An Analysis of Strengths, Weaknesses, Opportunities, and Threats (SWOT) on the Use of Blockchain Technology in Islamic Banking in Indonesia

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Abstract. The background of this research is to find out the use cases of blockchain technology and what types of blockchain which are suitable in the implementation of sharia banking institutions, as well as to find out the strengths, weaknesses, opportunities, and threats of the use of blockchain in Islamic banking, especially if it is applied in banking sharia in Indonesia. Qualitative descriptive research was used as research method in this research, with library research approach and some data were obtained from published reports and journals and they were also found on the internet based on the theme of research. If this study classified according to FC Dane theory, which also included in exploratory research, namely research that was conducted to find the cause and effect of an event or events. The object of this study was blockchain technology and the research subject was Islamic banking in Indonesia. The data analysis technique which was used here was the theory of Miles and Huberman method which consisted of data reduction, presentation of data, and conclusion. The results of this research showed that the blockchain with permissioned blockchain type and which was more specifically private permissioned blockchain was the right type to be applied in Islamic banking because it was in line with the regulations related to Islamic banking in Indonesia, with various consideration for applications in the form of smart contract, digital currency, cloud storage, remittances, and smart sukuk. Meanwhile, the scopes of division which implemented the applications were categorized based on 3 (three) fields, namely the payment sector, trade finance sector, and regulatory compliance. Based on various considerations in SWOT analysis method, then this technology was very possible to be implemented in sharia banking in Indonesia with the aim of achieving common interests.

Keywords: SWOT Analysis, Blockchain Technology, Islamic Banking, Indonesia

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Introduction

We currently enter a phase called the fourth industrial revolution, namely where each industry plays an important role in involving various kinds of machine technologies in learning, such as artificial intelligence, Internet of Thing, and Blockchain. This new digital technology disrupts the "old world" and introduces changes in practices and mindset of our society. New technology leads to the appearance of “more flat” and more decentralized organization (Vermeulen et al., 2018). In industrial revolution, each player is required to compete and attract consumers to use various products which offered by each company. The same thing has also been experienced by financial institutions such as banking, both conventional banking and sharia banking. In this digital era, the main innovations in change, movement, development, transformation of systems and ideas with the upheaval of new technologies in the field finance, or better known as Financial Technology (FinTech) (Sahabuddin et al., 2019).

Banking institutions are established as institutions which have function as a place of currency circulation has important role in the economic activities of a country. The existence of industrial revolution made banking institutions that were at the point of "one stop shops" in the beginning, it becomes “everywhere, never at banks” (King, 2013), i.e. where banks adopt various technologies to simplify the operational system and attract more people to be customers.

The large penetration of the use of digital technology in Indonesia encourages government to make digital economy which is one of main focus of government. Utilization digital technology in financial services is a challenge for banks today in terms of adaption to innovation. Sharia banking and finance is no exception. According to Assistant Governor of Malaysia, Marzunisham Omar, Fintech growth provides innovative opportunities in financial sector and therefore Sharia Fintech cannot be ignored by Islamic banking and finance industry (Aisyah, 2018). Some researchers have produced a positive relationship of FinTech aspect of Islamic banking services. This relationship provides a strong correlation between independent variables (sharia advisors responsibility, sharia management, sharia realization, compliance and improvement) with dependent variables (sharia obedience) (Ahmed et al., 2019).

Through implementing FinTech services, so that majority of people can achieve equitable financial inclusion. From the application of this service means both individuals as and business sector have access which is useful and convenient in accessing financial products and services that meet their needs such as transaction, payments, savings, credit and insurance, and can send them in a convenient way accountable and sustainable (Arifin et al., 2018).

Among the technologies that will be used in FinTech services, there are: one of the main topics of discussion in banking circles, one of one is blockchain technology. Blockchain is currently one of the most important topics both in the world of academia and industry, mainly because of the possible effects that can result from the continued application of this newly acquired technology (Fernandez-Vazquez et al., 2019). Blockchain innovation plays an important role in driving the financial sector, including the Islamic finance sector (Mohamed, 2016). Blockchain is a peer-to-peer distributed database that can be optimizing technical aspects (such as streamlining processes involving storage, reduce the workload of manual processes, to reduce costs designated for technology and settlement efforts) (Chen et al., 2018); and trying to arranger cording financial transactions in real-time, without consuming a complicated process and long (Singhal et al., 2018). This technology when paired with other technological devices such as artificial intelligence (artificial intelligence) will be able to get optimal results in operational field because it provides digital bookkeeping (Faccia & Mosteanu, 2019).
a significant impact the most in the entire process spectrum both on the front and back of the operator (front-to-back process). Not only that, other studies also concluded that blockchain is very relevant when applied to banking (Pakenaite & Taujanskaite, 2019).

The immutability attribute in the blockchain database makes it possible to store unlimited information in its database. Furthermore, it will increase the level trust in the truth of information assets within the blockchain. Furthermore, it will lead to traceability, because blockchain contains time stamp records which can be verified for every asset which has ever been transacted by blockchain. Therefore, based on the original audit, blockchain technology is available to verify assets. In this way, asset verification becomes feasible and perhaps and more reliable by using blockchain technology (Tilooby, 2018).

When it is viewed historically, the blockchain concept was originally adopted by anonymous named Satoshi Nakamoto in 2008 in his paper entitled “peer-to-peer electronic cash system” (Nugraha & Sutopo, 2018) and the term cryptocurrency appeared, and at the same time of the occurrence of monetary crisis, that situation made the blockchain term appeared in public media to become a serious debate in any industry until now. Then, various studies which conducted on financial market trend, revealed that although it is a relatively new technology, Blockchain and distributed Ledger have the interest of approximately 90% of executives in banking sector. 40% of the bank still explores the possibilities and various outcomes that can be achieved through these technological advances, while about 30% of them is testing various scenarios from this technology through modeling proof of concept (Vishwakarma et al., 2018).

