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An Exploratory study of Anti-Corruption Policy Using Blockchain

블록체인을 활용한 부패방지정책에 관한 탐색적 연구

Min, Kyoung Sun(민 경 선)*

국문초록

블록체인의 활용에 관한 연구는 다양한 분야에서 증가하고 있으며, 블록체인의 위변조 불가능성으로 인해 부패방지영역에서도 논의가 시작되고 있다. 블록체인을 활용한 부패방지정책에 관해 다음과 같은 연구질문을 생각해볼 수 있다. 블록체인은 부패방지를 위한 새로운 도구로 활용될 수 있을 것인가? 블록체인을 활용한 부패방지정책이 기존의 정책과 어떻게 다르며, 어떤 장점이 있는가? 블록체인을 활용한 부패방지정책을 도입하기 위해 필요한 조건은 무엇인가? 블록체인을 활용한 부패방지정책에 부정적인 측면은 없는가? 이 연구에서는 이러한 연구질문에 대한 시론적인 답을 제시하고자 하였다. 연구질문에 대한 답을 찾기 위해 기존의 문헌 중 인도네시아, 남아프리카, 중국을 대상으로 사례분석을 시도한 연구를 선별하여 심층분석을 하였다. 또한, 부패를 금전적 거래가 수반된 부패와 금전적 거래가 수반된지 않은 부패로 구분하여 블록체인을 활용한 부패방지정책의 활용가능성을 평가하였다. 아울러, 부패방지정책을 사전적 정책과 사후적 정책으로 구분하여 블록체인의 활용가능성을 검토하였다. 이러한 작업의 결과로 다음과 같은 주장을 제시하였다. 첫째, 블록체인은 금전적 거래가 수반된 부패에 있어서 부패방지 도구로 활용될 수 있기에 조달행정 및 부패방지감사에 적합하다. 둘째, 블록체인기술은 사전적 부패방지 뿐만 아니라 사후적 부패방지 도구로도 활용이 가능하다. 셋째, 블록체인 기반의 부패방지정책은 기존의 부패방지정책에 비해 비용을 절감하고 부패에 대한 억제력이 높을 것으로 예상되어 후진국에 도입할 경우 효과가 클 것으로 전망한다. 넷째, 블록체인 기반의 부패방지정책이 제대로 작동하기 위해서는 국가의 금전적 거래시스템 전반에 도입되어야 하고 공직자의 블록체인에 대한 이해가 선행되어야 한다. 마지막으로, 블록체인은 하나의 부패방지정책이 될 수 있을 뿐이지 부패를 완전히 제거할 수 있는 만병통치약이 아님을 알고 기술만능주의에 빠지는 것을 경계해야 한다.

