

An Exploratory Survey on the Adoption of Blockchain Technology in Streamlining Malaysia Real Estate During Covid-19 Pandemic

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ABSTRACT

The global pandemic outbreak of Covid-19 and the restrictions on movement have created an unprecedented crisis for the real estate industry with mounting pressure including on property management. The higher-than-normal occupancy and load especially on strata residential buildings during the movement control order (MCO) leads to a more crucial task for property managers to ensure that every part of the building was in good working order. A high transmissible virus poses various challenges in property managers' jobs including maintenance, inspections, viewing, and marketing the property. Accordingly, the pandemic has created a greater sense of urgency than before for real estate companies to increase technology usage by having an automated real estate record involving the buying or selling process. This study aims to explore the potential opportunities of blockchain adoption in the real estate management process. The objectives of this study are: i) to investigate the challenges of real estate managers in managing the real estate during the pandemic; ii) to study the benefits of blockchain technology adoption in the real estate management process, and (iii) to examine the opportunities of blockchain to enhance in streamlining the real estate management process. This research engages with the qualitative nature of the research strategy due to the explorative character by conducting the unstructured interview with the real estate players involved in managing the properties. All the collected materials have been transcribed and categorized to ensure that they could be analysed through NVivo, a qualitative data analysis programme. The expected outcome of this study will provide scientific evidence on the readiness of the Malaysian real estate industry to embrace technology by digitalizing the property management which is in line with the vision of the government to ensure Malaysia makes the Digital Leap into the Fourth Industrial Revolution (IR 4.0).

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1. Introduction

The global Covid-19 pandemic has dramatically expedited the merger of real estate and technology in a way that sector is on

the path of becoming contactless and technologically rich (Gujral et al., 2020). Accordingly, the pandemic has created an unprecedented crisis for the real estate industry with mounting pressure including on property management. Due to the higher

than normal of occupancy and load especially on strata residential buildings during the movement control order (MCO) leads to a more crucial task for property managers to ensure that every part of the building was in good working order. A high transmissible virus poses various challenges in property managers' jobs including maintenance, inspections, viewing, and marketing the property. Most of the property management staff operation has turned remote, virtual property tours have been implemented, tenant communication has been switched to a digital platform, and more technology is being used to handle day-to-day operations. For instance, the property manager needs to be prepared to administer flexible rent arrangements requests by the landlord.

Aside from that, in the wake of the epidemic, buyers, sellers, property owners as well as a potential tenant have grown more cautious. As a result of this pandemic situation, consumers tend to avoid showrooms and sales galleries, and preferably on a wait-and-see approach (Sarkunan, 2020). This situation contributed to fewer real estate seekers and delayed property listings. As a result, property managers must rethink their marketing methods for real estate, as customers' willingness to meet and engage face to face in a site has declined. To solve the property touring issue upon the pandemic, real estate companies would be leveraging a virtual reality technology that has improved so much in the last few years that a virtual tour is finally a realistic option. This is to ensure that the client's need to understand the look and feel of space for sale or lease not be eliminated. The evolution of virtual touring solutions that accelerate dramatically becomes another major in-person activity disrupted by the pandemic.

Aside from that, real estate firms are utilising cloud-based technologies for digital marketing and digitally connecting with tenants to provide a digital tenant experience. Tenant data on lease renewals is stored in this cloud, which may be used to develop effective tenant retention tactics. Real estate firms are also benefiting from the modernity of a highly connected world, where a vast quantity of information is available online and consumers are becoming savvier in selecting the products and services they require. According to the research conducted by MRI (2019), a search through digital channels is determined to be the starting point for around 87 percent of buying decisions. Thus, a new and clever content marketing method is adopted in the real estate business, bypassing old marketing approaches. The inference that can be drawn from this situation is that the social distancing policy accelerates the adoption of digital services that facilitate real estate transactions, as the pandemic will leave behind long-lasting consumer behaviour changes that impact the real estate traditional practices and ecosystem.

The pandemic has created a greater sense of urgency than before for real estate companies especially in property management to increase technology usage by having to transition real estate digital processes involving the buying, selling, owning, renting and management of properties to be easier, more efficient and provide a better customer experience.

Based on the survey conducted by AppFolio towards 3,533 property management professionals, 46% revealed that the pandemic forces them to pivot rapidly to adopt new technology as a top way to protect their residents and staff and preparing for their future business continuity amid lots of uncertainty (Monroe, 2020). The development of the world's digital technology innovation is also impacting the real estate sector. According to Ullah et. al. (2019), the real estate industry can be transformed from its traditional rigid approach to a more up-to-date, advanced, and smart approach using various property technologies (PropTech).

Indisputably, looking into the digitised world nowadays, most of the developed countries have shifted to have an automated real estate record including the process of buying/selling up until managing the real estate (Kothari et al., 2020). On top of the emerging trend of digitisation in the real estate market, some issues need to be highlighted on the transparency, reliability, and correctness of the data. Record tampering is still a risk with these automatic systems (Ali et al., 2020), triggered by the misuse of property and unethical practices due to the third party's dependency. Real estate-related information sources are becoming more widely available in digital form, owing to advances in technology. However, present methods involving the hosting of some digital information on separate systems expose users to greater risk of fraud due to less transparency and efficiency, as well as a higher rate of errors (Martijn, 2017).

Despite all issues related to real estate management that have been highlighted especially during the pandemic crisis, there are some other common issues and problems with the traditional real estate market such as lack of accessibility, lack of transparency, high capital barrier, third-party interference, lack of liquidity (Namrata, 2020), the complexity of the agreements, managing cash flow, record keeping and security, and absence of the real-time data (Akash, 2019). Most of the properties are handled either by paperwork or by software that is frequently ineffective (Trotman, 2019). Daily tasks are generally accomplished physically, such as at meetings, when assistance bills and individual contact numbers are established on paper (Lemieux, 2019). This traditional way of record keeping, and documentation is cumbersome in the process of tracking and maintaining real estate records.

