academic papers should be used to set the framework, which can then be applied to a given industry, and tested in practice.

CHAPTER 5
CONCLUSIONS AND RECOMMENDATIONS

5.1 Conclusions

The choice of key informants that have been chosen for the in-depth interviews play a large role on the outcome of this study. Their opinions and perceptions are reflected in the results, therefore, before drawing the final conclusions of this research, this need to be understood and taken into consideration, if any conflict of interest should be reflected.

5.1.1 Financial Sector

The financial sector is poised to be the first sector to be heavily impacted by blockchain technology. This is mainly due to the ten years that Bitcoin has already been in public use, together with the amount of research that have been published on various payment systems, ranging from cross-border remittance services to Federal tax payments. The whole idea of transferring value between two parties without a central authority is a powerful enabling, that does not only benefit individual people, but large organizations as well.

Where Bitcoin is seen more as personal peer-to-peer use, Ripple is seen to be the large organizations preferred choice. Ripple brings the decentralization, speed and transparency to the surface, and puts it in the hands of its partners very elegantly. This is also why three major Thai banks have already formed a partnership with Ripple Network, namely; Kasikorn Bank, Siam Commercial Bank, and Krungsri Bank. Siam Commercial Bank being the first to announce such partnership. Banks and other financial institutions like Ripple Network because it allows them to innovate, why still showing government and regulators that they are cautious with KYC and AML laws. Of course there are loopholes in early technology development, and this cannot fully be safeguarded, but the banks are doing their best to take their precautions.

Most of the innovation in this sector is driven by startups, but once tested to a certain stage, larger cooperation can be innovative by implementing these initiatives, just like we are seeing with these three major banks in Thailand.

5.1.2 Logistics Sector

The key difference, with regards to blockchain adoption, between the financial sector and the logistics sector is, that the logistics sector tends to put more focus on business improvement, and how blockchain can support such challenges. Whereas the financial sector is mainly focused on payments, so where Ripple Network is the preferred choice for financial institutions, Ethereum blockchain solutions are preferred among the logistic companies.

The IBM Hyperledger BaaS (Blockchain-as-a-Service) solutions are the most innovative and convenient beta-testings out in the market currently. Big partnerships between Maersk and IBM have already been implemented, on tracking the shipment of perishable roses from West-Africa to Holland, with temperature and shipping documents all locked in the blockchain, and approved by digital signatures along its route.

As Thailand is a country with a favorable geographical location logistics wise, this sector is very important for Thailand and the whole import and export that evolves around it. In an ecosystem that is driven by partnerships and collaboration, blockchain solutions implemented on a large scale can drive down operating costs, and make the Thai logistics market much more competitive, to take on increased competition from its neighboring countries.

5.1.3 Convergence

One crucial things that is at the convergence of the two sectors is, that in order for blockchain solutions to be implemented, it needs to be a strategic direction set by the executives, managing the company. If the Chief Technology Officer find it extremely interesting, but the other executives do not buy in on the idea, it will never be implemented.

In order for blockchain to be of great benefit to both the organizations and the consumer, it does not need to be visible. Actually, blockchain should not be the headline or key selling point for a given product or service, it should just make sure that everything runs smooth, transparent and secure in the background. This will optimize the cost efficiency, improve the customer experience, and provide the company with greater profitability.

5.2 Recommendations

It is not easy to implement new technologies, and often, actually in most cases, there will be more people against it, than of those who embrace it. In a country like Thailand where hierarchy and high power-distance still is very present in many companies, it is a challenge to get the message across to the right stakeholders and decision-makers. In my opinion, the biggest challenge that Thailand is facing in the education in this area. This is reflected in the lower-than-average supply of blockchain talent on the market. There need to be more experience sharing sessions hosted by various universities, visiting professors from the field, actual business professionals that have successfully implemented such solutions, and other key opinion leader to educate the Thai people, and expats living in Thailand. This is not something that is done overnight, but it is a direction that needs to be set, just like a company need to broaden their perspective to capture this new technology, so does we, the individuals.

