

BLOCKCHAIN ADOPTION AMONG MALAYSIAN SMES: A CRITICAL REVIEW ON THE SUPPLY CHAIN IMPLICATIONS

Bryan Teoh Phern Chern
Dr Teoh Bak Aun

ABSTRACT

There is a general lack of awareness regarding blockchain technology in the Malaysian business environment. One of the reasons is the lack of talent with regards to cryptography. There are many inherent benefits that the technology can bring towards business activities and can be worth venturing into. Blockchain is a ledger containing all the past transactions which are duplicated and distributed across all the computer systems within the network. The technology makes data secure, immutable, distributed, time-stamped, unanimous, anonymous, and programmable to suit each company. This technology can be applied in various industries and sectors, and there are certainly opportunities for Malaysian SMEs within the space. This study identifies the potential benefits that blockchain technology can bring to Malaysian SMEs. The study also identifies various applications where Malaysian SMEs can consider improving aspects of their businesses. The four areas that Malaysian SMEs can use blockchain technology include traceability, data storage, remittance, and applications for Islamic finance. Within these areas, this study also proposes six blockchain projects that can be a good fit for Malaysian SMEs which are LuxTag, VeChain, Ripple, Stellar, Storj and Filecoin. Based on the benefits and evaluation done in this study, the blockchain space is worth exploring among Malaysian SMEs, both for near term process enhancements and long-term growth.

Key words: Blockchain, Supply chain management, Malaysian SMEs.

INTRODUCTION

As of April 2020, there are 48 blockchain startups in Malaysia compared to 397 startups in Singapore (Tracxn, 2021). The severe discrepancy can be attributed to the lack of local talent in developing the technology (Yunus and Jalil, 2019). Besides the lag in cryptography skills to develop blockchain technology, there is also a lagging awareness regarding the benefits that blockchain technology can bring. Businesses need to be more aware of the technology compared to the public, although public awareness would certainly aid the process. Another way the country can move forward in the blockchain realm is to attract foreign firms to start regional hubs locally. Chaintope Inc. has recently announced their plans to develop their Malaysian subsidiary, Chaintope Malaysia, into a Southeast Asian hub in using blockchain for sustainability projects (The Star, 2021). This is due to the stable environment, proficient English talent, and cost efficiency in the country in comparison to other Southeast Asian countries. In Malaysia, three of the first industries to explore this space include the renewable energy and utilities industry, palm oil and agriculture, and Islamic banking (Sharon, 2018). Recent blockchain applications in Malaysia include the co-launching of digital vaccination certificates for Covid-19 vaccine recipients (Bernama, 2021), and traceability in the palm oil industry by the Malaysian Palm Oil Council (Neo, 2020). Both projects are large scale and require high levels of capital injection. Another potential large scale blockchain application is the halal food market. The global halal food market is booming while Malaysia currently only accounts for 1% of the global demand (Mohtar, 2020). The use of blockchain technology can improve the transparency and trust within the industry, eliminating the occurrence of scandals such as those that have happened in the past year.

Small and medium enterprises (SMEs) account for 98.5% of Malaysian businesses, 36% of Malaysian GDP, and 66.2% employment (SME Info, 2021). SMEs typically do not enjoy the benefits of innovation as larger organisations usually implement new technology and reap the rewards of being early adopters. SMEs tend to implement them when the technology matures further as the implementation risks drop down to a level that better suits their risk appetite. This phenomenon has been an issue that SMEs face, as they lose out to larger firms even before the competition begins. The gap between larger and smaller firms will widen as time passes due to this underlying problem. Therefore, this paper intends to investigate if SMEs can have a headstart as blockchain technology is still in its nascent stage? Can SMEs enjoy the benefits of blockchain adoption as early adopters, instead of merely users of a more mature technology? This study attempts to shed light in the following areas:

1. What are the potential ways Malaysian SMEs can benefit from blockchain technology now?
2. What are the examples of low risk, low cost, beneficial blockchain applications for Malaysian SMEs?
3. Is blockchain adoption worth it for Malaysian SMEs in 2021?

LITERATURE REVIEW

Blockchain technology

In layman terms, blockchain technology is a way to record data that makes it difficult to cheat or hack the system. A ledger containing all the past transactions is essentially duplicated and distributed across all the computer systems within the network, hence the name distributed ledger technology. Blocks on the chain contain several different transactions and new blocks are created as new transactions occur. Since the transactions are duplicated, hackers would need to change the information on all the computers in the network at the same time, which is almost impossible to do so (IBM, 2021). The increasing importance of data in today's

business environment is why blockchain can be so impactful. This is because the technology makes data more secure, immutable, distributed, time-stamped, unanimous, anonymous, and programmable to suit each company (Euromoney Learning, 2021). More popular blockchain applications include cryptocurrencies such as Bitcoin and Ethereum. In a supply chain, assets are typically given unique identifiers (digital signatures) which allow them to sign the blocks as transactions are being made. This technology allows for greater transparency, visibility, and tracking throughout the supply chain (Gaur and Gaiha, 2020). Cryptocurrencies have led the publicity of blockchain technology among mainstream users. It allows for a peer-to-peer payment system that does not rely on conventional financial institutions. Using a digital wallet, users can transfer payments to each other, which are recorded as digital transactions in public blockchain ledgers, accessible by everyone (Kaspersky, 2021). The use of cryptocurrencies is secured by cryptography, making it unlikely for counterfeits, although still possible (Frankenfield, 2021). Bitcoin was the first of its kind, where every other cryptocurrency is known as an alternative coin. These cryptocurrencies are highly traded like other commodities such as silver and gold and are beginning to receive governmental oversight and recognition. However, there are many malicious actors in this space and have almost 2,000 dead coins which have failed or were developed as scams (Walsh, 2021)