A thing to be considered was that during the 2008 in monetary crisis to be exact, in the past, there were 2 things, namely: 1) the rise of cryptocurrency side which led to discussions and implementation of underlying technology, namely blockchain technology in developed countries, while the others are; 2) the appearance of Islamic banking term as a trusted institution in Indonesia because it is not affected by the monetary crisis.

In addition, there were themes of researches which discussed this blockchain technology, but researchers only found a few of them which related to our discussion this time including a research conducted by Asep Zaenal Ausop and Elsa Silvia Nur Aulia entitled Bitcoin Transaction Technology for Investment and Business Transactions According to Islamic Shari’a, although the research only discussed about bitcoin aspects when viewed from an Islamic perspective but there was a statement that concluded that the underlying technology, blockchain technology, was very good to be implemented because it is safe and sophisticated (Ausop & Aulia, 2018).

Another research was conducted by Richard-Marc Lacasse, Berthe Lambert, and Nida Khan entitled Islamic Banking – Toward Blockchain Monitoring Process, with a case study of Islamic Bank Bangladesh Ltd. (IBBL). The results of this research showed that the concept of using blockchain was very supportive in improving features of transparency and accountability among banking internal agents (Lacasse et al., 2018).

M. Niranjana murthy, BN Nithya, and S. Jagannatha in 2018 with the title “Analysis of Blockchain: Pros, Cons, and SWOT”, as conclusion of his research, it was explained that blockchain was a data structure that could process a ledger and shared it with members of computer network, and it allowed users to process and verify transactions directly without any intermediary. Blockchain is a transaction database that contained information related to all information which had been executed in the past and worked on Bitcoins protocol. Blockchain contains cryptography, mathematics, algorithms and economic models, which combines a peer-to-peer network and uses a distributed consensus algorithm to solve synchronization problems of traditional distributed database, it integrated various areas of infrastructure construction. This technology has 6 main elements, namely decentralization, transparency, open source, autonomy, immutable, and anonymity. This technology can also be divided into 3 types, namely public, consortium, and public. The advantages of blockchain
were no intermediary (disintermediation), empowering users, high data quality, durability, reliability and longevity, integration processes, transparency immutability, simplifying the ecosystem, efficiency, auditability, raceability, fast transactions, low fees (Niranjanamurthy et al., 2019).

Az Azrinudin Alidin, Abdo Ali Abdullah Ali-Wosabi, and Zamri Yusoff in 2018 with the title "Overview of Blockchain Implementation on Islamic Finance: Saadiqin "Experience”, the results of his research showed that Saadiqin's introduction to Blockchain was expected to bring about more effective and efficient operations, as well as data transactions carried out are much more secure, transparent, and auditable. If integration Saadiqin with this blockchain is successful, then other tools will be developed such as E-Dental and E-Nasab (Alidin et al., 2019).

A research of Dr. Mustafa Rabbani, Shahnawaz Khan, and Eleftherious Ioannis Thalassinos in 2020 with the title “FinTech, Blockchain, Islamic Finance: An Extensive Literature”, the results of this research showed the identification process of sharia obedience related to blockchain / cryptocurrency which was the biggest challenge for Islamic Fintech organizations and it has happened at this time. During their research, they found between Islamic Fintech and financial institutions acted as partners compared to other competitors. If financial institutions wanted to improve efficiency, transparency, and customer satisfaction then they should adopted fintech and cooperated with fintech companies (Rabbani et al., 2020).

From some of previous studies, it can be concluded that opportunities offered by blockchain to the Islamic banking sector provided some easiness in the field of operationalization to be more efficient, reliable, and integrated information. One of countries which applied this blockchain system to the Islamic banking sector was Saudi Arabia. They already assumed that blockchain had offers a number of features that were not offered by traditional banking systems. These features included transparency, trust, availability of resources, efficacy, availability and integrity of assets through general ledger. To apply transparency in the ledger, blockchain provided a public ledger that could not be tampered with (Abdeen et al., 2019).

In addition, in a study entitled “Sharia Analysis of Bitcoin, Cryptocurrency, and Blockchain”, concluded that blockchain was considered as boon for the requirements of transparency and disclosure in sharia, which had function to improve the understanding of trust in exchange and transfer transactions. It had function to enforce the principle of cash transactions in currency exchange and commodity (Abu-Bakar, 2017).

Therefore, seeing situation which done by this blockchain made researchers to further examine the role that blockchain had in Islamic banking, in this case, it would be examined, especially in Indonesia. Because, there were no researches related to the use of blockchain technology in Islamic banking for Indonesia yet, so that's why this study was conducted. It focused on Islamic banking in Indonesia. Due to the privilege which obtained from the blockchain technology, it had made researchers creating framework on aspects of blockchain technology with the aspects of financial institutions, especially Islamic banking when it was viewed from the state of Indonesia.

The selection of object of Islamic banking institutions was due to Islamic banking as an institution which system was based on a cooperation agreement (coorporation / partnership) and tend to avoid things which prohibited by Shari'a (Ascarya & Yumanita, 2005). Meanwhile, some of its cases in Indonesia, because Indonesia itself had big opportunity or huge opportunity to support the growth of blockchain technology in this country, although its implementation was still minimal based on several facts, including: as follows:

1. Establishment of institutions, such as blockchain sphere, which supported the integration of blockchain technology in various sectors.
2. The establishment of crypto markets, such as Indodax, and the release of Bappepti No.5th.2019 regarding the technical provisions for the implementation of physical market for crypto assets in the futures market as well as changes from the above regulations No.9 th.2019, and  
3. The inclusion of blockchain technology in the “Blueprint of Payment System of Indonesia 2025”.

