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Cryptographic Technology and Anti-Money Laundering Policies Against the Sale of Drugs Using Bitcoin Transactions

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Abstract: This research aims to analyze the influence of cryptographic technology and the effectiveness of Anti-Money Laundering (AML) policies on countering Bitcoin transaction-based drug trafficking in Indonesia. Using a normative legal research method with a desk study approach, this study evaluates the contribution of cryptography to transaction security, challenges in monitoring, and weaknesses in AML policies in Indonesia. The results show that cryptographic technology enhances the security and efficiency of transactions through blockchain, but its anonymity is utilized in illegal activities. In addition, AML policies in Indonesia still face implementation challenges, such as low compliance with Know Your Customer (KYC) principles and minimal supervision of cryptocurrencies. This research recommends strengthening regulations and international cooperation as strategic steps in tackling digital crime.

Keyword: Cryptography Technology, Anti-Money Laundering (AML), Digital Drug Trafficking.

INTRODUCTION

Indonesia is currently facing an increasingly alarming drug emergency phenomenon. The presence of drugs has had a huge negative impact on public health, security, and the country's socio-economic development. Drug crimes continue to increase in various forms, ranging from the circulation of these illicit goods to abuse involving various layers of society, including among the younger generation. This crisis demands serious handling from various parties, including the government, law enforcement officials, and the community itself.

Data related to the drug phenomenon in Indonesia is increasingly worrying. Data from the Indonesian National Police shows a significant increase in drug trafficking and abuse cases. From January to April 2024, the National Police handled 17,855 drug cases with 22,177 suspects. Evidence seized included 2,194,560 grams of methamphetamine, 1,703,659 grams of marijuana, and 2,228,758 grams of ecstasy, potentially saving around 18 million lives from the dangers of drugs (Polri, 2024).

In terms of drug trafficking, Indonesia is also one of the countries prone to drug smuggling, with potentially far-reaching impacts on the younger generation, society, and the economy. This phenomenon shows how serious the threat of drugs is to the sustainability of social life and the security of the country. In addition, Indonesia now also ranks third in the world in terms of drug transactions and abuse. Based on data released by the United Nations Office on Drugs and Crime (UNODC) in 2021, Indonesia faces a major threat in terms of growing drug abuse, both in the form of consumption and trade (Trafficking, 2021). This indicates that in addition to being a large user market, Indonesia is also an international drug distribution route that is vulnerable to various forms of transnational crime.

Along with the rapid development of information and communication technology (ICT), we are witnessing major changes in almost all aspects of life, including in the field of crime. One significant change that has occurred is the shift in drug trafficking transaction methods from traditional means to digital transactions through online platforms. The advent of cryptography technology, which enables anonymous and untraceable transactions, has changed the landscape of drug crime. One of the fastest growing forms of digital transactions is the use of Bitcoin and other digital currencies, which are often used in illegal trade, including drug trafficking.

The shift of drug transaction methods from traditional methods to digital transactions has become an increasingly widespread phenomenon in line with advances in information technology. Drug transactions that were previously conducted face-to-face with physical intermediaries are now increasingly turning to digital platforms. One of the most striking methods is the use of digital currencies such as Bitcoin, which allows for anonymous and untraceable transactions by law enforcement officials. The cryptographic technology underlying the system provides extra security for its users, as well as reducing the risks associated with sending and receiving money in person. Drug offenders are taking advantage of this development to avoid detection and prosecution by authorities. This shift shows that technology has become an important tool in the evolution of crime modus operandi, particularly in drug trafficking, which is now more distributed and hidden.

Some of the factors influencing this shift in drug transactions are technological advancements that provide anonymous and decentralized payment systems, such as Bitcoin. As these systems evolve, criminals see them as a solution to avoid traceable transactions. Bitcoin and other digital currencies offer huge advantages in terms of privacy, which traditional payment systems struggle to achieve (Narayanan, 2006). In addition, digital platforms connected to global networks allow traffickers to sell and buy drugs more easily, without being bound by the geographical or legal boundaries of a particular country. This is exacerbated by the ease of access to technology through the internet, which allows transactions to be carried out quickly, efficiently and without clear identities. The use of this technology creates major challenges for law enforcement officials who must adapt to the new methods used by drug trafficking networks (Abidin, 2015).