The use of blockchain technology have been investigated in many industries including healthcare, logistics, financial services, oil and gas, agriculture, manufacturing, retail, government, media, and insurance. There are several options if businesses want to implement blockchain technology. Companies can choose to use public blockchains such as Bitcoin where it is completely decentralized and no one entity has control over it. Private blockchains are also decentralized peer-to-peer networks but there is an organization behind executing the consensus protocol, maintaining the ledger, allowing participants, and generally governing the network. A permissioned blockchain can be set up in both public and private blockchains, but there are several restrictions that can be set for each participant. Lastly, a consortium blockchain is where a group of entities manage a blockchain together (IBM, 2021). Gaur and Gaiha (2020) suggested that supply chains require private blockchains because information is to be shared among known entities and not to the public. Therefore, it should be a built on a permissioned, private or consortium blockchain. Such blockchains do not require expensive and energy intensive consensus protocols such as Bitcoin's proof of work consensus protocol, but may opt to use round robin, proof of stake, or proof of authority consensus protocol (POA Network, 2021).

One of the largest applications of the blockchain technology is a smart contract. The Ethereum blockchain network was the first blockchain to use smart contracts and is currently the largest network doing so (Kampakis, 2020). In addition to the transparency and security of the blockchain technology, a smart contract allows relevant parties to enter the predetermined terms and conditions beforehand and ensures each transaction is being performed before moving on to the next step. Galvin (2020) describes smart contract as self-executing agreements that have been coded into the blockchain, guaranteeing a certain action or outcome if a certain condition has been met. For example, payments are automatically released when the shipments have been shipped. This eliminates lengthy approval processes or intermediaries such as attorneys or banks to confirm a transaction. Smart contracts can be applied in a variety of situations such as negotiated agreements between buyers and sellers or commercial lease agreements (Giventer, 2021). A smart contract can also be a good complementary technology to traditional enterprise resource planning (ERP) tools which only purpose is to store and transfer information (EY Global, 2019). Although smart contracts are easier to develop today with the help of tools such as Remix IDE (Kampakis, 2020), this study will not include it as a possible option for SMEs as it might present a steeper learning curve for some SME owners and operators.

Malaysian SMEs

According to SME Corp (2021), a small medium enterprise (SME) in Malaysia can be categorized into medium enterprises, small enterprises, micro enterprises, and has the following characteristics:

Manufacturing sector:

- Medium: Sales turnover is less than or equal to RM50 million or have less than or equal to 200 employees.
- Small: Sales turnover is less than RM15 million or have less than 75 employees.
- Micro: Sales turnover is less than RM300,000 or have less than 5 employees.

Other sectors:

- Medium: Sales turnover is less than or equal to RM20 million or have less than or equal to 75 employees.
- Small: Sales turnover is less than RM3 million or have less than 30 employees.
- Micro: Sales turnover is less than RM300,000 or have less than 5 employees.

Entities are considered as SMEs in Malaysia if they fulfil the above criteria, unless they are public listed companies on the main board of Bursa Malaysia, or they are listed as a subsidiary of a public listed company on the main board of Bursa Malaysia, a multinational company, a state-owned enterprise, a government-linked company, or under the Ministry of Finance.

According to the Department of Statistics Malaysia (DOSM), there were a total of 907,065 registered SMEs in the country as of 2016, where the service sector (809,126 or 89.2%) represented the largest category of SMEs. Selangor has the highest number of SMEs (19.8%) in the country followed by Kuala Lumpur (14.7%) and Johor (10.8%) (DOSM, 2017). These statistics show that SMEs are clearly an essential part of the economic backbone of Malaysia and the continuous growth and enhancements of these enterprises should be paid special attention to. SMEs are also more flexible to adopt small changes to their businesses compared to larger enterprises. According to OECD (2021), blockchain startups should work together with SMEs as they have the flexibility to explore due to their smaller scale. At the same time, the SMEs can enjoy innovative technology that are typically not accessible to them at an early stage.

METHODOLOGY

This study will first identify multiple areas that blockchain technology can benefit Malaysian SMEs. These areas have been selected because they require less time to implement, less capital expenditure to implement, have inherently lower risk, and can produce results quickly upon implementation. This is because SMEs have lower capital to spare for technological enhancements and have a lower margin of error as cash flow is critical for daily business operations. Subsequently, this study will identify various blockchain projects in the market that match the above criteria as possible options for Malaysian SMEs to venture into. The data collection includes investigating contemporary issues that Malaysian SMEs face, where information is collected via reliable sources such as local news portals and academic journals. Subsequently, the study will go through the top blockchain projects and organisations that are already market-ready and available in Malaysia. These organizations will be thoroughly reviewed before being proposed in this paper to solve the identified issues.