Blockchain technology is considered as one of the technologies having the ability to revolutionise how the real estate sector functions while solving deficiencies and difficulties in present methods, based on its application in records administration, real estate transactions, and smart contracts (Franks, 2020; RICS, 2020, Bhatia & Wright de Hernandez, 2019; Hoxha & Sadiku, 2019; Grover et al., 2019; Karamitos, Papadaki, & Barguthi, 2018, Johnson et al., 2018). There has been a rapid uptake of blockchain technology in the real estate market, particularly among commercial owners. (Namrata, 2020). Blockchain technology would change the traditional practices in real estate management by opening fresh opportunities and innovative ways of conducting a business. Residential real estate activities such as buying and selling, leasing, and data administration could be streamlined with the use of Blockchain technologies such as

distributed decentralised ledgers, smart contract breakthroughs, and even the introduction of real estate asset tokens. (Namrata, 2020; Kejrival & Mahajan, 2017). According to some other reports, blockchain is particularly suited for managing real estate and conducting commercial finance (Kiu, Chia & Wong Phui Fung, 2019; Trotman, 2019; Graglia & Mellon, 2018; Ramage, 2018; Zheng et al., 2017; Kejrival & Mahajan, 2017, Swan, 2015). By eliminating many of the existing inefficiencies in the main process, it can create transparency, efficiency, and cost savings for real estate owners. (Nijland & Veuger, 2019).

Accordingly, to empower global innovation and facing up with unprecedented risks such as the pandemic crisis, the Malaysian government through the Ministry of Science, Technology, and Innovation (MOSTI) has launched *Dasar Sains Teknologi dan Inovasi Negara (DSTIN) 2021-2030* on 2nd December 2020 to mitigate these challenges. MOSTI established a 10-10 Malaysian Scientific, Technology, Innovation, and Economy (MySTIE) Framework as part of this policy, which emphasised ten important Malaysian socio-economic drivers alongside ten world-leading science and technology drives. Through the 10-10 MySTIE framework, various digital disruptive technologies have been highlighted including blockchain, AI systems, sensor technology, 4D/5D printing, and many more, that could shift Malaysia up the global innovation for business and financial socio-economic driver including on real estate industry (Academy of Sciences Malaysia, 2020).

In response to the above issues, the quest of this study is to focus on exploring the readiness of Malaysian real estate companies to embrace blockchain technology in building a resilience property management process. More specifically, this paper tries to address this by answering the following three research questions (RQs):

- RQ1 : What are the challenges of real estate managers in managing the real estate during the Covid-19 pandemic?
- RQ2 : What are the benefits of blockchain technology adoption in the real estate management process?
- RQ3 : How could the real estate management process be streamlined with the adoption in the Malaysian real estate sector?

The body of the paper is arranged as follows: Section 2 includes a study of the literature on real estate management during the Covid-19 outbreak, as well as the prospects of blockchain technology in the Malaysian real estate market. The obstacles to blockchain adoption in the Malaysian real estate market are also discussed.

2. Literature Review

2.1 *Malaysia Real Estate Industry Scenario during Covid-19 Pandemic*

A variety of measures have been developed to investigate how the pandemic has affected the real estate market, including sales,

credit, and valuation (Miranda, 2019). Before the COVID-19 pandemic, the real estate market was thriving and looking forward to a bright future.

The global economy started to stagnate after the COVID-19 virus hit in March 2020, and the real estate market was no exception. As a result of the 'new standard,' workers continued to work from home, and others worked overtime to compensate for their limited need to communicate with customers face to face, setting up meetings, discussions, and explaining new plans for properties and other relevant issues of interest. The ability of commercial premises to generate consistent sales has been diminished, and social distancing practices would sweep away the efficiency of daily human activities.

COVID-19 pandemic has altered nearly every aspect of our life, including how we work, live, and interact with others (UNCTAD, 2020). Many practices and policies in property management have changed to support property managers and residents. The real estate market has evolved quickly and relies largely on mobile technology to complete operations, stay connected, and preserve company continuity. While many of these modifications were intended to be a temporary solution to COVID-19 issues, many of them are expected to persist long even after the epidemic has passed (Holden, 2021).

Holden (2021) has summarised how property management has changed in the past few months due to the Covid-19 pandemic, and how these changes will impact the future, which is as follow:

1. Shift to Remote Work

According to a recent AppFolio survey, 82.3 percent of property managers have at least some employees who are working remotely, and slightly over half (50.04 percent) have fully worked from home (Monroe, 2020). For the first time, property management companies were forced to handle daily duties, teams, properties, and customer support without having to be present in the office.

Property managers have found this to be difficult as this career is based on in-person contact and building human ties. According to the poll, the top three obstacles for residential property managers working remotely are leasing, maintenance, and collecting maintenance fees. To overcome this challenge, property management businesses have been turning to technology — 46% of survey respondents mentioned adopting new technology as one of the top ways they're preparing their business for the future considering COVID-19.

It is proof that utilising technology has not only become the preferred method of doing daily work and communicating, but it has also become a must for property managers to do their duties and prepare their employees for the future. Even after the epidemic has passed, property managers will probably continue to work remotely to some extent, and technology tools are required to do so efficiently.

2. Digital Communications

One of the most important things worth sharing with colleagues, according to property managers, is the necessity of "proactive, regular, and quality communication." Property managers have found it more difficult to keep connected with residents or communicate with prospects due to social distancing. Residents are no longer able to sign their leases, pay their rent, or ask inquiries at the office.