Leading into the Ethical Implication section, it is important to tell apart real viable projects from fake and scam projects. Whenever a new technology is emerging, criminals are always the first ones to capitalize on it, before regulators are able to close the loopholes. This is seen very clear with the whole issue on the Thai government trying to enforce taxation on cryptocurrency capital gains. This is something that has now yet been accomplished in any country anywhere in the world, but just like other countries, Thailand is trying to fight this with various tools. But for now, there are still a lot of flaws that need to be corrected. This takes us back to Figure 01, that shows the level of adoption in comparison to whether the environment is regulated or not. Once the environment is regulated properly, the innovation and adoption will flourish, and the growth curve is poised to increase exponentially.

5.3 Ethical Implications

One of the key value propositions with blockchain is the transparency and the immutability of the data. But around this very secure solution, there will always be malicious people trying to capitalize on scams for short term gains. Some of these is:

Initial-Coin-Offerings (ICO's)

The concept of an ICO is far from a scam, actually it is a very convenient way for individuals to raise capital, similar to that of crowdfunding or venture capitalists. But the issue with these ICO's is, in almost every country, these are not regulated by the SEC. Even though they sell stakes (tokens) in the company or solution, there is no guarantee or regulations in place to regulate this. The SEC of Thailand is currently trying to implement a framework and set of laws that will make ICO's subject to the securities law, but this is still on-going. Around many of the legitimate ICO's out there, are of course some ICO's that is purely scams, promising things they can never deliver, because they know that regulators cannot hold it against them. This is a loophole that is on the priority list of the SEC of Thailand to close as soon as possible.

Data Theft

With blockchain technology, data is becoming the most valuable resource. If some of these blockchain service providers do not create algorithms that is tamper-proof and can withstand hacks from enormous computing power from quantum computers, then the consumers data are in jeopardy. It is the responsibility of the service provider to safeguard the consumers as properly as possible, otherwise their data might fall into the hands of the wrong people, and even worse, their assets could be stolen, if the coding in the algorithm is not thoroughly tested.

"Partnership"

In conjunction with the ICO's, some blockchain startups like to boast extensive partnerships with companies like Microsoft, Google, Alibaba, Tencent, General Motors, etc. but these claims are not always genuine.

Therefore it is the responsibility of the consumer to do the research and background-check on these companies before doing any business with them.

5.4 Suggestions for Further Research

This study has only focused on two sectors, namely the financial sector, and the logistics sector. I believe that this is just the tip of the iceberg, and that there are a lot of more interesting sectors and branches to research in greater depth. From this research, a lot of data and information has pointed in the direction of the supply chain as a whole. Initially this research was supposed to include the supply chain as well, but the scope was too broad, because the topic is so broad, that it deserves a research on its own. Therefore, I will recommend academics and/or business professionals to conduct additional research in the following three areas:

- Supply Chain
- Insurance
- Healthcare

These three sectors are very heavy on data, and especially in the insurance and healthcare industry, transparency and accountability is very important. There are currently many startups trying to crack the “healthcare nut”, on how to store patients data securely on a blockchain, so that that information can be shared across the world for medical schools to study, by giving limited access to the patient data. They even experiment with putting ones organs on the blockchain, so that when one passes away, the organs can then be transferred to another person’s blockchain. So basically the ownership changes. This research will end on an aspirational note, but one that I firmly believe is possible for humanity to achieve over the coming decade, and for this, I sincerely hope that Thailand will contribute with all of its great talent.

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APPENDIX A

INTERVIEW QUESTIONS

1. Have you ever heard about blockchain?
2. How are you connected to blockchain or smart contracts?
3. When was the first time you heard about this technology?
4. What do you feel are the main obstacles/challenges in your industry?
5. Have other players in your industry adopted any blockchain solutions?
6. Do you see this as a global movement, or will it be very country specific?
7. How could this impact your industry, and the way that you do business?
8. What do you see at the main potential risks?
9. In your company, who is the decision maker on the implementation of such solutions?

→ Probe further on each question.

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