For this reason, researchers here tried to analyze to find out what type of blockchain which was appropriate to be implemented in islamic banking, and also to know some points that would be found through the four SWOT methods (Strengths, Weaknesses, Opportunities, and Threats) when it was related with sharia banking in Indonesia. Based on several reasons that had been described above, the researchers were interested in conducting this research entitled “An Analysis of Strengths, Weaknesses, Opportunities, and Threats (SWOT) on the Use of Blockchain Technology in Islamic Banking in Indonesia”.

2 Literature Review

2.1 SWOT Analysis

SWOT analysis according to some experts, namely:

1. According to Freddy Rangkuti (2018), it is the identification process of various factors systematically to formulate corporate strategy. Analysis which done based on logic to maximize strength and opportunities, and can also minimize weaknesses (Weaknesses) and threats (Threats) (Rangkuti, 2018).

2. According to Kotler (2019), it is a comprehensive assessment of strength, weaknesses, opportunities, and threats to a company (Putra, 2020).

From those two definitions above, it can be concluded that SWOT analysis is a planning tool which done systematically and thoroughly to formulate company policies, through several shared concepts that include strengths, weaknesses, opportunities and threats.

SWOT analysis is considered as an analytical method used to describe the most basic of companies. Any organization or company which wanted to adopt a system, the surrounding factors, both internal and external, must firstly be analyzed and actualized into the SWOT matrix. This SWOT analysis aims to create a policy that has a positive value to the company in the future.

At first concept of SWOT analysis, it was dedicated by an expert named Albert Humphrey, who at that time was doing research at Stanford University in 1960s-1970s (Salusu, 1996). Humphrey and his research team used SOFT categories (Strength, Opportunities, Fault, and Threats) which was later changed to the acronym at the suggestion of Urick and Orr in 1964 at a conference under the name of SWOT (Strengths, Weaknesses, Opportunities, and Threats) (Fatimah, 2016), as is known.

There are 4 (four) kinds of indicators contained in the SWOT analysis, namely: in the form of Strengths, Weaknesses, Opportunities, and Threats. The explanation of some of those indicators, namely:

a. Strengths

   Strengths is a condition that describes internal strength of a company. This condition is at the most important point in the establishment of a company, because in this way the company can strengthen its image by making it as competitive advantage for its competitors. In addition, the presence of this element will strengthen trust of stakeholders.

b. Weakness

   Weaknesses is everything that can be a weakness or weaknesses in an organization. Basically, having a weakness is a normal thing in an organization. But the most important
thing is how organization builds a policy in order to minimize the weaknesses or can also take advantage of weaknesses to become strengths which other organizations do not have. These weaknesses can be lacking of facilities and infrastructure, the quality and ability of individuals in the organization, weak consumers' confidence, and so on.

c. Opportunities
Opportunities are conditions or things that are outside organizations/companies which are profitable and can be a tool in advancing the organization/company. The way to find out what external things are which can be used as an opportunity through comparing the internal analysis of organization which run by internal analysis of other competitors.

d. Threats
Threats are external conditions that can disturbed the operational process of organization/company. This condition contradicts with opportunities, include things which are not profitable for a company or organization. If a threat is not solved immediately, it can result in long term impact so that it becomes a barrier or obstacles in reaching the goal of an organizational/company goal.

These four assessments will indicate the formulation of right policy for organization/company which will be operated, by doing a comparative analysis between internal factors (Strengths and Weaknesses) and external factors (Opportunities and Threats).

Research on this SWOT analysis will later be formulated into SWOT matrix. The SWOT matrix is a tool used to compile the factors of company strategy. This matrix can clearly describe how the opportunities and External threats faced by company can be adjusted to the strengths and weaknesses of the company weakness that a company has. This matrix can produce four possible sets of alternative strategic, and it can be seen in the table below (Rangkuti, 2018):

| Internal | Strengths (S) | Weaknesses (W) |
|----------|--------------|----------------|
| **Opportunities** (O) | **Strategy S – O**  
Create a strategy which uses power to take the advantages of opportunities | **Strategy W-O**  
Create a strategy which minimizes weakness to take the advantages of opportunities |
| **Threats** (T) | **Strategy S – T**  
Create a strategy which uses power to overcome threats | **Strategy W – T**  
Create a strategy which minimizes weakness and avoid threat |

Based on the matrix SWOT model above, from both internal and external factors so that some strategies are formulated as follows (Rangkuti, 2018):

a. Strategy S – O  
This strategy is made using all of strength and make use of big opportunity.

b. Strategy W – O  
This strategy is implemented based on the use of existing opportunities with minimizing the existing weakness.

c. Strategy S – T  
This strategy is made using strength which owned by company to overcome threats.

d. Strategy W – T  
This strategy is based on activity which is devensive and it minimizes weakness and avoid the threats.
2.2 Blockchain Technology

*Blockchain* is divided into two words, namely "Block" which means Block and "Chain" which means chain. When it is merged, it becomes *Blockchain* which means block chain or *Chain of Blocks*. The block chain itself, each block which is in the block chain network and it is connected each other to form a chain, it is said so because each block containing transactions of both parties which consists of a cryptographic algorithm of previous block and the block will be connected each other until the most uptodated block.