As a result, property managers have had to come up with innovative ways to interact by utilising mobile technologies. To keep tenants or residents always informed of the new update, property managers have been forced to automate digital communications and shift from sending individual emails and text messages to group messaging. This move has ushered in a new era of efficiency in property management, streamlining many components of the process. Bulk text messages and emails, according to 87 percent of study respondents, are here to stay. Residents will likely want to connect with their property management business via digital means rather than in person in the future.

3. Changes in Leasing Priorities

Property managers have had to adjust their objectives when it comes to leasing activities due to working remotely and communicating online and this resulted in the demand for leasing drop. To tackle this challenge, property managers have been quickly implementing cutting-edge technologies such as virtual tours, self-guided showings, and online leases to fill vacancies and maintain consistent occupancy.

There are 71 percent of respondents believe virtual showings have become more important, and 62 percent believe they are here to stay (Monroe, 2020). The advantages of virtual technologies are that they allow property managers to create a wonderful client experience without having to engage with customers in person.

4. Maintenance Become More Complex

According to an earlier survey done by AppFolio in March 2020, about 90% of property management organisations had already implemented or were working on a COVID-19 policy. Policies such as social distance regulations for residents, merchants, and technicians, as well as heightened safety standards like mandating maintenance personnel to wear masks and gloves, were all clarified in these policies.

Maintenance activities, unlike rent collecting and leases, cannot be completed entirely online. However, cloud-based property management software with fully integrated maintenance work order tracking has enabled businesses to deliver better service, communicate more efficiently, and retain transparency.

With step-by-step online instructions, video chats, and doorstep material drop-offs, several property managements firms have devised novel and imaginative ways for homeowners to conduct non-emergency repairs themselves. Non-essential repairs, on the other hand, will need to be addressed at some point, and mobile property management software will assist property

managers in resolving these concerns more quickly. When it comes to maintenance operations, the demand for technology will grow in the future, as it allows property managers to connect with their residents and suppliers safely and effectively.

2.2 *Blockchain Technology Adoption in Real Estate Management.*

Blockchain is closely related to Bitcoin. Therefore, it is safe to consider that blockchain technology is popularized through blockchain. The first whitepaper on Bitcoin was produced by Satoshi Nakamoto called "Bitcoin: A Peer-to-Peer Electronic Cash System" in 2008. The paper explained the inability of a financial institution in acting as a trust-based model of commerce on the internet. Hence, Nakamoto (2008) claimed Instead of utilising a trust-based system to address the difficulties, a cryptographic system is ideally effective for allowing two willing parties to trade directly without the assistance of any trusted third party in an electronic payment system.

According to the Malaysian Government (2019), the introduction to blockchain in Malaysia was made in 2015 by the Security Commission and Bank Negara Malaysia. The effort of introducing blockchain in Malaysia is an attribute towards the 4th industrial revolution. Consequently, this effort resulted in the Kuala Lumpur Blockchain Conference and engagement with Andreas Antonopoulos. As an effort to spread awareness, Malaysia Digital Economy Corporation (MDEC) launched an event called "Finnovasia", "Meet Vitalik" and facilitated blockchain start-ups' applications for MSC's tax incentives status.

The National Mirror Committee on Blockchain and Digitalized Ledger Technology (DLT) was initiated in 2017 by the Malaysian Industry-Government Group for High Technology (MIGHT), *Jabatan Standards Malaysia (JSM)*, MIMOS, Malaysian Communications and Multimedia Commission (MCMC), Malaysia Digital Economy Corporation (MDEC), Ministry of International Trade and Industry (MITI), Personal Data Protection Act (PDPA) Department, Security Commission (SC) and *Bank Negara Malaysia (BNM)*. It is a joint-venture effort from various government agencies. In 2019, activities related to blockchain continued to rise and up until now, it is still gaining its popularity.

The simplest way to explain blockchain is that it is where the data is stored in blocks and when it connects, it forms a chain. Blockchain is accessible by all participants and the data stored can be made private or public. The data stored in the blockchain is unchangeable as the characteristic of the blockchain is immutable which means it is safe from being manipulated. Torres & Brann (2019) said that blockchain is used to record transactions in cyberspace which is unvarying as well as a transparent digital ledger. The operation of blockchain is by a set of synchronized ledgers that are managed by more than one entity.

According to Azizi (2019), the easiest way to express blockchain is as secure and permanent storage of digital ledger transactions,

agreements, contracts, and other information by the network of users collectively. Meanwhile, Ajay & Julita (2018) stated that data stored in digital ledger across nodes can be broad ranging from contracts to transactions information. As known, cryptographically linked blocks will form a chain containing a previous record, transaction data, and timestamp. Being said, digital ledger transactions that can be recorded in blocks and linked to one another cryptographically forming chains and accessible by each participant whenever desired.

A public ledger that stores transactional data and digital events shared among participants through Distributed Ledger Technology (DLT) is called a blockchain. Only encrypted and verified data can be stored in the ledger. Before a new block of data is visible to the user and added to the chain, it needs to be verified and encrypted by other participating parties. The most well-built character of blockchain is that the added data in blocks of the chain are not possible to be amended or deleted (Surin & Joe, 2020). The whole purpose of exploring blockchain is to ensure the decentralised system as well as publicly available data without boarder through technology development and digitalization.

From the point of view of property management, there are two entities that need constant communication known as a property manager and property owner. The communication between property managers with investors, property owners as well as tenants should be simple yet effective. However, the traditional communication method between property managers with owner, tenant, and investor is quite ineffective. This is due to the hierarchy of the property management organization chart. As known, this hierarchy is complicated and complex. Consequently, blockchain can tackle this problem. 5 core elements of blockchain enable an effective and systematic property management process.