DISCUSSION (IMMEDIATE BENEFITS TOWARDS THE INDUSTRY)

Remittance

One of the main problems SMEs face is in payment processing (Gupta, 2019). Conventional methods for remittance typically take a long time, have high transaction cost, and there are only a few options in the market depending on the countries involved in the transaction. New Straits Times reported an alarming survey by TransferWise indicating that more than half of the Malaysian respondents feel that the total time taken for remittance is the largest issue they face, which includes the time to set up the transfer. Another issue is that 50% of Malaysians feel that remittance charges are too expensive for them. Because of this issue, 48% of these Malaysians have opted to reduce the total amount to be transferred, while 35% of them were forced to opt out of the activity altogether. Due to the limited branches available in the country, 54% of Malaysians felt that the need to find a local branch is challenging (NST Business, 2021). The more popular companies operating in Malaysia include Moneygram, Wise, and Western Union. The average fees are around 3% of the transfer amount (The World Bank Group, 2015). Whereas local banks charge a RM10 flat fee on top of their pre-determined exchange rate, but the fees incurred by the recipient bank is left unknown. A customer has complained that they were charged RM170 on top of RM10 to transfer money from Malaysia to Australia (Bigpay, 2020). In addition to the cost, international bank transfers can take a long time due to different time zones, weekends, public holidays, fraud prevention procedures, conversion procedures, having multiple intermediaries involved, and in the cases where incorrect payment details have been entered (Go Cardless, 2021; Walker, 2021). The cost and time will increase especially for smaller countries. This can be costly for expatriates or foreign workers that need to transfer money back to their homes or for any other reasons. For example, HSBC UK had a local client that has a corporate buyer in the Netherlands. Average transactions take between 40-45 days, but their new blockchain application allowed the business transaction to be completed in 1 day (Galvin, 2020).

Blockchain technology allows quick and simple transactions involving payments, especially if one or more parties are in a different country. The channels to transact in cryptocurrencies have been growing exponentially, giving users multiple options (Shippo, 2020). The transfer of money was one of the first blockchain applications and presents many benefits such as speed, security, and low transaction cost (Kampakis, 2020). Realistically, the use of cryptocurrencies removes certain intermediaries such as remittance agents or even remittance companies. This directly eliminates a certain percentage of the transaction cost. Besides, transactions on the blockchain are safer as they are printed on the network and are inherently immutable and irreversible. This fortifies the trust between buyers and sellers since there is a minimal waiting time which leaves little room for uncertainties. This also eliminates chargeback problems for sellers, which is when buyers cancel their credit card payment after the seller ships out the merchandise (Giventer, 2021). The quick transfer time also frees up cashflow for SMEs for other purposes. Companies such as Shopify have allowed sellers to use digital wallets to accept cryptocurrencies as a form of payment (Shopify, 2021). CIMB Bank Malaysia has also begun to use the blockchain services of Ripple for cross-border payments through their SpeedSend program (The Star, 2018).

Traceability

A typical supply chain involves the inventory, information, and financial flows from upstream entities to downstream entities and vice versa. In its present state, ERPs do not have the capability to track these movements throughout the supply chain and would require manual data entry at each point of the supply chain. This is a serious yet common source of execution errors and subsequently supply chain conflicts (Gaur and Gaiha, 2020). This includes duplicate payments, missing shipments, missing documentation, wrong journal entries, which cause even more problems as parties try to locate the problem and rectify the issue. Even though many shipments contain RFID tags or barcode identification, the integration of these into different ERP systems throughout the supply chain makes it costly to implement, especially for SMEs. Therefore, there is a gap between the integrated system and the RFID tags.

Blockchain record keeping can eliminate or at least reduce this problem by providing a link between unique tags such as RFID tags or NFC tags and the blockchain network. This technology works well with Internet of Things (IoT) applications. The network allows for a trustworthy system that is transparent to all supply chain parties and provides a clear, traceable trail of all transactions that have occurred throughout the supply chain. An additional benefit of the technology is the reduction of physical documentation throughout the supply chain and a consistent management approach. A common blockchain application is in the food supply chain as the source of a particular food, or its individual materials can be tracked to the highest tier supplier. This can track the source of food-borne viruses very quickly and locate the severity of the spread of the virus (OECD, 2021). The pharmaceutical industry can also benefit from the technology as pharmaceutical companies can easily track the provenance of their products through the distributed ledger, overcoming the long-standing global issue of counterfeit medicine (Gupta, 2019). This will increase in importance as many countries including Malaysia is expanding telemedicine facilities and medicine authenticity is critical (Ali,

2021). Walmart Canada has begun using this technology to track their logistics system, synchronizing all their inventory and transportation data across relevant stakeholders.

Currently, the Malaysian and Singaporean government has worked together to develop digital vaccination certificates for Covid-19 vaccines using blockchain technology. This allows the authorities to accurately track vaccine recipients and the exact vial that was used for each individual (Bernama, 2021). This issue directly impacts national security; therefore, information immutability and traceability are of utmost importance. Another example is in the palm oil industry. As the world's largest palm oil exporter, Malaysia is under constant scrutiny by the European Union. Blockchain technology will allow exporters to assure consumers of the sustainability of the commodity where all processes are traceable through the blockchain network (Neo, 2020). In addition, the Royal Malaysian Customs Department (RMCD) is exploring TradeLens, a blockchain platform that offers traceability features throughout supply chains, to avoid another occurrence of the Halal meat scandal in 2020 (Mohtar and Loh, 2020).