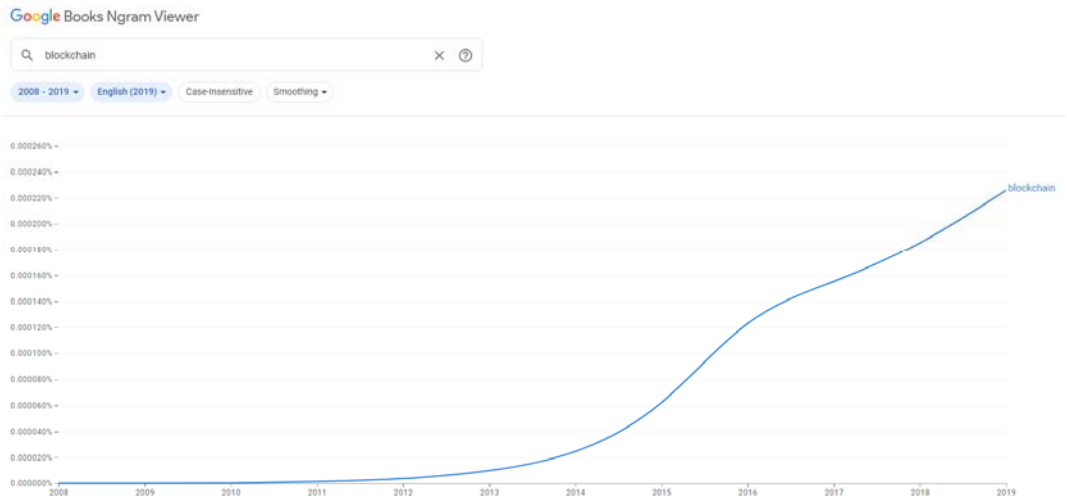
주제어: 감사, 부패, 부패방지, 블록체인, 조달행정

* 경찰대학 행정학과 조교수, 행정학박사

Ⅰ. Introduction

Since Satoshi Nakamoto (2008) published a thesis on blockchain, many studies on blockchain have been published. Blockchain can be defined as “a peer-to-peer distributed timestamp server to generate computational proof of the chronological order of transactions” (Nakamoto, 2008). Nakamoto (2008) is not the first author to mention blockchain, and he did not mention blockchain in his paper but introduced Bitcoin. Nevertheless, since Nakamoto's research, interest in Bitcoin has increased exponentially, and blockchain research has become more active. Figure 1, the Google Ngram Viewer Search Result, shows that since 2008, numerous publications have consistently addressed blockchain.

〈 Figure 1: Google Ngram Viewer Search Result – Blockchain 〉



Blockchain research can be broadly divided into research on the blockchain technology itself and the use of blockchain. For example, Nofer, Gomber, Hinz, and Schiereck (2017) explained blockchain technology with examples and showed that this technology can be used in areas such as insurance, copyright, and anti-counterfeiting. Research on the use of blockchain was initially focused on applying it to financial transactions based on the tamper-proof characteristics of blockchain. Researchers are currently discovering various fields that can utilize the characteristics of blockchain, one of which is the field of anti-corruption.

Several research questions can be presented that link blockchain and anti-corruption. Could blockchain be a new approach to anti-corruption? What are the advantages of using blockchain as an anti-corruption tool compared to existing anti-corruption policies? What are the conditions necessary for blockchain to be used as an anti-corruption tool? Are there any negative side effects to be concerned about when blockchain is used as an anti-corruption tool? These questions are expected to increase in importance with the development of blockchain, but have not been sufficiently studied yet.

It will be difficult for this study to provide in-depth answers to these research questions based on empirical evidence due to a lack of data and cases. Despite this limitation, this paper intends to carry out basic preceding research that can answer these questions by conducting in-depth literature research on the existing literature. This study seeks to answer the following research questions. How can blockchain technology be used to prevent corruption? What type of corruption can blockchain technology effectively control?

This paper points out that blockchain technology is effective in controlling classic corruption, such as embezzlement and breach of trust in procurement administration. In pursuit of this objective, blockchain technology can be used for auditing. To use blockchain technology in anti-corruption audits, we should implement blockchain technology in administration involving financial transactions, and auditors must understand blockchain technology. To this end, blockchain technology education for public officials is necessary.

One thing that is overlooked by studies on the applicability of existing blockchain in anti-corruption policies is that blockchain can only be a tool for preventing corruption, but it is not a panacea for eliminating corruption. If this point is overlooked and over-reliance on blockchain is made, or if the introduction of blockchain becomes the purpose of anti-corruption policy design rather than an anti-corruption tool, the introduction of blockchain may not reduce corruption. Then, the disappointing results of blockchain adoption can lead to people's resistance to blockchain technology in the anti-corruption area.

This paper develops the discussion as follows. First, a basic conceptual definition of blockchain and corruption is presented. Types of corruption and anti-corruption policies are also explained. Next, literature review discussing anti-corruption policies through blockchain technology are shown. Finally, based on literature research, this paper will

discuss methods and conditions for using blockchain in anti-corruption policies.

Ⅱ. Blockchain, Corruption, Anti-Corruption Policies

1. Definition of Blockchain

Blockchain can be construed as a distributed ledger technology that runs on a point-to-point network, enabling confidence between unidentified parties inside the system and frictionless payment without the need for human involvement (Nakamoto, 2008). It means that blockchain can be an electronic transaction system that does not rely on a trusted third party. Its foundation is to ensure that the exchange of decentralized information and data is stored in a secure way to enable accountability, transparency, and efficiency (Rauchs et al., 2018). Purpose of blockchain technology was to time stamp documents. Since they were created to be used for approving legal papers, they cannot be altered once they have been properly acknowledged and signed (Ogunlela, Ojugbele, and Tengeh, 2021).