Observation from Hileman & Rauchs (2017), cryptography, peer-to-peer network, consensus mechanism, digital ledger, and validity standards are the five components of blockchain in general. One-way hash functions cryptography, Markle trees, and public key infrastructure are examples of cryptographic approaches (private-public key pairs). Each piece of data in a block has its unique identifier, known as a hash. In peer-to-peer fashion, a peer-to-peer network is used for peer discovery and data exchange. This enables verification without help from another third party to validate the transaction. The purpose of the consensus mechanism is to act as an algorithm in determining transaction order in an adversarial environment assuming not all participants are honest. A digital ledger is a collection of transactions organised into blocks that are cryptographically linked. Validity rules are a set of network-wide guidelines for determining whether transactions are legitimate and how the ledger is updated.

Achim (2019) on the FIBREE Industry Report Blockchain Real Estate 2019 mentioned that activities related to blockchain have been active since 2016 in which the companies develop blockchain as the extension of existing products or solutions as a by-product. Moreover, as of 2018, it was found that there are 501 blockchain as well as real estate incentives found worldwide. The product discovered is defined as the product

database. Blockchain development in incentives of real estate is recognised as a worldwide phenomenon as the report itself collected its output from 23 countries around the globe.

The effort of applying blockchain in real estate is because there are a few problems in the traditional property transaction method which need improvement. In details of the traditional method problems, (Wouda & Opdenakker, 2019) have discovered that the traditional method lacks transparency, is inefficient and complex as well as high transaction costs and time-consuming. The reason why real estate is prone to fraud is that data related to real estate is closed data where not everyone has the accessibility to it. This issue can be viewed as low transparency due to the limitation of obtaining such data. Difficulties of obtaining such data are addressed by Kalyuzhnova (2018) because sellers or buyers need to spend time and money to acquire property information, price comparison, views, and visits. This cost is called information retrieval costs due to the data limit of various real estate properties.

The inefficiency of real estate transactions comes from the due diligence as well as completion phases leading to delays. An important reminder that time is indeed money. Thus, the delays and due diligence of real estate transactions results in the raise of transaction costs. The longer the delays, the higher the transaction cost. As claimed by Mashatan & Roberts (2017) the manual data transmission between participants makes the transaction process overly time-consuming. Kalyuzhnova (2018) supports the idea that transaction costs have risen due to the difficulty of assessing features of real estate before deciding to rent or buy a home, such as material quality, safety, utilities, and location. Considering this trend, buyers often use surrogate ratings such as reviews and developer reputation, raising the transaction costs. The complexity of real estate transactions attracts low efficiency and addition to the transaction cost. The issues of transparency, inefficiency, complexity, and overhead of time and money are closely related to each other as they influenced the transaction process altogether.

From the mentioned topic above, the effort of venturing into blockchain in the real estate industry is significant. As blockchain has the exact opposite characteristic of the traditional method making it suitable to tackle the listed affair. Taking advice from Mashatan & Roberts (2017), operating blockchain in real estate can improve transparency which enables regulators to prevent and catch fraudulent behaviour. Smart Property Ledger (SPL) in the blockchain is claimed to improve transparency because when approvals are given in the process, users will be notified. Participants can log onto the smart property ledger SPL and check every approved transaction without the need for help from lawyers or agents.

Other than that, blockchain can simplify the transaction process in most jurisdictions. By simplifying the transaction process, the time, as well as the cost of the transaction, can be reduced dramatically. It is doable to solve this problem by taking advantage of the SPL system because this approach permits data to be transmitted in real-time to all approved users with minimal latency. Overall, the transaction process can be reduced by minimizing waiting done between one step to another. As specified by Wouda & Opdenakker (2019), the

efficiency of the transaction can be maximized because standardized and structured data can form the input of internal analyses and workflows including assessment of risks.

The reliability level of blockchain is high because all the transactions are approved immediately, and participants can monitor and notify of the transactions on a real-time basis. The reliability of blockchain in real estate transactions is agreeable as the observation by Wouda & Opdenakker (2019), all the information collected in the network is validated by all participants which satisfy all the requirements. Based on the audit trail reliable reports can be easily generated. The report that can be produced with blockchain technology in real estate transactions is financing reporting.

2.3 Benefits of Blockchain Adoption in Real Estate Management Process

Blockchain integration into the real estate sector addresses each of the issues mentioned in the previous subsection and eliminates transaction complexities, making the real estate transaction uncomplicated and cost-effective. Based on the documents retrieved in the various types of the search engine, a total of the benefits of blockchain adoption in the real estate management process were shortlisted as depicted in Table 1.

Table 1 The benefits and challenges of blockchain adoption in the real estate management process

| No | Benefits of Blockchain Technology | No | Benefits of Blockchain Technology |
|----|-------------------------------------|----|-----------------------------------|
| 1 | Transparency | 7 | Cost-Effectiveness |
| 2 | Immutable | 8 | Near real-time |
| 3 | Decentralization | 9 | Transaction dependence |
| 4 | Prevention of fraudulent activities | 10 | Efficient document searching |
| 5 | Manual documentation phased out | 11 | Document verification |
| 6 | Zero third-party involvement | | |

1. Transparency
Every member of that network has access to all information and data stored in the blockchain

2 Immutable
It is not possible to alter or alter the data inside a blockchain since all the data is encrypted with cryptographic hash functions.

3. Decentralization
Various entities are responsible for managing and owning the data contained within the blockchain.

4. Prevention of Fraudulent Activities

Due to Blockchain technology, which keeps all data and can verify each transaction completed, the chance of duplicate spending, fraud, and transaction manipulation may be reduced.

5. Manual documentation phased out.
The use of Blockchain to secure the removal of manual documentation or paperwork offers environmental benefits as well. Through tokenisation, blockchain solutions for real estate enable smooth execution of the property transfer process, removing the need for any documentation.

6. Zero Third-Party Involvement
The Blockchain uses cryptographic authentication to enable direct, one-to-one transactions between two parties. Transactions are made on a peer-to-peer (P2P) basis and managed in a decentralised manner.