Documentation Storage

The conventional cloud storage services are dominated by several mammoth organizations such as Amazon, Google, and Microsoft (Hertig, 2018). The downside of this phenomenon is the risk of data protection, licensing, and overall control of this data. When sensitive company information is in the hands of another, there is always a risk of cyberattacks and malware infections which subsequently lead to loss of intellectual property. A common cyberattack is the Distributed Denial of Service (DDoS) attack, where hackers flood the servers with a large amount of traffic in a short time to crash the servers (Akamai, 2021). Some of the large scale cyberattacks in the past include data breaches in Adobe, eBay, LinkedIn, and Yahoo (Swinhoe, 2021).

Blockchains allow for a safer method of data storage at a lower storage cost as compared to conventional cloud storage services (Giventer, 2021). This can be done through decentralized cloud storage where data is divided and stored in millions of computers in the blockchain network, encrypted, with no single entity controlling the data (Hertig, 2018). The data is then protected by a 256-bit encryption which is very difficult to be hacked. Even in the rare case that the data has been hacked, the hacker will only manage to obtain a small part of the entire file since it has already been divided and distributed across the network (Jitendra, 2020). This technology is theoretically self-sustainable, faster, transparent, efficient, and secure. Basically, the company offering the service act as coordinators and do not actually own the data even if they wanted to peek (Rovai, 2020). Many users might argue that they do not have an actual issue with the current cloud storage service, however, transitioning to a blockchain-based cloud storage service can allow SMEs to enjoy immediate benefits with minimal investment in resources.

Islamic Finance

The Islamic finance industry is conducted under Islamic principles such as banning gambling, interests, speculations, and uncertainty (Muneeza and Mustapha, 2019). Under the Shariah law, institutions are not permitted to collect any interests, and that all debts need to be backed by physical goods such as gold and silver (Sharon, 2018). Compared with normal banks, Shariah-compliant banks tend to have higher administrative and legal costs incurred. For example, a normal loan agreement represents a contract between the bank and the borrower. Whereas there are 3 or more parties in Islamic finance on average (Zainuddin, 2018). Given that Muslims represent the largest religion in Malaysia, any solutions to reduce this cost should be further considered. Smart contracts can be utilized by banks to eliminate many of the costs incurred by intermediaries. However, as mentioned previously smart contracts may be costly or timely for SMEs to implement. SMEs that are Shariah-compliant can use cryptocurrencies to perform certain business transactions to reduce time and cost, while enjoying the benefits of blockchain technology. IFG (2021) has screened the top 53 cryptocurrencies in the market to determine which of them are considered as halal and Shariah-compliant. The screening process is based on a few criteria: (1) the underpinning technology is not linked to or supporting haram transactions such as internet-based lending, (2) is the organization tied to illicit activities? And (3) are there any structural or technical concerns about the company or the technology. The website shows that 36 out of 50 cryptocurrencies are Shariah-compliant. Companies such as Aave (AAVE) and Synthetix (SNX) operate decentralised finance cryptocurrencies and facilitate online lending and were listed as non-compliant. Whereas Monero (XMR) is focused on privacy and anonymous transactions which have been known to facilitate criminal activities. This was listed as 'grey' as it may not be compliant from a taqwa perspective (IFG, 2021).

DISCUSSION (IMMEDIATE BENEFITS TOWARDS THE INDUSTRY)

This section introduces several blockchain projects that are already on the market where Malaysian SMEs can acquire their services immediately. These projects were selected to match the potential benefits highlighted in the previous section. (Disclaimer: this study is not funded or in any way connected to the below blockchain projects. The projects are merely examples of companies that match the above characteristics and to the best of the authors' knowledge, may benefit Malaysian SMEs).

Ripple and Stellar

Ripple and Stellar both focus on improving cross border payments and have their own strengths (Callahan, 2021). Cross border payments are projected to surpass \$35 trillion by 2022 (Gupta, 2020). Ripple (XRP) focuses on working with banks globally to eliminate intermediaries when completing transactions between them, enabling quick and low-cost transactions through their blockchain network. Ripple has more than 100 banks globally that have signed on to join the network, but individuals and certainly SMEs are allowed to use the network freely. On the other hand, Stellar (XLM) does not have an extensive relationship with banks globally as their focus is to reach poor and less-developed areas and enable unbanked people to interact within the global economy at a low cost. Both these companies use their cryptocurrencies to facilitate cross border payments within seconds where a currency is converted to XRP or XLM tokens and then converted again to the destination currency (Kraken, 2021). Where many blockchains

aim to disrupt their respective industries, Ripple has taken a different approach and developed its network within the current banking system and even remittance companies such as Money Gram (Hamilton, 2021). On the other hand, Stellar is a non-profit aiming to democratize financial services. This is in line with the World Bank's 'Understanding Poverty' initiative which aims to give the unbanked community a transaction account to store and transact, serving as the first step to improving their financial lives (Rick, 2021). Currently, Ripple's network can handle 1,500 transactions per second while Stellar's network can support 4,000 transactions per second (Gupta, 2020).