The development of cryptographic technology and cryptocurrencies, such as Bitcoin, has brought about a major transformation in the global financial system. These technologies enable secure, fast, and decentralized transactions that do not rely on the traditional banking system. Bitcoin, first introduced in 2009 by an individual or group under the pseudonym Satoshi Nakamoto, changed the way people conduct transactions around the world. By using the

blockchain system, which provides high transparency and data security, Bitcoin allows individuals to make transactions directly without going through a third party, such as a bank or other financial institution. It also opens up opportunities for sectors that were previously inaccessible to the traditional financial system to access financial services globally (Narayanan, 2016).

In Indonesia, the use of cryptocurrencies as a means of transaction is still debatable. Although the technology promises efficiency and convenience in various transactions, both domestic and international, Indonesian authorities, such as Bank Indonesia, have yet to recognize Bitcoin and other cryptocurrencies as legal tender. In 2017, Bank Indonesia banned the use of cryptocurrencies for domestic transactions, citing the need for consumer protection and to prevent misuse that could harm the country's economy (Soehartono, 2019). Nevertheless, despite the official ban, interest in the use of cryptocurrencies in Indonesia remains high, both as an investment and as a transaction tool for specific purposes. People are increasingly aware of the potential benefits offered by this technology, despite the high risks associated with price volatility and regulatory uncertainty.

The research that the author conducted, of course, did not depart from a vacuum but was moved by the foundation of relevant previous studies. First, a scientific article entitled “Criminological Review of the Potential Crime of Money Laundering through Virtual Currency (Cryptocurrency),” written by Kristian Sinaga and Diah Ratna Sari Hariyanto. This article was published in the Kertha Negara Journal, volume 12, number 4 of 2024. This research explains that technological advances, the characteristics of cryptocurrency, and the ability of the perpetrators make virtual currency a potential means of money laundering. This research found that there is a legal vacuum in the regulation of cryptocurrency in Indonesia, so policy formation and increased law enforcement efforts are needed to overcome these challenges (Sinaga, 2024).

Second, a scientific article entitled “*Cryptocurrency Utilization in the Crime of Money Laundering*”, written by Nadia Wulandari Rotty, Anggita Cahyani, Daffa Khalisha Nabila, Rachmah Fidiastuti, and Regentio Candrika Komala Dewa. This article was published in the law journal of UPN Veteran Jakarta. This research explains that cryptocurrency can be an effective tool in money laundering due to its anonymity and decentralized nature, which makes it difficult for law enforcement officials to trace. The research emphasizes the importance of strict supervision and the need for specific regulations related to cryptocurrencies in Indonesia to prevent abuse (Rotty, 2022).

Although the previous two studies have made positive contributions to the academic world, especially because they have discussed the potential of cryptocurrencies as a means of money laundering crimes and regulatory challenges in Indonesia. However, these studies have not specifically addressed how the cryptographic technology underlying cryptocurrencies, such as Bitcoin, affects the complexity of tackling digital transaction-based crimes, particularly drug trafficking, and how it relates to the effectiveness of anti-money laundering (AML) policies. Instead, the authors' research aims to fill this gap by analyzing the role of cryptographic technology in cryptocurrency-based drug transactions and evaluating existing AML policies, including weaknesses in their implementation. Thus, this research offers novelty in the form of integration between technological aspects and legal policies to formulate strategic recommendations that are more adaptive in the face of increasingly complex digital crimes.

This research is of high urgency as the increasingly complex global drug trade is shifting to digital platforms using cryptocurrencies such as Bitcoin, which are difficult to trace due to their anonymous and decentralized nature. In this context, it is important to evaluate the adaptation of Anti-Money Laundering (AML) policies and the role of cryptographic technology in tackling digital transaction-based drug trafficking. Indonesia's position as one of the largest markets for drug abuse reinforces the relevance of this research, especially since

there is still a regulatory vacuum related to digital drug transactions. This research aims to provide effective policy recommendations for law enforcement officials and related institutions, with an integrative approach between cryptographic technology and AML policies, to face the challenges of drug crime in the digital era.

Departing from that, this research will try to answer several questions that become problem formulations: a) The Contribution of Cryptographic Technology to the Security of Bitcoin Transactions; b) The Effectiveness of Anti-Money Laundering (AML) Policies in Countering the Misuse of Bitcoin for Illegal Activities; c) Challenges and Solutions to the Supervision System for Bitcoin Transactions Based on Blockchain Technology.

METHOD

This research uses normative legal research methods, namely methods that analyze laws and regulations, legal doctrines, and theoretical concepts to answer certain legal problems (Ariawan, 2013). Normative legal research is appropriate to examine the legal aspects of cryptocurrency-based drug trafficking and the effectiveness of Anti-Money Laundering (AML) policies.