7. Cost-Effectiveness
With Blockchain technology, management costs may also be minimised by eliminating third-party entity interference. Indirectly, this improves the efficiency and speed of the entire process.

8. Near Real-time
A blockchain allows transactions to be settled in near real-time, lowering the risk of non-payment by one of the transaction's parties.

9. Transaction dependence
Many real estate deals have conditional clauses that can be implemented using smart contracts. The completion of a lease and purchase agreement, for example, might be reliant on credit approvals or title clearances.

10. Efficient Document Searching
Blockchain technology brings real estate activities together under one roof. The benefit is that third-party document searches may be replaced with digital document searches, which can be completed in a matter of seconds.

11. Document Verification
For real estate transactions, blockchain technologies enable both automatic and human document verification, saving time and resources. It is also possible for users to submit numerous documents.(Kothari et al., 2020)

2.4 Barriers to Adoption of Blockchain Technology in Real Estate Management Process.

As much as the benefits that blockchain contributes to real estate transactions, there are still few drawbacks of utilizing this technology. In respect of Wouda & Opdenakker (2019), immaturity of the technologies and lack of standardization are holding back its implementation. On that account, the proposed model of blockchain will be quite complicated. The vital reason that blockchain lacks standardization is that it is a decentralised system which means that more than one entity is accessible to manage the blockchain. Due to the previous statement, blockchain lacks uniformity because it is manageable by many entities.

In terms of legality, as blockchain promotes digital currencies, the framework of regulating digital currency had to be created. However, there is currently no legal framework that can protect smart contracts on the blockchain or any other transactions that are made on the blockchain (Kalyuzhnova, 2018). The legal framework is not as easy as it seems to be created because the participants in blockchain range worldwide from different countries and even from different continents. Before anything else, Ajay et al. (2018) emphasise the importance of centralizing authority in recognizing contractual obligations in digitalised real estate. Regional as well as country-specific variations in-laws may complicate it.

Furthermore, blockchain is familiar with anonymity. As well as it may be one of blockchain's strengths, it can also be some sort of weakness. Konashevych (2020) specified that anonymity promotes security issues where anyone may carry out transactions and publish data in the blockchain. This encourages the challenge in the uncertainty of ensuring that the rightful owner is the one who completed the transaction and added new data to the blockchain. All things considered, security issues such as identification verification exist in blockchain technology. Without proper verification, fraudulent activities can still happen in digitalised real estate transactions. These drawbacks oppose the original motive of blockchain.

Taking from the perspective of (Mir, 2017), blockchain technology is still underdeveloped and there is so much more future potential for blockchain application to be investigated. Further research in the applications of blockchain is needed to reveal the full capability of blockchain in giving impact on real estate transactions. This point of view is agreed by Konashevych (2020) as blockchain has few principal features that can hold

back blockchain from being taken into practice at the state level where further research and development is required to confirm its ability. The application of blockchain depends on its framework's suggestion of how and what to do in turning over the drawbacks and disadvantages of blockchain.

3. Research Methodology

This paper aims to develop new knowledge which can be used as an introductory overview. Due to the qualitative nature of the research questions, this study applies an exploratory study research design. According to Saunders et. Al., (2019) an exploratory study is an appropriate approach for the study that wants to discover what is happening and to gain insight on the topic besides understanding a phenomenon of the research area. This study was conducted in the following three stages as illustrated in Figure 1. To understand the concept of blockchain technology, the benefits, and the challenges involved in implementing it in real estate management, an extensive literature review was conducted by using IEEE Xplore, Springer, Science Direct, Emerald, Scopus, and Web of Science (WoS) search engines. Stage 2 of the study consists of unstructured interviews through which real estate managers are surveyed regarding the challenges they face in managing the real estate industry during the Covid-19 Pandemic, their level of knowledge of revolutionary blockchain technology, and the key barriers to implementing it in real estate. Stage 3 provides the analysis and results for the discussion and finally, the conclusion and recommendations for further research are presented based on the results.