Earlier this year, Malaysian remittance company Mobile Money and Bangladesh's remittance company bKash has decided to use RippleNet to process transactions between the two countries. bKash, the largest remittance company in Bangladesh has processed \$18.2 billion in 2020, and Malaysia is one of top three countries where remittance was transferred from. This helps the many Bangladesh workers in Malaysia that need to send money back to Bangladesh on a regular basis and deters them from using illegal remittance services (Sinclair, 2021). This is a good example of how blockchain technology can significantly improve the remittance problems faced by Malaysian SMEs whether it is payments to suppliers or to employees. SMEs only need to create cryptocurrency wallets to hold XRP or XLM or any other cryptocurrencies that can facilitate their transactions.

Storj and Filecoin

To overcome the downsides of cloud storage services, the market leaders in blockchain-based cloud storage or decentralized cloud storage are StorJ and Filecoin. Storj encrypts the uploaded files with state-of-the-art encryption technology (AES-256-GCM), splits it into 80 pieces, and disperses it to nodes throughout the network, in various geographical locations spread across 84 countries (Storj, 2021). This makes it difficult for unauthorized users to access the files. StorJ offers 150gb of free storage for each user consisting of 3 projects with a maximum of 50gb per project. For companies with more information such as larger companies or companies that simply have bigger files (eg: architecture firms), the standard plan costs merely \$4 for 1TB of total storage consisting of 10 projects with 100gb per project (Storj, 2021). Whereas for Google Drive, only the first 15gb is free. Whereas the cheapest plan is \$1.99 per month for 100gb. The plans become cheaper and more competitive with Storj as the storage size increases (Vaugh-Nichols, 2021).

Filecoin operates differently from Storj where they appeal to companies which operate on a tighter budget for storage. Filecoin is an open-market system where there is no central control over the network. The pricing of the storage fluctuates but is suppressed because this peer-to-peer network has storage providers competing to rent out their storage space. Filecoin's storage now includes a complete replica of all of Wikipedia's information which is host to 20 billion views per month (Filecoin, 2021). Filecoin has a bigger vision to change the storage business altogether with better technology and wider visions. Although promising, there might be a steeper learning curve for Malaysian SMEs and more suited towards technology savvy companies and users. On the other hand, Storj offers a turnkey solution like other cloud storage services that are already on the market. The SMEs only need to subscribe to their preferred plan and upload their documents onto the blockchain to utilize the service. This can be a potential cost saving measure for Malaysian SMEs as the economy increases their operating cost in many other aspects.

LuxTag and VeChain

LuxTag is a Malaysian blockchain-based company that allows anyone to register their assets on their blockchain network (LuxTag, 2019). The ability to do this opens a gateway to many opportunities in a wide range of industries such as education, art, luxury goods, fashion, food, etc., only limited by the creativity of the users. The services that they provide include NFC authentication services, e-certificates, digital representation on assets, and product traceability among many others (LuxTag, 2021). Similarly, VeChain is one of the global leaders in using blockchain technology for product traceability (VeChain, 2021). VeChain tags products with unique tags and all the information on the blockchain are verified by Det Norske Veritas (DNV), an independent third party in Norway. At any point in the supply chain, users can scan the tag to trace it back to its origin. VeChain has worked with many organizations globally and is backed by DNV, PWC, Breyer Capital, and many big names in the industry (VeChain, 2021).

For instance, registering a unique identification tag on luxury items can assure consumers that the product they are buying are not counterfeit items. This can be done by sealing RFID or NFC tags where consumers can scan with their phones, giving them access to unique product information on the secure and immutable blockchain. Individual assets such as artwork and collectibles can also be registered on the blockchain for the same purpose. This process is also known as tokenization, where assets are registered as unique tokens on the blockchain. The digital assets are then known as non-fungible tokens (NFTs). This can benefit SMEs involved in these industries, such as luxury goods reseller, art galleries, sportswear outlets, where they no longer need to convince consumers to trust them because this trust can now be manufactured into their business via blockchain technology. Malaysian influencer Khairul Aming recently found out his viral sambal product on Shopee was faked and buyers were misled to buy from the wrong Shopee account (Majid, 2021). In 2008, the dairy supply chain from China's Sanlu Group and New Zealand's Fonterra group was contaminated with melamine at some point in the supply chain, killing four babies and more than 54,000 babies fell sick, causing Fonterra \$139 million in losses (Food Ingredients First, 2021). The impact of supply chain issues can vary in severity, but it highlights the need for traceability. In the case of Khairul's sambal, a simple QR code by VeChain or LuxTag can be attached on the glass bottle where unique information of each bottle can be traced. The QR code will record the transaction when it is processed through Khairul's manufacturing facility and when it is sold through his official platform. Once it is sold and verified, it cannot be sold a second time. Therefore, even though the QR code can be easily duplicated, the information on the blockchain cannot be erased or modified, ensuring authenticity of Khairul's product. SMEs that have products that risk being counterfeited should consider traceability solutions through blockchain networks.