The characteristics of blockchain can be summarized as follows. The first feature of blockchain is decentralization. A blockchain runs on a decentralized network of computers, in contrast to traditional centralized systems. Each node in the network holds a copy of the full blockchain, preventing total system control by any one entity. Theoretically, decentralized systems are not easier to censor and govern than centralized ones (De Filippi, 2016).

Second, blockchain has a unique data structure. Blockchain stores data in blocks, each of which contains a group of transactions or other information. A chain is created when each block has a “hash” that uniquely identifies its contents and a reference to the hash of the previous block (Yang et al., 2018).

Finally, transparency is an important feature of blockchain. By enabling anybody to observe the whole transaction history kept on the blockchain, blockchain technology promotes transparency. Although the participants′ real names may be concealed behind pseudonyms, the data is transparent (Sunny, Undralla, and Pillai, 2020).

2. Definition of Corruption

There have been ongoing discussions on what constitutes corruption, and no one has come to a consensus on a single definition. This disagreement is being held for many different reasons. First, several types of corruption exist. Some people envision a single act of bribery when they think of corruption, while others envision the general decline of society. Otherwise, to put it another way, corruption "ranges from simple misuse of bureaucratic power by government officials to redirection of a country's wealth for the benefit of those in positions of power" (Jain, 1998, p. 3).

Debates about corruption are connected to normative issues (Johnston, 2005). Consequently, there is a discretionary element to understanding corruption. Because corruption is viewed differently depending on the environment of the country where the discussion of corruption takes place, the discretionary component is essential (Lambsdorff, 2007). People in one country might view a public official's poor behavior as criminal and corrupt, whereas people in another country would view the same behavior as appropriate for a public official.

For these reasons, a good definition of corruption, satisfying every scholar, remains elusive. There is no perfect definition that can apply to every analysis of corruption. However, for the purpose of this paper, a simple definition might be enough to understand the impact of blockchain on corruption. Corruption can be understood as "the misuse of public power for private gain" (Theobald, 1990, p. 2). Today, corruption may be found in both the governmental and private sectors. However, this study focuses on corruption in public sector for the convenience of discussion.

3. Types of Corruption

There are various standards for types of corruption, but this paper will first discuss the most widely known types of corruption: petty corruption and grand corruption. Numerous authors explain the distinction between petty and grand corruption. However, neither term has a concrete, consistent definition. This unclearness is due to two factors. First, there is no distinct point along the continuum that distinguishes between petty and grand corruption (Sindzingre, 2002). Second, petty corruption and grand corruption are typically linked (Della Porta & Vannucci, 1999). Therefore, it is difficult to distinguish between petty and grand corruption.

Although it is not easy to differentiate between petty and grand corruption, some scholars argue that distinct definitions of the two corruption are required. They suggested some definitions for making distinction. Heidenheimer (1989) stated, “Petty corruption refers to bending of official rules in favor of friends, as manifested in the somewhat untruthful reporting of details, the ignoring of cut-off dates, the “fixing” of parking tickets, and so on” (p. 150). Byrne (2013) explained, “Grand corruption is at the top levels of the public sphere, where policies and rules are formulated in the first place” (p. 209).

Corruption can also be classified by other criteria. It is also divided into political corruption and bureaucratic corruption (Morris, 2011). Political corruption refers to political elites becoming corrupt actors and committing corrupt acts. For example, there may be corruption related to defense industry purchases involving members of the National Assembly. Bureaucratic corruption refers to cases where the perpetrator of a corrupt act is a bureaucrat. For example, there is a case where a bureaucrat intervenes in the government procurement process and receives a bribe. Typically, political corruption is often grand corruption, and bureaucratic corruption is relatively often petty corruption. In particular, most of the corruption committed by low-ranking officials is petty corruption. However, corruption involving high-ranking officials is often grand corruption, and high-ranking officials and politicians sometimes commit corruption together. Also, even if a politician is involved, if an aide or secretary is exploited for a small amount of money, this can be considered political corruption as well as petty corruption. In other words, a scandal can be both bureaucratic corruption and grand corruption, or political corruption and petty corruption.

Bribery and extortion are representative types of corruption (Morris, 2011). Bribery is usually a transaction between a provider and a recipient. It is often carried out because both parties want to do so. However, extortion occurs when those in power plunder those without power. In this case, the exploiter profits and the exploited suffers a loss, so the transaction is not carried out because both parties want it, but is carried out unilaterally by the exploiter.