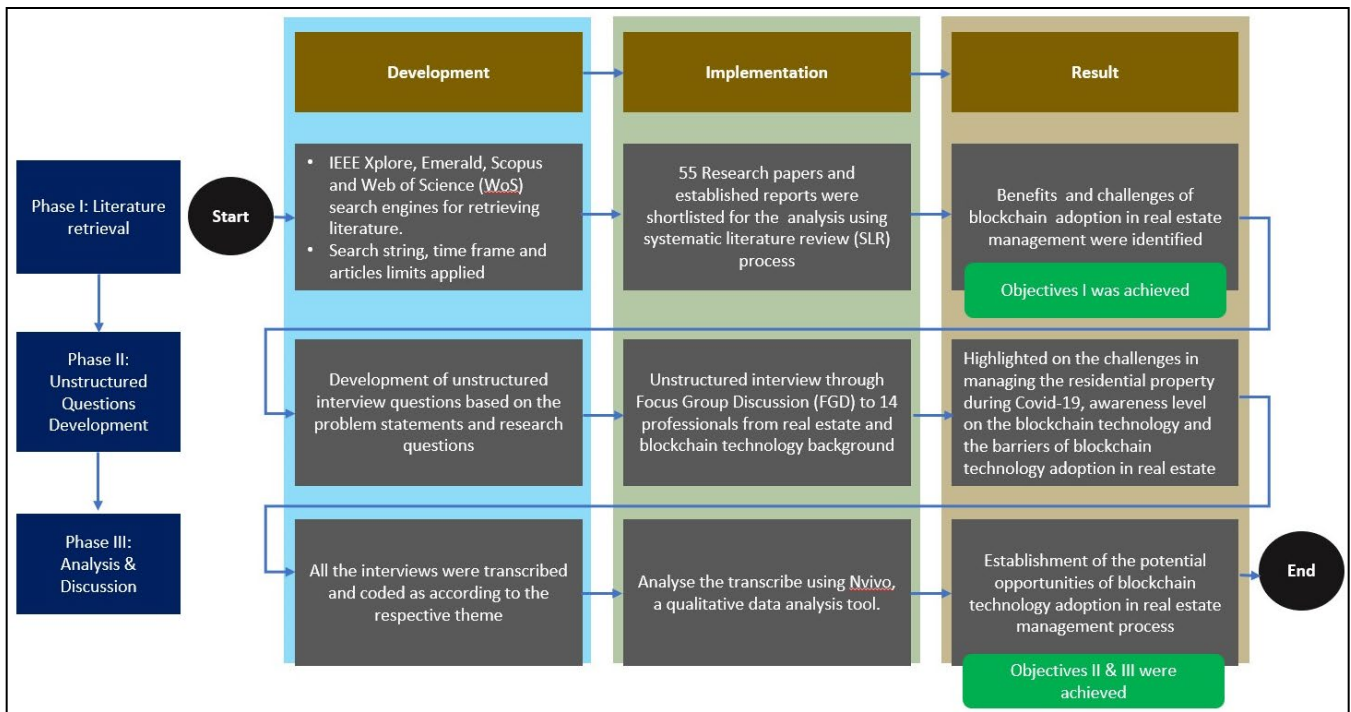


Figure 1 Research Methodology Framework

3.1 Stage I: Literature Retrieval

This study provides a clear and scientific literature review to formulate research problems and to answer the research questions using a thorough process. The research repositories of IEEE Xplore, Springer, Science Direct, Emerald, Scopus, and Web of Science (WoS) are used to shortlist the relevant documents. The keywords and strings used for searching on all platforms include alternate terms of "property management", "real estate management" and blockchain technology". To keep a recent focus of the publication regarding the adoption of blockchain in real estate management, the timeframe is limited to the last decade (2011-2021). The selected documents were restricted to the type of research articles, conference papers, books, and book chapters. However, due to the immaturity of blockchain adoption in the real estate management process, this study also considered other resources such as relevant "grey literature" including unpublished research by government or private/public institutions through electronic searches. Table 2 indicates the list of the search strings and results for each search engine type. A total of 55 retrieved documents between the years 2011 and 2021 were reviewed in this study to highlight the benefits and challenges of blockchain adoption in real estate management.

Table 2 List of the documents in search strings and results.

| Search Engine | Search strings | Results |
|---|------------------------------------|-----------|
| IEEE Xplore | Topic: (real | 27 |
| Springer | estate) OR (real | 92 |
| Science Direct | estate | 28 |
| Emerald | management) | 195 |
| Scopus | AND TOPIC: (blockchain technology) | 91 |
| Web of Science (WoS) | | 35 |
| Selection by title | | 53 |
| Duplicates and removal (Irrelevant article types) | | 12 |
| Grey Literature | | 14 |
| Total Shortlisted | | 55 |

3.2 Stage II: Unstructured Interview Questions Development

A comprehensive question as shown in Table 3 was developed to capture the opinion of real estate managers and blockchain technology experts regarding the adoption of blockchain technology in the real estate management process. An exploratory expert interview through Focus Group Discussion (FGD) also was conducted to support shaping the problem statements and research questions. The interview was unstructured since it offers the widest approach, hence creating a distinct range of information. There are a total of 14 interviewees involved, consisting of professionals from real

estate backgrounds such as a registered real estate manager, managing director of a real estate company, and registered real estate agent. Besides that, to explore the possibilities of blockchain adoption in the real estate industry, the interviewees also consist of blockchain technology experts from academia and industry

Table 3 List of questions for unstructured interviews through Focus Group Discussion

| No | Questions | Literature Study | Interviews |
|-------------------------------|---|------------------|------------|
| Real Estate Management | | | |
| 1 | What are the challenges in managing the commercial office building especially during Covid 19 pandemic? | ✓ | ✓ |
| 2 | What are the different phases or tasks involved in the current real estate management process? | ✓ | ✓ |
| 3 | Do you aware of blockchain technology as a digital disruptive technology in managing real estate? | | ✓ |
| Blockchain Technology | | | |
| 4 | How does the blockchain work in real estate? | ✓ | |
| 5 | What are the opportunities of blockchain to enhance the real estate management process? | ✓ | ✓ |
| 6 | What are the barriers to implementing blockchain in the real estate management process? | ✓ | ✓ |

3.3 Stage III: Analysis and Discussion of Results

Towards the end of the process, we analysed the transcribed data using the NVivo, a qualitative data analysis programming system developed by Qualitative Solutions and Research PTY. LTD. of Melbourne, Australia. It offers a variety of tools for navigating, coding, and annotating data records, as well as gaining access to data records quickly. (Richard, 1999). Figure 2 depicts an example of coding in NVivo using "Coder" while Table 4 summarises the interview coding scheme that addresses the different categories covered during the FGD process.