CONCLUSION

The various blockchain applications have provided clear pathways towards blockchain adoption. These do not require a complete revamp of company processes, instead, it complements and enhances existing organisational processes while minimising operating costs. Blockchain technology is still fairly new among Malaysian SMEs. SMEs have the opportunity and capability to jointly innovate the general business environment in the country and blockchain technology seems to be a good area to venture into. This paper has introduced several implementation areas that require minimal resources, including remittance, data storage, traceability, and Islamic finance applications. SMEs that use these services frequently should explore blockchain implementation and its potential benefits. Market-ready blockchain projects include Ripple, Stellar, Storj, Filecoin, VeChain, LuxTag, and many more local and international companies. There will certainly be challenges towards implementation such as non-compatibility, investments, resistance to change, new processes, and uncertainties, but this should be a small risk worth taking for the potential returns. Based on the benefits and evaluation done in this study, the blockchain space is worth investing in among Malaysian SMEs, both for near term process enhancements and long-term growth. This is mainly due to the minimal implementation time, low cost of implementation, and overall high risk to reward ratio.

Although this paper focuses on Malaysian SMEs, they can be a good reference for SMEs in other countries as well. Remittance services, data storage, and supply chain traceability are common organisational functions. The potential for low-risk enhancements in these areas should be attractive to many SMEs, not just in Malaysia. Blockchain adoption in Islamic finance can also be applied in various Muslim countries and communities globally such as United Arab Emirates, Qatar, Indonesia, and many others. Besides SMEs themselves, the local authorities can also enhance the regulation overseeing this space to encourage innovation among SMEs. With regards to Malaysia being an attractive destination for foreign investment, Malaysian authorities need to expedite the regulatory protocols as a delay may further widen the gap between Malaysia and neighboring countries competing for foreign investment (University of Malaya, 2018). Future research can be conducted in this area to promote the benefits of the technology towards SMEs, both short term and long term. Future research can also study the impact of the technology in various business sectors empirically. For instance, the use of specific blockchain applications in specific industries. This can guide institutions further in their adoption process.

REFERENCES

- Akamai (2021). *What are the security risks of cloud computing?* Akamai. <https://www.akamai.com/us/en/resources/data-security-in-cloud-computing.jsp#:~:text=If%20the%20security%20of%20a,property%20or%20other%20personal%20files.&text=Due%20to%20the%20high%20volume,potentially%20at%20risk%20of%20cyberattacks.>
- Ali, N. (2021). *Blockchain – Exploring its potential for Malaysian healthcare*. Asian Hospital & Healthcare Management. [https://www.asianhbm.com/articles/blockchain-exploring-its-potential-for-malaysian-healthcare.](https://www.asianhbm.com/articles/blockchain-exploring-its-potential-for-malaysian-healthcare)
- Bernama (2021). *Malaysia, Singapore use blockchain technology for vaccination certificates*. The Edge Markets. [https://www.theedgemarkets.com/article/malaysia-singapore-use-blockchain-technology-vaccination-certificates.](https://www.theedgemarkets.com/article/malaysia-singapore-use-blockchain-technology-vaccination-certificates)
- Bigpay (2020). *3 reasons to rethink Maybank telegraphic transfer vs Bigpay*. Bigpay. [https://www.bigpayme.com/post/3-reasons-to-rethink-maybank-telegraphic-transfer-vs-bigpay-bigpay.](https://www.bigpayme.com/post/3-reasons-to-rethink-maybank-telegraphic-transfer-vs-bigpay-bigpay)
- Callahan, M. A. (2021). *Ripple vs. Stellar: Will there be only one winner?* FX Empire. [https://www.fxempire.com/education/article/ripple-vs-stellar-will-there-be-only-one-winner-521999.](https://www.fxempire.com/education/article/ripple-vs-stellar-will-there-be-only-one-winner-521999)
- DOSM (2017). *Output of Malaysia's SMEs surged to RM1.0 trillion for the first time since 2003*. DOSM. [https://www.dosm.gov.my/v1/index.php?r=column/cthemByCat&cat=426&bul_id=T20rcEJyQmFENUpRYThOSGRmdFIIZz09&menu_id=WjJGK0Z5bTk1ZEIVT09yUW1tRG41Zz09.](https://www.dosm.gov.my/v1/index.php?r=column/cthemByCat&cat=426&bul_id=T20rcEJyQmFENUpRYThOSGRmdFIIZz09&menu_id=WjJGK0Z5bTk1ZEIVT09yUW1tRG41Zz09)
- Euromoney Learning (2021). *What is blockchain*. Euromoney. [https://www.euromoney.com/learning/blockchain-explained/what-is-blockchain.](https://www.euromoney.com/learning/blockchain-explained/what-is-blockchain)
- EY Global (2019). *How blockchain can support 'smart' contracts*. EY. [https://www.ey.com/en_my/tax/how-blockchain-can-support-smart-contracts.](https://www.ey.com/en_my/tax/how-blockchain-can-support-smart-contracts)
- Filecoin (2021). *Use Filecoin to store and retrieve data*. Filecoin. [https://filecoin.io/store/#intro.](https://filecoin.io/store/#intro)
- Food Ingredients First (2021). *Fonterra takes a \$139 million hit on melamine scandal*. Food Ingredients First. [https://www.foodingredientsfirst.com/news/fonterra-takes-a-139-million-hit-on-melamine-scandal.html.](https://www.foodingredientsfirst.com/news/fonterra-takes-a-139-million-hit-on-melamine-scandal.html)
- Frankenfield, J. (2021). *Cryptocurrency*. Investopedia. [https://www.investopedia.com/terms/c/cryptocurrency.asp.](https://www.investopedia.com/terms/c/cryptocurrency.asp)
- Galvin, J. (2020). *How blockchain is helping SMEs*. FinTech. [https://fintechmagazine.com/banking/how-blockchain-helping-smes.](https://fintechmagazine.com/banking/how-blockchain-helping-smes)
- Gaur, V. and Gaiha, A. (2020). *Building a transparent supply chain*. Harvard Business Review. [https://hbr.org/2020/05/building-a-transparent-supply-chain.](https://hbr.org/2020/05/building-a-transparent-supply-chain)
- Go Cardless (2021). *How long does an international bank transfer take?* Go Cardless. <https://gocardless.com/guides/posts/internationalbanktransfertimes/#:~:text=One%20of%20the%20main%20reasons,put%20in%20place%20by%20banks.&text=Then%2C%20once%20the%20funds%20have,could%20delay%20payment%20even%20further.>
- Giventer, D. (2021). *4 ways your small business can benefit from Shopify*. Entrepreneur Asia Pacific. [https://help.shopify.com/en/manual/payments/alternative-payments/cryptocurrency.](https://help.shopify.com/en/manual/payments/alternative-payments/cryptocurrency)
- Gupta, N. (2019). *Should small and medium-sized enterprises adopt blockchain?* Medium. [https://medium.com/akeo-tech/should-small-and-medium-sized-enterprisesadoptblockchain-ff6c1cca784f.](https://medium.com/akeo-tech/should-small-and-medium-sized-enterprisesadoptblockchain-ff6c1cca784f)
- Gupta, N. (2020). *Cross-border payments – Ripple vs Stellar*. Akeo. [https://medium.com/akeo-tech/cross-border-payments-ripple-vs-stellar-af041523dea1.](https://medium.com/akeo-tech/cross-border-payments-ripple-vs-stellar-af041523dea1)