*Blockchain* is referred to distributed ledger which connected through computer and it is based on a network system, where no one owns the data or a data controller that is centralized (single) in a place, but it spreads to whole peer-to-peer network of users. Even though these data spread all over network but everyone who makes a transaction will appear in an encryption that keeps it as secret, it is called as *blockchain* (Bashir, 2017). *Blockchain* is characterized as endurance of sensor mechanism, immutability, global, and has a network that has function as a validator called a *miner*, which manages it through rewards such as cryptotokens.

Some systems in the *blockchain* involve certain parts of *game theory* (such as the *Byzantine General Problem*) to reach consensus in decentralized network, where there is a possibility of the network being tampered by suspicious users (*bad users*). Proper mechanism to reach *immutability* depends on the intended application of the *blockchain* and its parameter, such as scalability and accessibility (Zīle & Strazdiņa, 2018).

At first, this technology was as the basis of the creation of the *cryptocurrency* "Bitcoin", but its wide use case does not focus on the *cryptocurrency* “Bitcoin” only. This term appeared by an *anonymous* person/group which called himself Satoshi Nakamoto (2008) in his paper entitled "peer-to-peer electronic cash system ", which lead to idea of creating a peer-to-peer -based electronic cash system (person per person). However, this idea is not the first time used by a person/group like Satoshi Nakamoto, but it had existed in the early days in using computers, one of which had been proposed by Ehrsam, Meyer, Smith, and Tuchman in 1976 they mentioned the same term, namely "cipher block chaining" which meant messages or information that are encrypted/encoded (Chuen & Low, 2018).

Some ideas which appears via *anonymous* named nakamoto satoshi and it is discussed until now by business people. In fact, financial institutions, such as financial institutions, especially Islamic banking starts to look at the use of this technology in its institution in order to create an effective and efficient payment system.

In short, *Blockchain* is a specific type of data structure which used in multiple distributed ledgers that store and transmit data in package, called blocks that are connected to one another in digital chain. Cryptographic and algorithmic methods were used and it was used to record data from across networks in an immutable way.

If it is viewed historically, when various parties need some data then it will automatically ask the parties who have the data, namely someone who control and are trusted to hold data and called as third parties. A classic example is the use of clearing services that still use centralized data (the golden sources) regarding the trade between two entities. The role of *blockchain* here is to empower the parties (participants) to agree on activities without requiring third parties, and its records will be directly stored on the network (Mohamed & Ali, 2019). In this kind of scope, it makes *blockchain* look like a new technology that has instantaneous record.

*Blockchain* was created as an open distributed ledger technology and transparent and able to solve problems related to *Double Spending* for digital currency without the need for a trusted authority (Chuen & Low, 2018). Behind this, the concept of distributed system contained in *blockchain* devices, is not a new concept in the circles of *information technology* (IT). The term is used by a mathematician named *David Chaum* and used as
an electronic cash (E-Cash) model. He used the term at his seminar in 1984 with the main aim to solve problems which caused by E-Cash namely accountability and anonymity, in his paper, he introduced two operationalization concepts through cryptography which called blind signature (a concept that makes it possible to sign documents electronic) electronically and secret sharing (a concept that makes it possible to detect the use of same token or double spending). The management of e-cash concept creates efficient management with a security system that is difficult to hack (Bashir, 2017).

A different but relevant concept to the blockchain, namely HashCash, which introduced by Adam Back in 1997 as a proof of work (PoW) to control spam e-mail (Bashir, 2017). Then, in 1998 b-money was introduced by Wei Dai, he proposed making money through computational puzzles, such as Hashcash. This money is based on a peer-to-peer network where each node/person who managed their own transactions. Another similar idea came from a guy named Nick Szabo with a currency named BitGold in 2005, he also proposed computational puzzles for digital currency creation (Muedini, 2018). In the same year, Hal Finney introduced the concept of currency based on cryptography, by combining the ideas of b-money and Hashcash puzzles but it still relied on central authority. There are some problems.

With the scheme that has been described previously, the problem was about no solution for clear agreement between nodes to rely on a centralized authority (Bashir, 2017).

In the blockchain, there are at least three levels, including (Bashir, 2017):

a. **Blockchain 1.0**

Blockchain at this stage is the first generation of blockchain, namely technology who appeared as actors behind the scenes and as the first generation of digital money, such as Cryptocurrency (crypto currency) (Yulianton et al., 2018). All currency categories, like crypto or Bitcoin belongs to the Blockchain 1.0 category. This category is a major application, such as payments.

b. **Blockchain 2.0**

This Blockchain 2.0 generation is used by financial services, and the term of smart contract was first introduced in this generation. It includes various assets of financial assets, such as derivatives, options, foreign exchange (swaps), and bonds. Some application behind currency, finance, and sttime belong to this category.

c. **Blockchain 3.0**

Blockchain 3.0 generation is used to implement some applications behind the financial services and it is used in industrial terms for some general purposes, such as government, health, media, arts, and courts.