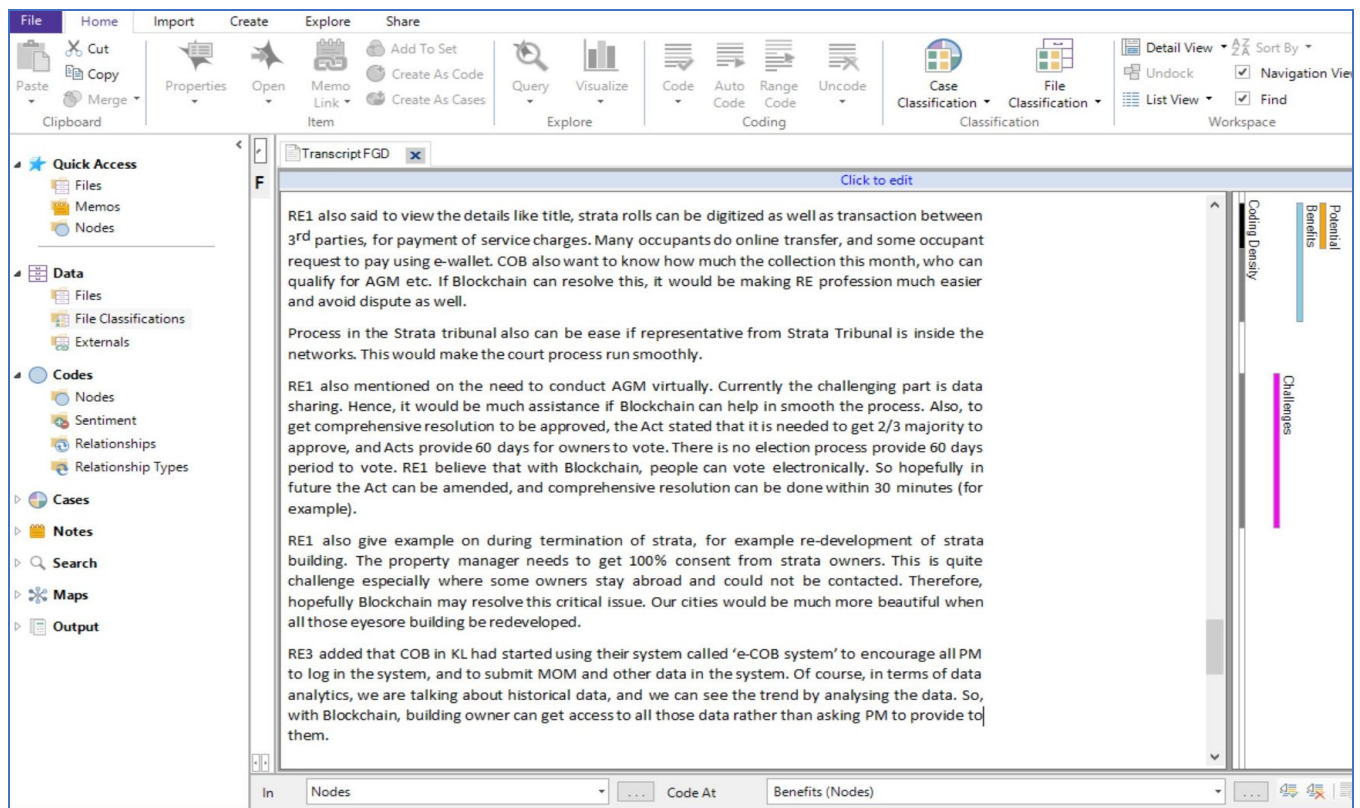


Figure 2: An example of transcribed data coding in NVivo using “Coder”.

Table 4 Summary of the interview coding scheme that addresses the different categories covered during the FGD process.

| Coding Category | Interviewee 1 | Interviewee 2 | Interviewee 3 | Interviewee 4 | Interviewee 5 | Interviewee 6 | Interviewee 7 | Interviewee 8 | Interviewee 9 | Interviewee 10 | Interviewee 11 | Interviewee 12 | Interviewee 13 | Interviewee 14 |
|--|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|----------------|----------------|----------------|----------------|----------------|
| Challenges of Real estate management during Covid-19 | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Partly | Yes | Yes |
| Benefits of blockchain | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Partly | Partly | Partly | Yes | Yes |
| Potential opportunities of blockchain adoption in real estate management | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |

4. Results and Discussions

The information provided by focus group participants provided a better understanding of current practices of real estate

management including the challenges that the property manager had faced during the Covid-19 pandemic, and the respondent’s perception toward adoption of blockchain in the real estate management process. Also as reported in the previous part, the

literature review provided insights to the researcher in understanding the concept of blockchain technology, the benefits and the challenges of blockchain adoption in real estate management

4.1 RQ1: What are the challenges of real estate managers in managing the real estate during the Covid-19 pandemic?

Based on the literature reviews and the focus group discussion that was held, it can be summarised on the challenges that being faced by the property managers throughout the Covid-19 pandemic, which is as follow:

i. Shift to remote works and digital communications

Findings from the interviews indicate that the main challenge faced by the Property managers while operating the management of the real estate during the Covid-19 pandemic is shifting from the conventional ways of meeting people, which is face-to-face, to modern ways which is via virtual meeting. This would also indirectly affect the collection of maintenance fees since physical meeting are limited.

ii. Enforcement of the Covid-19 SOP for Real Estate Management Sector

The property manager would also have to establish and enforce very detailed SOPs following the National Security Council with regards to the efforts in combating Covid-19 in addition to the real estate management process. The challenge emerged in enforcing the SOP to indiscipline and intolerable occupant. Apart from that, there is a lot of reporting that needs to be done in the event of the person infected by the disease identified in the premise, in addition to the current work process.

iii. Maintenance becomes more complex

The property manager may also need to allocate an extra budget for items involved with regard to implementing Covid-19 SOPs. This includes the purchase of personal protective equipment as well as training materials to ensure the management team is fully ready and well versed on how to handle the Covid-19 case. Property managers may also need to train the management team on how to handle the emotional part of the occupants who are likely to be affected by the lockdown imposed by the Government.

Apart from that, the interviewees also highlight on the other challenges occurred upon managing the real estate as summarised in Table 5 below:

Table 5 Summary of challenges in managing the real estate

| No | Challenges | No | Challenges |
|----|---------------------------------------|----|--|
| 1 | Lack of Accessibility | 10 | Record keeping and security |
| 2 | Lack of transparency | 11 | Absence of the real-time data |
| 3 | High capital barrier | 12 | Inefficiency property search process |
| 4 | Third-party interference | 13 | Higher risk of fraud |
| 5 | Lack of liquidity | 14 | Data sharing concern |
| 6 | Lengthy transactions | 15 | Process of strata tribunal |
| 7 | Multiple entities can modify database | 16 | Conducting AGM during pandemic |
| 8 | Complex agreement | 17 | Redevelopment of strata building |
| 9 | Managing cashflow | 18 | Complexity in managing ongoing lease agreement |

Based on the challenges that have been discussed above, all the interviewees agree that venturing the Blockchain technology in the real estate industry is significant and could help for better-structured data in the real estate management process.