- Hamilton, D. (2021). *XRP vs Stellar Lumens (XLM) – What's the difference?* Securities.io. <https://www.securities.io/ripple-xrp-vs-stellar-lumens-xlm-whats-the-difference/>.
- Hertig, L. (2018). *Hidden blockchain opportunities (3): Decentralized cloud storage*. Plesk. <https://www.plesk.com/blog/product-technology/hidden-blockchain-opportunities-3-decentralized-cloud-storage/>.
- IBM (2021). *What is blockchain technology?* IBM <https://www.ibm.com/topics/what-is-blockchain>.
- IFG (2021). *The IFG Halal crypto list*. Islamic Finance Guru. <https://www.islamicfinanceguru.com/crypto/>.
- Jitendra (2020). *How can blockchain technology improve cloud storage?* Alibaba Cloud. https://www.alibabacloud.com/blog/howcanblockchaintechnologyimprovecloudstorage_596197.
- Kampakis, S. (2020). *How your SME can benefit from blockchain technology*. The Data Scientist. <https://thedata scientist.com/sme-benefit-blockchain-technology/>.
- Kaspersky (2021). *What is cryptocurrency? Cryptocurrency security: 4 tips to safely invest in cryptocurrency*. Kaspersky. <https://www.kaspersky.com/resource-center/definitions/what-is-cryptocurrency>.
- Kraken (2021). *Stellar vs. Ripple*. Kraken. <https://www.kraken.com/compare/stellar-vs-ripple>.
- Luxtag (2019). *4 examples of blockchain-based platforms made in Malaysia*. LuxTag. <https://www.luxtag.io/blog/4-examples-of-blockchain-based-platforms-made-in-malaysia/>.
- LuxTag (2021). *We are perfecting our craft, here's some of our work*. LuxTag. <https://www.luxtag.io/our-products/>.
- Majid, H. (2021). *What if the food you eat is fake?* LuxTag. <https://www.luxtag.io/blog/what-if-the-food-you-eat-is-fake/>.
- Mohtar, J. (2020). *Use blockchain technology to certify halal products*. New Straits Times. <https://www.nst.com.my/opinion/columnists/2020/12/651806/use-blockchain-technology-certify-halal-products>.
- Mohtar, J. and Loh, J. (2020). *Adoption of blockchain route for the halal meat industry*. Focus Malaysia. <https://focusmalaysia.my/top/adoption-of-blockchain-route-for-the-halal-meat-industry/>.
- Muneeza, A. and Mustapha, Z. (2019). *Blockchain and its Shariah compliant structure*. *Halal Cryptocurrency Management*. 69-106.
- Neo, P. (2020). *Blockchain for palm oil: Malaysia looks to technology and traceability to foster industry trust*. Food Navigator-Asia. <https://www.foodnavigator-asia.com/Article/2020/05/04/Blockchain-for-palm-oil-Malaysia-looks-to-technology-and-traceability-to-foster-industry-trust>.
- NST Business (2021). *High cost, waiting time associated with remittances big concern among Malaysians, survey shows*. New Straits Times. <https://www.nst.com.my/business/2021/01/660967/highcostwaitingtimeassociatedremittances-big-concern-among-malaysians>.
- OECD (2021). *The digital transformation of SMEs*. OECD Studies on SMEs and Entrepreneurship. OECD Publishing. Paris.
- POA Network (2021). *Proof of authority: consensus model with identity at stake*. Medium. [https://medium.com/poa-network/proof-of-authority-consensus-model-with-identity-at-staked5bd15463256#:~:text=Proof%20of%20Authority%20\(PoA\)%20is,performs%20the%20role%20of%20stake%20.&text=But%20unlike%20PoS%2C%20there's%20only%20one%20identity%20per%20person](https://medium.com/poa-network/proof-of-authority-consensus-model-with-identity-at-staked5bd15463256#:~:text=Proof%20of%20Authority%20(PoA)%20is,performs%20the%20role%20of%20stake%20.&text=But%20unlike%20PoS%2C%20there's%20only%20one%20identity%20per%20person).
- Rick, C. (2021). *Bringing blockchain to the unbanked*. Overture. <https://www.overtureglobal.io/story/bringing-blockchain-to-the-unbanked>.
- Rovai, A. (2020). *Cubbit vs the blockchain(s): The future of decentralized cloud storage*. Medium. <https://medium.com/cubbit/cubbit-vs-the-blockchain-s-or-why-distributed-protocols-dont-need-new-forms-of-money-to-a1c3fbb9a00d>.
- Sharon, A. (2018). *Malaysia is turning to blockchain to boost its three largest industries*. OpenGov Asia. <https://opengovasia.com/malaysia-is-turning-to-blockchain-to-boost-its-three-largest-industries/>.
- Shippo (2020). *What can small businesses do with blockchain now?* Shippo. <https://goshippo.com/blog/what-can-small-businesses-do-with-blockchain/>.
- Shopify (2021). *Cryptocurrency*. Shopify. <https://help.shopify.com/en/manual/payments/alternative-payments/cryptocurrency>.
- Sinclair, S. (2021). *Ripple Tech to power new Malaysia-Bangladesh remittance corridor*. CoinDesk. <https://www.coindesk.com/starling-blocks-crypto-exchanges>.
- SME Corp, (2021). *SME definitions*. SME Corp. <https://www.smecorp.gov.my/index.php/en/policies/2020-02-11-08-01-24/sme-definition>.
- SME Info, (2021). *Here's why SMEs matter in Malaysia*. SME Info. <https://www.smeinfo.com.my/profile-of-smes>.
- Storj (2021). *Transparent pricing, always*. Storj. <https://www.storj.io/pricing>.
- Swinhoe, D. (2021). *The 15 biggest data breaches of the 21st century*. CSO Asean. <https://www.csoonline.com/article/2130877/the-biggest-databreachesofthe21stcentury.html>.
- The Star (2018). *CIMB, Ripple team up for instant cross border payments*. The Star. <https://www.thestar.com.my/business/business-news/2018/11/15/cimb-ripple-team-up-for-instant-cross-border-payments>.
- The Star (2021). *Japanese blockchain company plans to make Malaysia regional hub*. The Star. <https://www.thestar.com.my/business/business-news/2021/05/14/japanese-blockchain-company-plans-to-make-malaysia-regional-hub>.
- The World Bank Group (2015). *Remittance prices worldwide*. The World Bank Group. <https://remittanceprices.worldbank.org/en/corridor/Malaysia/Nepal>.
- Tracxn (2021). *Blockchain startups in Malaysia*. Tracxn Technologies. <https://tracxn.com/explore/Blockchain-Startups-in-Malaysia>.
- Tracxn (2021). *Blockchain startups in Singapore*. Tracxn Technologies. <https://tracxn.com/explore/Blockchain-Startups-in-Malaysia>.
- University of Malaya (2018). *Malaysian blockchain regulatory report*. GB Gerakbudaya Enterprise. <https://law.um.edu.my/Research-UMCORS/RegTech/UM%20-%20Malaysian%20Blockchain%20Regulatory%20Research%20Report.pdf>.