Whereas if it is seen from the way blockchain has developed in recent years, it can be divided into several types, namely:

a. **Public Blockchain (Permissionless Blockchain)**

As its name, this blockchain is opened to public and anyone can participate as nodes in the decision-making process (mining) or so-called as a consensus process. This ledger is not owned by a single authority but spread all over network in which the users participate in it. This Blockchain is known as a Permissionless Ledger (Bashir, 2017). The consensus process determines the blocks which will be added to the chain and determines the condition of block chain that there is available right now. In a public blockchain, compared to the use of a server that centralized, blockchain secured by cryptographic keys which supported by incentives of miners. Anyone can become miners to collect and publish their transactions. Because in public blockchain, no one is implicitly trusted to verify transactions, all users follow an algorithm that can verify transactions by committing software and hardware resources to solve cryptographic puzzles (the brute force). Successful miner who complete the puzzle at the first time will be given a reward,
and each way of solving the puzzle, along with the transactions used to verify it, forming the basis for next problem that must be solved. The consensus concept called as Proof-of-Work (POW) or proof-of-Stake (PoS) (Bambara et al., 2018). Proof of Work (PoW) is unsustainable in hardware and energy. It's easy to convince yourself that Proof of Work is fair enough, because it does not really depend on the communication method of network, apart from the simple requirement that all systems finally reached. Then, random computational problems took over the control mechanism in a very fast time. In the case of a fully dependent protocol on (usually very logically complex) communication protocols, fairness and even alignments are not easy to be seen at all. Vulnerabilities are very likely to appear from time to time. It is very possible that even one individual can take network transfer if the individual is highly intelligent and understands the protocol, while Proof of Stake (PoS) is almost a substitute for Proof of Work which is currently adopted by many systems. However, Blockchain Innovations position showed that Proof of Stake only avoids the main problem of security system (Wolfskehl, 2018).

b. Permissioned Blockchain, which is divided into two, namely (Bambara et al., 2018):

1) Blockchain Consortium or also called as hybrid blockchain, such as R3 i.e. a distributed ledger in which the consensus process is governed by selected nodes while the right to read/view the ledger is public (can be seen by all network participants). Such Blockchain is a ledger that can be considered as “decentralized” partially or partially decentralized).

2) Private Blockchain

Private Blockchain is a ledger that is private and only be opened to selected members or groups in the network. In other words, the function of this blockchain remains centralized but its permissions to read it, it is public or limited to members/parties which has been elected in the network.

2.3 Sharia Banking

Islamic Banking is an institution that is based on the principles of the Qur'an within its objectives and operations. Thus, they were separated from 'conventional' institutions, which do not have duties like those conventional banks. This definition is more than equating Islamic finance with 'free-interest' banking. It makes it possible to take into account possible or impossible operations which are free from interest, but still used certain Islamic principles: the avoidance of usury (in the broad sense of unjustifiable increase) and gharar (uncertainty, risk, speculation); focus on halal activities (religiously permissible); and more generally to seek justice, and other ethical and religious things.

Two aspects of Islamic finance should be chosen, among them: (1) Risk sharing philosophy: The lender must share the borrower's risk. Because fixed interest rate that has been pre-determined guarantees a return to the lender and falls automatically disproportionately to borrowers, they are seen as exploitative, socially unproductive and economically wasteful. The preferred mode of financing is profit sharing (profit-and-loss sharing/PLS); (2) Economic promotion and social development through practice special business and through zakat (alms). Most but not all of Islamic institutions have a Shariah board – a religious advisory committee who ask opinions on acceptance of new instruments, and conducting religious audits of bank activities – as well as other features that reflect their religious status. In short, the difference which determined is about 'conventional' finance that usually seeks profit maximization within a certain regulatory framework, Islamic finance is also guided by other goals which based on religious value (Warde, 2000).

Another definition states that Islamic banking is a financial service which provides a variety of products and services by prioritizing good sharia principles in raising funds and distributing funds to achieve economic democracy which is based on a partnership between
the two parties (*shahibul maal* and *mudharib*). In running its operations, Islamic banking is based on five principles, namely (Yusmad, 2018):

1. Free from *usury* (*Interest Rate*)
   It proves that any return of the loan rate that has been previously determined is prohibited. Then, the prohibition of interest rate comes from Al-Qur'an and Hadith, namely QS. Al- Baqarah: 278 (Lawal, 2019).

2. Free from *mayshir*
   Uncertainty/speculation is illegal. Sharia banking clearly prohibits various transactions that are involved speculation (*gambling*), It clearly stated in QS. Al-Maidah: 90 (Lawal, 2019).

3. Free from *gharar*
4. Free from *wrongdoing*
5. Free from things that are prohibited by Shari’a, both concerning the object as well as the party which doing the transaction.

Islamic banking and finance is based on the principle that prohibits investment in unethical business or business which by prohibited commodities. It means only support practices or products which are based on Shari’a. For example, trading alcohol, or pork is forbidden as stated in QS: Al-Maidah: 3 (Lawal, 2019).

To avoid those five principles above, Islamic banking is directly supervised by sharia supervisory board (DPS) under the national sharia board (DSN-MUI) guided by the fatwas that have been issued by the DSN-MUI.

In terms of good running of the management system which based on the fatwas of DSN-MUI, internal control is also carried out by company in the form of supervision mechanism which determined by bank management to maintain bank assets, ensure correct and accurate reports, increase the obedience sense with applicable regulations, minimizing the impact of a loss of fraud and irregularities, and improve organizational effectiveness.

This internal control is very necessary to be owned by bank management because: internal control is used as a benchmark in the bank's performance mechanism. In its application, certain application devices will be used in computer field and depend on the type of its use, which served as a supporter of the smoothness of the operation of banking system include recording, calculating, summarizing, classifying, and reporting of all activities in banking sector.

The use of these devices is regulated by Bank Indonesia (BI) which has authority in monetary policy that issues provisions regarding the use of Information System Technology (TSI) by the bank, namely through the Decree of the Board of Directors of Bank Indonesia, Number 27/164/KEP/DIR and Circular Letter of Bank Indonesia Number 27/9/UPPB, each issued on March 31, 1995, it explained about some principles which needs to be considered by bank management in the implementation of TSI (Sobana, 2019).