Data collection was conducted through desk research that included various primary and secondary legal sources. Primary legal sources include laws, regulations and official documents, such as Law No. 8/2010 on the Prevention and Eradication of Money Laundering. Secondary legal sources include books, scientific journals, and relevant previous research results. As stated by Zed, desk research enables comprehensive exploration of legal data through authentic documents (Zed, 2008).

The types of data used are primary and secondary data, collected through document studies. Primary data provides the legal basis for the object of study, while secondary data helps explain, support, and strengthen the legal analysis.

The collected data is analyzed using descriptive analysis, which aims to explain and interpret the relationship between existing legal phenomena. Through descriptive analysis, this research will compile a systematic narrative about the effectiveness of cryptographic technology and AML policies in tackling cryptocurrency-based drug trafficking (Flick, 2022).

RESULT AND DISCUSSION

1. Bitcoin Cryptography Technology's Contribution to Bitcoin Transaction Security

Cryptography technology is the core element that makes Bitcoin one of the most important innovations in digital transaction systems. Cryptography provides high security through mathematical algorithms that protect transaction data and user identities. It uses methods such as public-key cryptography and digital signatures to ensure that only those with the private key can access data or make transactions. Narayanan explains that the use of cryptography in Bitcoin not only protects data from manipulation but also allows transactions to be made without the need for intermediaries, such as banks or other financial institutions (Narayanan, 2016).

One of the biggest contributions of cryptography in Bitcoin is the creation of the blockchain, a decentralized ledger that records all transactions transparently and permanently. The blockchain uses cryptographic hash functions to secure each block of transactions that are linked in a chain so that any data changes to one block will be visible to the entire network (Antonopoulos, 2014). This system makes Bitcoin resistant to manipulation or cyberattacks, while increasing user confidence in the integrity of the data stored.

However, the security properties that cryptography offers also create new challenges. The anonymity provided by Bitcoin, while important for protecting user privacy, is also exploited by criminals, including in the drug trade. Bray notes that cryptographic technology allows offenders to hide their identities through pseudonymous addresses, making it difficult

for authorities to trace illegal transactions (Bray, 2016). Thus, while cryptography increases the security of transactions, its anonymity also facilitates criminal activity.

The advantage of cryptographic technology in Bitcoin also lies in its scalability. By utilizing digital signatures, the system can process thousands of transactions in a short period of time without the need for a central authority. According to Bonneau, this mechanism not only makes transactions faster and more efficient but also ensures that the data transmitted remains encrypted and secure throughout the process (Bonneau, 2015). However, issues such as limited network capacity and high energy consumption in the verification process are still concerns that need to be resolved.

2. Effectiveness of Anti-Money Laundering (AML) Policies in Countering the Misuse of Bitcoin for Illegal Activities

Anti-Money Laundering (AML) policies are designed to prevent and detect illegal activities involving the flow of funds, including money laundering through cryptocurrencies such as Bitcoin. Global AML policies, such as the Financial Action Task Force (FATF) recommendations, have established guidelines to enhance the supervision of cryptocurrency transactions. FATF recommends the implementation of Know Your Customer (KYC) principles and suspicious activity reporting to reduce the risk of Bitcoin being misused in illegal activities, including drug trafficking (Force, 2019). However, the implementation of these policies often faces technical and legal challenges, especially in countries with low regulatory capacity.

In Indonesia, AML policies have been regulated in Law No. 8/2010 on the Prevention and Eradication of Money Laundering Crimes. However, this regulation has not specifically regulated cryptocurrencies as part of the supervised financial system. According to Rotty, this legal vacuum provides room for criminals to utilize Bitcoin as a means of illegal transactions (Rotty, 2022). Without clear rules, it is difficult for law enforcement officials to track and seize assets related to cryptocurrency-based transactions.

The effectiveness of AML policies is also affected by the anonymous and decentralized nature of Bitcoin, which makes it easier for criminals to hide their identity and source of funds. According to Reddy, this anonymity poses a major challenge for regulators, as Bitcoin's underlying blockchain technology is designed to protect user privacy (Reddy, 2018). Criminals can utilize digital wallets and mixers services to break up the transaction trail, making it difficult for law enforcement officials to trace the flow of illicit funds.