To discuss the applicability of blockchain to corruption prevention, this study proposes a classification based on a criterion slightly different from the previously discussed classification. It can be divided into corruption involving financial transactions and non-monetary transactions. Corruption involving financial transactions can include bribery and embezzlement. Corruption involving non-monetary transactions may

include employment corruption related to relatives or personal use of public property.

3. Types of Anti-Corruption Policies

Anti-corruption experts have devised various policies (Altamirano, 2007). As anti-corruption policies have evolved, policymakers have acknowledged the need for a more comprehensive strategy to combat corruption. It implies that numerous anti-corruption policies should be adopted and implemented concurrently.

Anti-corruption policies have evolved into various categories. According to Meagher (2004), there are four categories of anti-corruption policies: investigation, prevention, education, and coordination. Shim and Eom (2009) explained that law enforcement, administrative reform, and social change are the three most effective means of combating corruption. The Independent Commission Against Corruption in Hong Kong has developed three approaches: prevention, deterrence, and education (Kwok, 2006).

There may be various ways to classify anti-corruption policies, but this study presents a simple classification for the convenience of discussion. Anti-corruption policies can be divided into proactive anti-corruption policies and reactive anti-corruption policies. A proactive anti-corruption policy is a policy that is applied before corruption occurs and prevents it from occurring. A reactive anti-corruption policy is a policy that is applied after corruption has occurred and prevents it from recurring. Representative examples of proactive anti-corruption policies are education and institutional design. Education includes strengthening ethics education to prevent public officials from committing corruption. Designing institutions makes the costs of committing corruption high. Typical examples of reactive anti-corruption policies are audits and investigations. Punishing corrupt actors through audits and investigations can reduce the recurrence of corrupt acts.

Ⅲ. In-Depth Literature Review

1. Overview

There are many studies discussing blockchain as an anti-corruption tool, but it

remains at the level of theoretical discussion or presenting the possibility that corruption can be prevented by utilizing the characteristics of blockchain. In this study, three studies were selected and analyzed in depth on cases of designing anti-corruption policies using blockchain. These three studies are about anti-corruption policies using blockchain in Indonesia, South Africa, and China. These articles mostly support blockchain technology's ability to combat corruption. This chapter analyzes the articles' contents, identifies common themes, and highlights limitations.

2. Agustin and Susilowati (2019): Preventing corruption with blockchain technology (case study of Indonesian public procurement)

First, Agustin and Susilowati (2019) argued that blockchain technology can be employed as an alternative to assist the corporate governance system. They examined how blockchain technology can be used in public procurement in Indonesia and conducted a qualitative research method using a literature study. To make predictions about the potential usage of blockchain technology, they chose the accounting theory including agency theory, social contract theory, institutional theory, legitimacy theory, and stakeholder theory as an analytical tool.

According to Agustin and Susilowati (2019), five rules can be adopted for implementing blockchain technology. First, the principle of entry and exit: The contract must specify procedures that make clear entry, exit, and renegotiation conditions so that stakeholders can decide when an agreement can be fulfilled. Second, the principle of governance: Procedures for changing the rules of the game must be agreed upon by unanimous consent. Third, the principle of externalities: If a contract between A and B involves C, C must be invited as a party to the contract. Fourth, the principle of contracting costs: Each party must bear their own costs. Fifth, the limited immortality principle states that a company should be run as though it can continue to advance the interests of its stakeholders for the foreseeable future.

Agustin and Susilowati (2019) concluded that because of its transparent workings, blockchain technology inspires trust among the populace, enabling easy public oversight of all government acts. Blockchain technology can be utilized as a substitute tool to assist effective corporate governance mechanisms, according to the results. The knowledge asymmetry between the principal and the agent, which invariably results in agency conflict, can be reduced by blockchain features that forbid third parties from

intervening. This will lessen the power imbalance between the government and the populace, which is the agency problem's root cause.

However, Agustin and Susilowati (2019) simply speculated on the possibilities of using blockchain for anti-corruption, which has the drawback of not offering a concrete approach. Although they claimed to be researching the case of Indonesia's procurement system, they made no concrete recommendations regarding how blockchain may stop corruption that might arise in Indonesia's procurement administration. Furthermore, it hasn't been kindly described how the accounting theories discussed above connect to the use of blockchain. Nevertheless, Agustin and Susilowati's (2019) study is significant because it implies that blockchain is a technology that can stop abuse of the government's sole authority and that it can be an effective tool for fighting corruption because it can always be validated by a third party.