### 3 Method

Descriptive qualitative method with a *library research* approach was used as research method here. Qualitative descriptive research is a research that prioritizes a systematic analysis of problems which is in the form of current facts from a population that is tested without using statistical media (Sangadji, 2010). While a research with literature study is a research that look for data or information related to the problem to be studied through documents on the internet. In this case, researchers looked for documents that had been done by other researchers, which discussed about the use of *blockchain* technology in banking field. Because data or information spread over the network. In such circumstances, the researcher's ability to find relationship among data, facts, and information which obtained by relating it to the problem study is needed (Irina, 2017). However, if it is classified according
to the FC Dane theory, this study also included in exploratory research, namely research that is done to find out cause and effect of an event or occurrence (Sangadji, 2010).

The data collection technique which used was a documentation study sourced from online searches of various educational journals and institutions, especially some studies related blockchain technology. Documentation studies are data obtained from or in the form of document. These documents are all materials in written form and they were made by other researchers, in this case in the form of notes either in hardcopy (media print) and softcopy (online media) (Sarosa, 2017).

Documents used in this research is in the form of books that have been published by publishers, journals and other works scientific papers, working papers from related organizations, as well as articles that support this research.

Table 2. The Sources of Documents used as Research

| Source                          | Quantity |
|--------------------------------|----------|
| Lainnya                        |          |
| McKinsey                       |          |
| EY                             |          |
| IBM                            |          |
| Deloitte                       |          |
| Accenture                      |          |
| Bank for International Settlement (BIS) |          |
| ResearchGate                   |          |
| ScienceDirect                  |          |
| Journal Universities Oxford    |          |
| Google Scholar                 |          |

Source: Processed Secondary Data, 2021

The Miles and Huberman method which consists of from data reduction, data presentation, and making conclusions (Sangadji, 2010). This technique is a step in carrying out the process of organizing and sorting data into data patterns, categories, and basic units of description so that themes can be found and can be formulated conclusions or work results as stated in the data.

In the data analysis technique, the researcher traces the circulating data/documents in online media, either through journals or through publications from institutions that studying blockchain technology. Due to the circulating data/documents produce a large amount of data, the researcher reduces the data/document with the words “Banking Blockchain” key. As a result, the researchers found that at least, the total of 137 pieces. Then, among the documents, it can be classified into several categories, namely classification for 59 journals, Working Papers 15 pieces, 11 whitepaper reports which published by organizations and discusses blockchain related to banking as many as 17 pieces, and the last one is 35 articles and other websites on blockchain.
There are documents which sourced from journals, and researchers take sources from journals that consists of Google Scholar, Researchgate, ScienceDirect, and the University of Oxford Journal. Meanwhile, documents sourced from institutions that publish articles in the form of technology Blockchain comes from IBM, Accenture, McKinsey, firm Ernst & Young (EY), and Bank for International Settlements (BIS). Then there are documents which sourced from Working Paper and Whitepaper, for documents sourced from Working papers and The researcher's white paper was taken through a random technique on the internet which has linkages with blockchain technology with banking institutions. As for the research flow what is done is as follows:

**Table 4.** The Technical Flow of Data Analysis of Research
4 Result and Discussion

4.1 The Use of Blockchain Technology in Islamic Banking

In the previous discussion, it was explained that Blockchain is a type of distributed ledger which recorded in real-time without use intermediaries. This technology is connected via a link so that changes cannot occur, and if there is a change, it must be based on the approval of the parties concerned along the network. Therefore, cooperation between other parties is needed in recording process (consensus).

Among the party’s primary motivation of Islamic banking in using blockchain in institutions are by: (1) Reducing the cost and value of transfers. Syariah banking usually cost a lot of money in a centralized database, since sales and maintenance costs is very high. On the other hand, bookkeeping and performance of operational are added to labor costs and the risk of human error (human error-risk). Blockchain can solve these problems, so that from the use of decentralization and automation of database can build banking models at low level cost and transparency and without much cost; (2) Can control risk more effectively; and (3) Finding more innovative ways to earn more. In the current case that prioritizing competitive competition, banks must seek innovative efforts and it is also advantageous to develop financial products and open markets. Meanwhile, the objectives of the use case in Islamic banking institutions are:

1) To have better understanding about customers and potential money laundering risks; and
2) Will change all business model for all parties involved in transactions and improve business efficiency (Chang et al., 2020). According to Witold Nowinski, he also found that blockchain technology influence various dimensions in the business model (Nowiński & Kozma, 2017). It will make most countries even more productive, and it can be seen from savings effort and time (Manda & Polisetty, 2018). By adopting blockchain, it will reduce various efforts resulting from the threat of database hacking, as transactions will be verified by each node of chain, and it will make transactions more safer so that make the banking system as a whole faster and safer (Hassan et al., 2018).

| Table 5. Blockchain Types |
|---------------------------|
| Public Blockchain | Private Blockchain | Consortium Blockchain |
| **Blockchain** | **Public database** where every participants can access databases and have the right to read, write or modify it as long as he follow the rules and the changes acceptable by another. | Only certain parties allowed (permissioned) in seeing and modify the ledger so that new record that will be added must be checked through the process limited consensus, what makes Verification process fast and more efficient. | Only parties allowed (permissioned) that have right to write and modify notes, while that others can only view the contents of Ledger. |
| **Permissionless Blockchain** | **Permissioned Blockchain** |
| Blockchain 1.0 | Blockchain 2.0 | Blockchain 3.0 |

Source: Processed secondary data, 2021
It is because the service of service products is the most suitable service to be implemented by *blockchain* technology. Thus, to make it easier in understanding the *blockchain* technology design, researchers here make a chart of the types of these technologies, as in table 5.