- Vaugh-Nichols, S. J. (2021). *Best cloud storage service 2021: Expert picks & pricing*. ZDNET. <https://www.zdnet.com/>.
- VeChain (2021). *About us*. VeChain. <https://www.vechain.com/about>.
- VeChain (2021). *What is VeChain*. <https://www.vechain.com/>.
- Walker, A. (2021). *International money transfer: How long does it take?* Western Union. <https://www.westernunion.com/blog/au-how-long-does-international-money-transfer-take/>.
- Walsh, D. (2021). *What are cryptocurrencies and how do you use them? Everything you need to know as a beginner*. EuroNews. <https://www.euronews.com/next/2021/06/08/what-are-cryptocurrencies-and-how-do-you-use-them-a-beginner-s-guide-to-cryptocurrencies>.
- Yunus, R. and Jalil, A. (2019). *Malaysia lacks talent to develop blockchain technology*. The Malaysian Reserve. <https://themalaysianreserve.com/2019/11/29/malaysia-lacks-talents-to-develop-block-chain-technology/>.
- Zainuddin, A. (2018). *Blockchain in Islamic finance*. World Islamic Economic Forum Foundation. <https://infocus.wief.org/blockchain-in-islamic-finance/>.

Bryan Teoh Phern Chern
Faculty of Accountancy, Finance and Business
Tunku Abdul Rahman University College, 53300, Kuala Lumpur, Malaysia
Email: teohpc@tarc.edu.my,

Dr Teoh Bak Aun
Faculty of Accountancy, Finance and Business
Tunku Abdul Rahman University College, 53300, Kuala Lumpur, Malaysia
Email: teohba@tarc.edu.my,