3. Ogunlela, Ojugbele, and Tengeh (2021): Blockchain technology as a panacea for procurement corruption in digital era

Second, in their investigation into using digital technology to reduce corruption in South Africa, Ogunlela, Ojugbele, and Tengeh (2021) stated that blockchain can be used to implement smart contracts in public procurement. The procurement administration in South Africa is seriously corrupt. It can be divided into a number of categories (Matlala and Dintwe, 2013). Vendor-employee collusion: Bidding is rigged in favor of the vendor in exchange for satisfaction for the public employees. Vendor fraud: it involves overcharging customers or substituting inferior goods, frequently with the help of willing staff, in exchange for reward or payment. Vendor collusion: it is cooperation between vendors that results in price fixing. Corruption in procurement administration can be classified in different ways such as price inflation, awarding contracts to friends or family without advertising, improperly forming bid committees, and failing to disclose conflicts of interest (Munzhedzi, 2016).

Ogunlela, Ojugbele, and Tengeh (2021) argued that blockchain has some benefits in public procurement. First, it can lower costs and time savings. Second, all stakeholders have access to information easily and everywhere because of high transparency. Third, information is updated instantly and is copied across all nodes. Fourth, because processes are automated, reporting and meetings take up less time. Finally, security can be enhanced because of loud-based data storage and transaction.

Ogunlela, Ojugbele, and Tengeh (2021) also mentioned the issues with implementing blockchain in public procurement. First, public sector decision makers should be ready to accept the new technology. Second, to accept blockchain technology, an environment must be formed that includes technical training for public officials and users. Finally, the public sector must be ready to adapt to any changes brought on by the introduction of blockchain, including decentralization.

Ogunlela, Ojugbele, and Tengeh (2021) concluded that blockchain technology can mitigate corruption issues related to public procurement with several reasons. First, data cannot be manipulated because of the decentralization of information ownership and authority, which reduces the likelihood of any one individual manipulating transactions due to their level of authority. Second, real-time transparency and accountability, as transactions occur in real-time and all nodes are informed and able to verify the transaction, the likelihood of data manipulation—which would be the norm in the traditional process—will be reduced or eliminated in the blockchain system. Third, any transaction that occurs within the blockchain is automated and updated right away across all of the network's nodes, and that the originator of the transaction can be identified. Finally, the traditional approach, which allows one person or a group of people to change data or records, is not possible, because transactions in the blockchain system are tamper-proof and all parties involved must consent before any record can be altered.

Ogunlela, Ojugbele, and Tengeh (2021) contributed to the anti-corruption effect of blockchain in two aspects. First, they suggested paradigm can aid policymakers and procurement managers in better understanding how public institutions' procurement procedures might be enhanced. Second, their framework can help policymakers better conceptualize how blockchain technology can be used to improve procurement processes in order to reduce corruption. However, this study only predicted the effect that the introduction of blockchain would bring to public procurement and the barriers to introduction, but did not provide empirical evidence for this.

4. Wang, Wang, and Cheng (2020): Application of blockchain technology in the governance of executive corruption in context of national audit

Finally, Wang, Wang, and Cheng (2020) used a quantitative method, the

difference-in-difference analysis, to capture the impact of hidden corruption of state-owned enterprise executives. They argued that blockchain technology can enhance the audit mode, ensure data integrity, improve audit efficiency, and decrease audit risk. There are two types of corruption related to top executives: explicit and hidden corruption. Hidden corruption, executives' exploitation of their position to pursue personal gain, is difficult to detect. Senior executives are corrupted frequently in state-owned businesses of China, and the overall number of cases is growing. To measure the impact of state-owned share proportion, shareholding ratio of the top five shareholders, and shareholding ratio of the largest shareholder on return on assets, they selected 270 stated-owned enterprises of China from 2012 to 2016. They found that these independent variables are needed to ensure an appropriate ratio to prevent the phenomenon of senior executives being corrupted covertly when the ratio of state-owned shares is too high.