From the table 5, it can be concluded that the most relevant to be implemented in Islamic banking is *Permissioned* section of *Blockchain* in the field of *Private Blockchain* or shortened to *private permissioned blockchain* (Kulkarni & Singh, 2019). *Private permissioned blockchain* is the most relevant system because only certain parties can view and modify the ledger. This is in accordance with the image of Islamic banking which has the nature of confidentiality towards customers' data so that it also ensures the reliability and create protection towards their data compared to other types of *blockchain*. In addition, transaction process which is done much faster because it reduces the number of *nodes* needed to consensus. Thus, it still maintain the secrecy of Islamic banking itself. This is also as expressed in the *economic studies* paper entitled *Using Blockchain in Financial Services* and in the *Mastering Blockchain* book (Bashir, 2017), that *private permissioned blockchain* is a suitable system to be used in financial and government services.

However, a thing that became main concern was that one of the causes why *blockchain* couldn't be *hacked* because of its nature which distributed throughout the network *nodes* *Blockchain* with *permissioned* type can't do it, *permissioned blockchain* is more concentrated in terms of ownership. This type is good for banking sharia but reduce the functions of nature characteristics of *blockchain* technology itself. The nature is decentralized, using *permissioned blockchain* features, it is assumed that the recorded data will be distributed to certain parties along the network.

In addition, *Permissioned blockchain* can present significant challenges such as the main problem which lies on volatility and business continuity, because perhaps there is no guarantee that the network will continue to operate or can be maintained in long-term. Therefore, there will be questions which may arise regarding the entity which one is reliable enough as a node of the *blockchain*, so that to ensure preservation of long-term transactions without exposing data to market fluctuations or token speculation. To overcome the problem of volatility and ensure platform trust systemically, especially for sensitive sectors, such as finance for example, which are intolerant towards the service disturbance. One solution is to involve parties such as *Trust Service Providers* (TSP) as the only full node that can verify network transactions (Atzori, 2018).

Trust Service Provider (TSP) is a high quality marketplace operator with the European Union (EU) trust, appointed by European government agencies after strict conformity assessment according to EU Regulation No. 910/2014 – eIDAS. Some services that are provided were usually the creation, verification and validation of electronic signature, stamp, and digital certificate; and management of electronic storage and document archiving (Atzori, 2018). While in Indonesia itself, some services as Trust Service This provider (TSP) is like the Financial Services Authority (OJK).

In the case of Islamic banking, there are several cases of the use of *Blockchain in Islamic banking* institutions based on the documents that have been analyzed by other researchers, among many products and services found in banking, sharia, researchers found criteria that matched the use of the technology based on the article presented by Elasrag (2019), among several cases especially about the use which can be applied in Islamic banking are as follows:

1. **Smart Contract**

   *Smart Contracts* or automated contracts has important role in its mechanism. The contract can do its duties when it receives information from the party which operates it. *Blockchain* is expected to help fulfill several tasks, such as: (1) Record transactions between the two parties, and (2) Protect information user. On the other hand, the main tasks of the *smart*
contract platform are: (1) Providing range of contracts to meet the needs of its mechanism, and (2) Execute orders based on information received by both parties (Ajouz et al., 2020). Smart Contract in blockchain is a good effort to ensure that products and services are based on sharia and this allows the integration of various kinds of terms and conditions in the contract. One of the forms that recommended from the use of smart contracts is an attempt to avoid fast interest rate growth, it will help to reduce uncertainty and speculation. By having the capacity to promote efficiency and productivity while saving is significant costs used by traditional contracts. In addition, it also removes role of involvement people directly, and establish contractual relationships that are efficient and economical with less potential for error, misunderstandings, and delays by technical aspects.

2. Digital Currency
There are various types of available digital currencies but currency development, especially digital money is not as easy as one might think. This development requires complete process for managing services. Therefore, kind of like money increases security and different rewards to miners. Several literature studies argue that mining process in blockchain has created value for bitcoin and digital currencies, since the effort made in issuing the currency, then bitcoin and other currencies or digital money holds an element of value in that currency. Blockchain application towards transaction will increase the efficiency in securities and derivatives (Kabuye, 2019).

3. Cloud Storage
Access to Cloud storage will be the biggest attraction in sharia banking. It can reduce various kinds of disputes and help customers to manage their cooperative relationship. Algorithm cryptographic mathematics in cloud storage will provide access to all information, and store all important data that can be accessed by the bank and customers to avoid various problems. Cloud storage model determines how digital data are stored and can be retrieved on various servers which may be geographically located in different locations and managed by other people.

4. Remittance
Islamic banking globally adopts various digital banking services to achieve accuracy, security, speed in processing, and low-cost processing for remittances, namely by peer-to-peer transactions, business to business, business to individual, and e-commerce. To make it real lower remittance fees, blockchain technology is used openly and transparent.

5. Smart Sukuk
The sukuk market is one of the most favourite market in Islamic finance, but smart sukuk has different features from conventional sukuk. The structure in smart sukuk that use blockchain technology will make performance more efficient, transparent, reduce costs, and provide convenience for businesses micro, small and medium enterprises (MSMEs) to release their own sukuk using new technology. Two of the first common cases of using blockchain technology on financial services that are often discussed by researchers, regulators, and various people/groups who are interested in the technology. And the rest is applications that will be possible from its use in Islamic banking, and many more that can be applied to Islamic banking institutions.