4.2 RQ2: What are the benefits of blockchain technology adoption in the real estate management process?

Referring to the data analysis presented in Table 4, it can be inferred that majority of the respondents agrees on the adoption of blockchain technology can benefits the real estate management process in all stages as depicted by KPKT, which is from the handing over vacant possession stages, until the termination of sub-division stage.

There are few examples shared by interviewees of how the blockchain would positively impact the real estate management process, including:

1. Near real-time: Obtaining data or generating a report of the building would be done in a faster way subsequently facilitating the decision-making process.

2. Immutable: Operations of the building would be more efficient, by utilising sensors to capture and analyse data whether, for indoor air health, safety, electricity, water consumption, or even security, and all data stored are nearly impossible to tamper.

3. Efficient document searching: Digitalised statutory documents such as strata title, licenses, etc, and can be viewed in real-time.

The results of the interviews demonstrate that most respondents expressed positive views regarding blockchain's development and role as a key driver of efficiency in real estate management. There are several advantages to using blockchain technology in real estate that was discussed during the FGD.

Additional benefits can be derived from using blockchain in the real estate management process, and these are outlined in Table 1 above and include benefits like transparency, decentralisation, prevention of fraudulent activities, elimination of manual documentation, zero third-party involvement, inexpensive, transaction dependence, and document verification.

4.3 RQ3: How could the real estate management process be streamlined with the adoption in the Malaysian real estate sector?

In both the literature review and the focus group discussion, it was revealed that digitalisation is the key to implementing blockchain technology in real estate management, in which any of the building operations data can be digitized and generation of various reports can be done in a faster way. The stakeholders such as the property management team, the 3rd party service contractor, the financial institution, local authority as well as law practitioners can become the nodes and have access to the Blockchain platform. A key benefit of blockchain technology is that stakeholders can all use the same data, and the process of data validation is reduced due to the trust environment established by the technology. In summary, the opportunities of blockchain adoption in the real estate industry could be summarised as follows:

i. Digital records of real estate assets

In real estate the whole lifecycle of a property can be digitalized and transferred on a blockchain. Blockchain can create a system where every property has its own digital passport with all the information about this specific asset, such as title registration with recent owners, sales prices, transaction dates, lease contracts, loans, maintenance contracts, and even the origin of the building materials and their condition recorded digitally.

ii. Re-design of real estate processes

If real estate assets are stored digitally on the blockchain, transactions could be handled on a blockchain in a similar way to how payments between parties are handled using digital currencies as stated by the literature study. With a fully secure, verifiable system, two parties could conduct a transaction immediately, without the need for a trusted third party to verify the transaction. Because the history is easily audited, all parties have confidence in the data being shared, and the time needed to close a transaction could be much shorter.

iii. Transparent markets

By creating a public ledger of transactions, the real estate market becomes more transparent and new platforms may arise as well as reducing falls listing or other fraudulent activities. Due to blockchain, transparency may also arise in the form of immutable results of the performance of actors in the process. If the performance results of stakeholders are stored via blockchain, this can create an immutable track record of performance and a possible new rating system. An increase of transparency will also allow regulators and rating agencies to get a better understanding of the risks affiliated with real estate. If more information about the risks of real estate is known, the risk aversion against real estate as an investment class may change resulting in higher demands for real estate investments.

iv. Payment system

Another point which is argued by literature is using cryptocurrencies in for instance lease payments or as deposits for rental agreements. The power of software is its programmability. The power of cryptocurrency is you can program it to escrow and distribute itself. Nevertheless, digital currencies are currently fluctuating a lot in their price. It is therefore arguable if digital currencies should be used in the ecosystem.

V. Smart contracts

Traditionally, the documentation needed for the purchase of a real estate asset, such as finance agreements, searches, title deeds surveys, property valuations, etc, are in the possession of different stakeholders and sharing information can be a time-consuming exercise. With blockchain technology, all the information can be assembled into one distributed ledger and authenticated at the point of creation by consensus mechanisms, which govern the data. Smart contracts can automatically monitor and execute transactions once certain conditions are satisfied thus reducing the chance of manual errors. They can reduce the number of intermediaries needed and enable automatic payment either directly from the buyer's bank account or from the escrow account, thus enabling completion to occur more quickly. Therefore, the combination of blockchain technology and smart contracts could reduce overall cost for real estate transaction participants.

5. Conclusion and Future Direction

This study aims to provide insight into the challenges facing by the real estate managers while managing properties during the pandemic, to investigate the benefits of blockchain adoption in real estate management, and to analyse the opportunities that blockchain technology can bring to speeding up the process of managing real estate. In this study, the researchers sought to highlight which stages of the real estate management process could be improved and benefited from blockchain technology adoption, by analysing the current real estate management process and learning about its benefits.

This study found that blockchain is still in its early stages of development in Malaysia, which means that it may still need to overcome several challenges, including technological, legal, and public perception before it can be deployed in real estate management. All these challenges therefore could become the future research consideration prior underlying programmable codes for blockchain-based property management in Malaysia. The Covid-19 epidemic, on the other hand, brought the onerous work of real estate management to the forefront for many parties. Stakeholders must re-invent their ideas and tactics to suit the pandemic-affected market to remain competitive in the sector and to weather economic challenges and uncertainties. Real estate management stakeholders should be on the lookout for potential innovation and technological disruptions.

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