Wang, Wang, and Cheng (2020) also argued that national audit is a crucial component of financial management, a type of professional oversight in administrative supervision, and an essential component of national governance. Moreover, it has been discovered that using blockchain technology to examine the pertinent data of state-owned firms can increase system operating efficiency, save costs, and guarantee information security. The real-time and transparent transition from a closed system to a distributed, real-time system is also made possible by blockchain technology, ensuring the efficacy and legitimacy of business.

Wang, Wang, and Cheng's (2020) discussion is meaningful because it suggests that blockchain technology can be used for public audit, not only for procurement administration. However, their study shows some pitfalls. First, they do not analyze a specific case of how blockchain technology is being used to manage state-owned firm executives' hidden corruption. Second, the findings of the quantitative research and the requirement for using blockchain are not clearly related. In their study, the dependent variable is the return on assets, and the independent and control variables are state-owned share proportion, the sum of the shares of the top five shareholders, the shareholding ratio of the largest Shareholder, enterprise scale, and debt-to-asset ratio. The units in their sample are state-owned enterprises in China, a total of 270 companies, and the period was from 2012 to 2016. After Ordinary Least Squares analysis, the treatment group and control group were separated, and the relationship between internal audit and turnover rate of total assets was analyzed. No variables

related to blockchain were found in this analysis. They mentioned auditing using blockchain, but auditing using blockchain was not actually included as a variable. In other words, the regression analysis does not seem to have anything related to blockchain. Finally, it is difficult to interpret the quantitative analysis results because they are not presented properly. For these reasons, in their study, the usefulness of quantitative analysis and the application of blockchain to public auditing are difficult to confirm.

5. Overall Review

This chapter summarizes the implications that can be gained from the three studies. The first is that blockchain technology will likely apply to corruption involving financial transactions. In the case of Indonesia and South Africa, the application of blockchain to procurement administration was discussed, and in the case of China, the application of blockchain to auditing was mentioned. Although it is said to be applied to audits, it is not applied to audits in general, but to audits of public companies. It can be understood as an audit using blockchain technology for financial transactions. In other words, blockchain technology can be used to suppress corruption related to financial transactions effectively.

Corruption prevention using blockchain technology can be used in developed countries with low corruption, but it is believed to be more desperately needed in developing countries with high corruption. All three countries have something in common: they have a serious level of corruption. According to the 2022 Corruption Perceptions Index published by Transparency International (2023), Indonesia ranks 110th out of 180 countries with a score of 34 out of 100, South Africa ranks 72nd with 43 points, and China ranks 65th with 45 points. The higher the score and ranking, the more corruption-free the country is.

In advanced countries with little corruption, the anti-corruption system is already well-established, and they have a system in place to proactively prevent and subsequently punish corruption that occurs in financial transactions, such as embezzlement. However, establishing such a system in developing countries with high corruption is very difficult due to cost and culture issues. Blockchain technology can be used as a technology to reduce such costs.

More research still needs to be done on how to use blockchain as an anti-corruption

tool. The three studies claim that blockchain can be used to control corruption in procurement administration or to conduct anti-corruption audits, but they fail to present specific methods or empirical evidence. Although it is possible to find research on theoretical discussions about the possibility of using blockchain as an anti-corruption tool, it is difficult to find research that presents a deeper discussion. Research on this is still in its early stages, and more research is needed.

Ⅳ. Blockchain as a Tool for Fighting Corruption

This chapter seeks to discuss how blockchain can be used as an anti-corruption tool based on the literature review discussed so far. Can blockchain become a new anti-corruption tool? If so, what is the difference between anti-corruption policies using blockchain and existing anti-corruption policies, and what are the advantages of anti-corruption policies using blockchain? What are the prerequisites for blockchain to be used as an anti-corruption policy? Are there any problems that anti-corruption policies using blockchain can bring? This study seeks to answer these research questions.

As confirmed through previous research, it is believed that blockchain can be used as an anti-corruption tool. It is believed that forgery and falsification will be difficult in financial transactions due to the three characteristics of blockchain: decentralization, unique data structure, and transparency. In procurement administration conducted through blockchain, modifying or falsifying financial transaction records is difficult, so corruption such as embezzlement can be prevented in advance. In other words, it is possible to design a proactive anti-corruption policy in the case of corruption involving financial transactions. Agustin and Susilowati (2019) and Ogunlela, Ojugbele, and Tengeh (2021) showed that blockchain can be introduced to prevent corruption in financial transactions of public institutions in Indonesia and South Africa.