Meanwhile, when viewed in general, the appropriate field to be implemented blockchain technology towards Islamic banking, are as follows (Cocco et al., 2017):

1. Payment (payment)
Everyone needs cash transactions as a medium of exchange most importantly, to buy goods and services. And bank as intermediary has developed a variety of payment methods for facilitate the exchange of money, with the aim of smoothing the flow of the economy. By using blockchain technology it is possible to eliminates the need for use in
the clearing process, improves efficiency, relatively low cost, and relatively short time. Other than that, a document automation, real-time settlement of transactions, track transactions real-time, and preventing fraud is also the use of implementation blockchain against Islamic banking in the field of payments (Shah & Jani, 2018).

2. Trade finance

There are complex networks that managed by multiple intermediaries, including banks, payment networks, stock exchanges, money transfer services, regulators, etc., generate some delay and record crime at every level and increase the burden finance across the value chain. By using blockchain you can streamline these complex processes into more instant and time measures very short journey. Some examples of technology use in cases of blockchain in the field of trade finance like digital contracts, cross-border transactions, real-time payments and settlements, digital assets.

3. Regulatory compliance

Having a record, will have convenience for regulators to implement their performance functions such as money laundering (anti-money laundering / AML) and Know-Your-Customer (KYC) (Karanam et al., 2020), tax evasion, and terrorism financing. Wide range of products to be integrated into blockchain technology, according to researchers, it depend on the nature of such Islamic banking to be applied in products of Islamic banking. Some products that are integrated into Islamic banking, it will be a new product type in the future. The following is the result of SWOT matrix of the use of blockchain technology toward Sharia banking in Indonesia:

Table 6. SWOT Analysis of the Use of Blockchain Technology in Banking Sharia in Indonesia

| STRENGTHS                                      | WEAKNESSES                                      |
|------------------------------------------------|-------------------------------------------------|
| 1. Launching peer-to-peer transactions        | 1. Eliminate number of intermediaries finance   |
| 2. The solution of problems of double spending| 2. Integration fee too significant               |
| 3. Simplifying financial processes, and shorten time | 3. Lack of qualification academic               |
| 4. Generate transparency level and reduce fraud|                                                 |
| 5. Facilitate recording and tracking ownership |                                                 |
| 6. Stakeholders can view the transaction bookeeping complete |       |
| 7. Reducing settlement costs can increase profitability |       |

| OPPORTUNITIES                                    | THREATS                                         |
|-------------------------------------------------|-------------------------------------------------|
| 1. Improved efficiency of financial transactions| 1. Eliminate multiple roles in payment field     |
| 2. Reduce opportunities for HR errors in accounting| 2. Changing the structure of business model     |
| 3. Reduce transaction delay                       | 3. Permissioned capacity blockchain more large, and scale storage that more centralized |
| 4. Increase transparency                          | 4. Have a chance in crime                       |
| 5. Facilitate cross-border payments and improve back-office infrastructure |       |
| 6. Increase financial inclusion                   |                                                 |
| 7. Reporting McKinsey institution states that costs such as cross-border payments can be reduced |       |
| 8. Regulators can test using regulatory sandbox (Zhang, 2020) |       |
| 9. The potential of Indonesia in the development of blockchain technology |       |
Table 7. The SWOT Strategy in Using Blockchain Technology in Sharia Banking of Sharia in Indonesia

| STRATEGY S – O | W – O. STRATEGY |
|----------------|-----------------|
| With the blockchain will make infrastructure management, Islamic banking is increasing. It will make reputation / views related to Islamic banking around society is more optimal and public interest in banking Sharia also increased. | 1. Provide education or technology related blockchain training for the Internal agent of Sharia banking |
| | 2. Cooperate with several senior company everyday |

| STRATEGY S – T | W – T. STRATEGY |
|----------------|-----------------|
| 1. Operational level becomes effective and efficient |
| 2. Reduce complicated performance |
| 3. Minimize the risk of crime | Although there are many benefits from the ecosystem blockchain. However there will be integration towards sharia banking sector and it id still not sufficient. In this case, there is still some necessary performance evaluated first to produce good performance. Besides, the absence qualified HR too to become the main obstacle of this technology. |

5 Conclusion

In case of its use in Islamic banking service institutions, the categories The blockchain used is a permissioned blockchain. Permissioned blockchain is a recording system that is private or only a certain group of people who can write/access data in Islamic banking. This category is divided again into 2 (two) parts, namely private and consortium. Private are parties who are allowed to view and modify the ledger, while the consortium are permitted parties who can modify temporary general ledger that other only given the right to view the contents of the ledger. This types of application In Islamic banking, then, there are several options, namely Smart Contracts, Digital currency, Cloud Storage, Remittance, Smart Sukuk. But if is viewed in general, the scope of the application model of blockchain technology in Islamic banking is on the service product and services that includes three fields, namely Payments, Trade Finance, Regulatory Compliance.

This research only focuses on the study of documentation from various studies which carried out by other studies and various published articles related to blockchain technology. This research was only conducted to determine the SWOT method of various sources of documentation conducted by researchers around the world and relate it to aspects of Islamic banking. In the case of its use in sharia banking itself, according to Islamic banking researchers, the use of blockchain with type of permissioned blockchain can be used because this type has potential to guarantee the confidentiality of customers' data so that it can create reliability for sharia banking. Therefore, for further research, it is hoped that it can include: various considerations regarding the stakeholders in Islamic banking in Indonesia towards blockchain technology, and if it has been implemented into Islamic banking, further research can examine the influence of that technology on islamic banking.
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