International efforts to improve the effectiveness of AML policies have been made through cross-border cooperation and the development of surveillance technologies. One example is the development of blockchain analytics tools, such as Chainalysis, which help detect suspicious transaction patterns in the cryptocurrency ecosystem (Gao, 2018). While these tools can be helpful in identifying illegal activities, their effectiveness remains dependent on the ability of regulators to access relevant data and apply strict sanctions against violators.

Furthermore, weaknesses in AML policy implementation also stem from low awareness and compliance with regulations at the local level. Bonneau notes that many cryptocurrency platforms still do not fully implement KYC principles, leading to gaps in supervision (Bonneau, 2015). In the Indonesian context, steps to strengthen regulation and international cooperation need to be accelerated to ensure that AML policies can adapt quickly to new technological challenges.

3. Challenges and Solutions for the Supervision System of Bitcoin Transactions Based on Blockchain Technology

The blockchain technology underlying Bitcoin brings significant challenges in transaction monitoring due to its decentralized, anonymous, and transparent nature. The

absence of a central authority in the system makes transactions peer-to-peer and records all activity on a public ledger. However, the information stored is only cryptographic addresses without user identities, making it difficult for law enforcement to track illegal activities. According to Reddy, this feature allows criminals, including drug traffickers, to utilize blockchain technology to hide traces of their transactions (Reddy, 2018).

One of the main challenges in surveillance is the use of tools such as mixers and tumblers, which break up the Bitcoin stream into a number of small transactions before merging them back into the destination wallet. This process obscures the path of funds, making it difficult to identify. Antonopoulos notes that these tools are specifically designed to increase user anonymity, which makes them popular with criminals looking to avoid surveillance (Antonopoulos, 2014). These technologies amplify the complexity of surveillance systems, especially when transactions take place on hidden networks like the Darknet.

In addition, another technical challenge is the huge volume of data in blockchain. With millions of transactions recorded every day, law enforcement needs advanced analytics tools to sift through the information and detect suspicious transaction patterns. Bonneau highlighted that without adequate tools, manual analysis is impossible, especially in the context of transnational crime (Bonneau, 2015). Lack of access to these advanced technologies, especially in developing countries, is a major obstacle to effective surveillance.

A technical solution to this challenge is the development of blockchain analytics tools such as Chainalysis and Elliptic, which use machine learning algorithms to detect transaction patterns and identify addresses associated with illegal activity. According to Gudgeon, these tools can help trace transactions back to the original wallet, even if the perpetrators use services such as mixers (Gudgeon, 2020). However, the implementation of these tools requires adequate infrastructure support and human resource training, as well as cooperation between law enforcement authorities across countries.

In addition to technical approaches, strengthening regulation is also an important solution to improve the supervision of Bitcoin transactions. FATF recommends the implementation of Know Your Customer (KYC) principles and suspicious activity reporting by virtual asset service providers (VASPs) to reduce anonymity in cryptocurrency transactions (Force, 2019). In Indonesia, Bappebti's role as a cryptocurrency regulator could be expanded by emphasizing rules that require compliance with AML policies for industry players. This step needs to be complemented by international cooperation to monitor cross-border transactions and address legal challenges arising from regulatory differences between countries.

CONCLUSION

Cryptographic technology in Bitcoin contributes greatly to the security of digital transactions through the application of public-key cryptography and digital signatures that ensure data integrity and protection. While this technology enables secure transactions without intermediaries, its anonymity opens it up to abuse, including in drug trafficking and other criminal activities. The creation of blockchain as a decentralized ledger adds transparency but also presents new challenges, such as network scalability and high energy consumption.

Anti-money laundering (AML) policies globally, including in Indonesia, face significant challenges in addressing Bitcoin abuse. The legal vacuum specific to cryptocurrencies provides room for criminals to hide illicit financial flows. On the other hand, the decentralized and anonymous nature of Bitcoin makes it difficult to apply Know Your Customer (KYC) principles and report suspicious activity. While blockchain analytics technologies such as Chainalysis have helped detect suspicious transaction patterns, the effectiveness of AML policies remains affected by regulatory weaknesses and low compliance at the local level.

Oversight of Bitcoin transactions faces complex technical challenges, such as large volumes of data and the use of mixers that obscure transaction traces. However, solutions such

as the development of blockchain analytics tools and international cooperation offer the potential to improve the effectiveness of oversight. Stronger regulation, including the implementation of mandatory KYC by virtual asset service providers (VASPs), is needed to reduce excessive anonymity. In Indonesia, the expansion of Bappebti's role as regulator and harmonization of policies with international standards could help address this challenge.

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