Blockchain technology can be used not only in proactive anti-corruption policies, but also in reactive anti-corruption policies. If blockchain technology is introduced in the financial transactions of public institutions such as procurement administration, blockchain technology will also be used for post-detection through investigations and audits. In other words, blockchain technology can be used as a proactive and reactive

corruption prevention tool in corruption involving financial transactions. Agustin and Susilowati (2019) and Ogunlela, Ojugbele, and Tengeh (2021) showed that blockchain technology can be used in proactive corruption prevention. Wang, Wang, and Cheng (2020) showed that blockchain technology can be used in reactive corruption prevention.

The difference between anti-corruption policies involving blockchain technology and traditional anti-corruption policies is efficiency. Limited to corruption involving financial transactions, anti-corruption policies using blockchain technology can significantly reduce the likelihood of corruption occurring at a relatively low cost compared to traditional anti-corruption policies. In the administration of financial transactions, including existing procurement administration, the monitoring costs were quite high, and the cost of establishing the system was also high. As a result, developed countries were able to build a system by covering the costs, but it was difficult to build a system by covering the costs in underdeveloped countries. Of course, introducing blockchain technology also costs money, but it is expected that the system can be built at a relatively low cost due to the characteristics of blockchain. In addition, once established, financial transaction details are not falsified, and evidence is preserved indefinitely, which reduces the possibility of corruption and is highly efficient in the long term.

Two conditions must be reached before blockchain technology can be implemented as an anti-corruption measure. First, public institutions must implement blockchain technology without exception for all financial transactions. Suppose exceptions are made because some institutions are not introduced, or the other party to the transaction is not prepared. In that case, corruption may occur in exceptional cases where blockchain technology is not actively used even if it is introduced. If this occurs, the introduction of blockchain technology will be less effective. Second, educational programs must be made available so that government officials and auditors can thoroughly comprehend blockchain. Suppose public workers do not understand blockchain-based transactions. In that case, work in the field will not be performed effectively, and blockchain technology may be used only opportunistically and in its current form. In addition, anti-corruption audits utilizing blockchain technology are impossible if auditors do not comprehend blockchain technology. In other words, the system's establishment and participants' comprehension must come first.

The problem that blockchain anti-corruption policies can bring is the technocratic

belief that blockchain can eliminate corruption. It is difficult for the blockchain anti-corruption policy itself to be a problem. Overreliance on anti-corruption policies using blockchain can be problematic. Existing studies mostly mention only the positive aspects of anti-corruption policies using blockchain. However, as mentioned earlier, anti-corruption policies using blockchain have a deterrent effect only on corruption that involves financial transactions. And if the financial transaction takes place in private relations, blockchain cannot trace it. For example, in the case of bribery, it cannot be caught through blockchain because bribery is not received through blockchain. In other words, blockchain can be used as one of the anti-corruption policies, but it must be recognized that not all anti-corruption policies can be based on blockchain.

Ⅴ. Conclusion

In this study, several research questions regarding anti-corruption policies using blockchain were set and answered. Blockchain and anti-corruption studies were selected from the existing literature and analyzed in depth. Instead of the current classification of corruption, the feasibility of an anti-corruption policy using blockchain was evaluated by dividing it into corruption involving financial transactions and corruption not involving financial transactions. Anti-corruption policies were divided into proactive and reactive policies, and the feasibility of using blockchain was examined. As a result of this work, several arguments were presented. First, blockchain can be used as an anti-corruption tool in corruption involving financial transactions. Second, blockchain technology can be used as a proactive anti-corruption tool and a reactive anti-corruption tool. Third, blockchain-based anti-corruption policies are expected to reduce costs and have a higher deterrence against corruption compared to existing anti-corruption policies, so they are expected to be highly effective when introduced in developing countries. Fourth, for a blockchain-based anti-corruption policy to work properly, it must be introduced throughout the country's financial transaction system, and public officials must understand blockchain. Lastly, we must be wary of falling into technological omnipotence, knowing that blockchain can only be an anti-corruption policy but not a panacea that can eliminate corruption.

This study has the following limitations. First, no specific method was presented on

how blockchain should be designed as an actual anti-corruption policy. It is difficult to find cases where blockchain technology has been used as an anti-corruption policy. As future research accumulates, we will be able to study these areas as well.

Second, although this study answered various research questions about blockchain and anti-corruption policies, it needed to provide empirical evidence for the answers. This study has no choice but to provide answers based on theoretical foundations and analysis of previous research because related cases have not yet been accumulated.

Third, blockchain technology can be used to prevent corruption, but on the contrary, it can also be used to make corruption easier. For example, virtual currency derived through blockchain can be used for bribery due to its anonymity. Of course, it is important to remember that blockchain and virtual currency are different concepts. However, it is necessary to consider the possibility that corrupt actors can utilize blockchain-based technology. There is also a need to examine the negative aspects of blockchain in preventing corruption.

Finally, this study only mentioned proactive and reactive corruption prevention systems related to financial transactions as areas of anti-corruption where blockchain can be utilized, but there may be other possibilities for utilizing blockchain in anti-corruption policies. Research into this possibility will need to be conducted. A more in-depth analysis will be possible as more cases accumulate in the future. Research in this field is only just beginning, so it is expected that much research will be conducted in the future.

This paper would like to conclude by making some suggestions. First, it is recommended that attempts be made to test the anti-corruption function by introducing blockchain technology into procurement administration. In South Korea, the Public Procurement Service (2021) announced that it would introduce blockchain technology into the public procurement system in 2024. According to the Public Procurement Service (2021), blockchain technology will be used to stop bid document forgeries and eliminate the hassle of repeatedly submitting bid and contracting paperwork.

Second, it is necessary to find a way to utilize blockchain technology to prevent corruption not only in public procurement but also in other functions such as auditing. Legislative support is also needed for this. To spread blockchain technology to anti-corruption policies, it is necessary to make clauses on the contents of support for the use of technology into existing laws, such as Government Procurement Act and Act on Public Sector Audits.

Finally, it is necessary to nurture experts who understand blockchain technology and can utilize it for anti-corruption purposes. It was mentioned earlier that public officials and auditors must have an understanding of blockchain. To help them understand, the government need to build a system to train them about blockchain. In Korea, educational programs on blockchain, big data, and artificial intelligence are being created and provided to public officials. However, it is questionable how professional this training provided through civil servant training institutions is. Opening a training course at a graduate school would be desirable for more specialized education and providing long-term training for six months to one year or more.

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<Abstract>

An Exploratory Research of Anti-Corruption Policy Using Blockchain

Min, Kyoung Sun*

Research on the use of blockchain is increasing in various fields, and discussions are also starting in the anti-corruption field due to the impossibility of forgery and alteration of blockchain. The following research questions can be considered regarding anti-corruption policies using blockchain. Can blockchain be used as a new tool to prevent corruption? How is an anti-corruption policy using blockchain different from existing policies, and what are the advantages? What are the conditions necessary to introduce an anti-corruption policy using blockchain? Are there any negative aspects to anti-corruption policies using blockchain? This study sought to provide answers to these research questions. To find answers to the research questions, we selected studies that attempted case analysis targeting Indonesia, South Africa, and China from the existing literature and conducted an in-depth analysis. In addition, we evaluated the usability of anti-corruption policies using blockchain by dividing corruption into corruption involving financial transactions and corruption not involving financial transactions. The possibility of utilizing blockchain was examined by dividing anti-corruption policies into proactive and reactive policies. As a result of this work, the following arguments were presented. First, blockchain can be used as an anti-corruption tool in corruption involving financial transactions, so it is suitable for procurement administration and anti-corruption audits. Second, blockchain technology can be used not only as a proactive anti-corruption tool but also as a reactive anti-corruption tool. Third, blockchain-based anti-corruption policies are expected to reduce costs and have a higher deterrence against corruption compared to existing anti-corruption policies, so they are expected to be highly effective when introduced in

* Assistant Professor at Korean National Police University, Ph. D in Public Affairs.

developing countries. Fourth, in order for a blockchain-based anti-corruption policy to work properly, it must be introduced throughout the country's financial transaction system, and public officials must have an understanding of blockchain. Lastly, we must be wary of falling into technological omnipotence, knowing that blockchain can only be an anti-corruption policy but not a panacea that can completely eliminate corruption.

Key words: Anti-Corruption, Audit, Blockchain, Corruption, Procurement Administration