Exploring the Potential of Blockchain Technology for Zakat Administration in Indonesia

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ABSTRACT

Zakat is believed to be able to alleviate or at least reduce poverty in Muslim-majority countries. Indonesia, the largest Muslim-majority country in the world, is claimed to have a vast potential for zakat. Unfortunately, the zakat collection rate based on the total zakat potential in the country is low. There is significant research on the effectiveness of zakat distribution in reducing poverty. However, studies on the effectiveness of zakat collection in Indonesia have not covered the potential of Blockchain technology. Thus, this study will investigate the potential for Blockchain technology in enhancing zakat collection in Indonesia. Through a survey, the study assesses the perception of a sample of 312 individuals in Jakarta regarding the levels of credibility of the existing fintech application offered through BAZNAS and assesses the need for blockchain adoption. An official from the BAZNAS is also interviewed to determine the perception and readiness of blockchain adoption for zakat collection. Lastly, this research shows that individuals in Jakarta demand credibility in paying zakat, and their acceptance of new technology is high. While BAZNAS has adopted blockchain in the initial stage as a zakat institution, it admits blockchain's usefulness.

Keywords: Zakat, Collection, Blockchain, Islamic Fintech

INTRODUCTION

Even though Indonesia's poverty rate has declined from year to year, the country is still struggling with a serious poverty problem. At least 9.4% of the Indonesian population lives below the poverty line, while 20.6% of the total population remains financially vulnerable (World Bank, 2020). Furthermore, COVID-19 has exposed many to situational poverty arising from lockdowns. Indonesia is experiencing an economic slowdown due to COVID-19, with unemployment and poverty expected to increase over the short term. In Q1 2020, Indonesia's year-on-year GDP fell 2.10% compared to GDP in Q1 2019. This economic weakening led to higher unemployment numbers: in February 2020, 6.88 million productive age people in Indonesia were unemployed, an increase of 0.06 million people from February 2019 (BPS, 2020b). Total poor people in March 2020 was 26.4 million people, or an increase of 1.63 million people from September 2019 (BPS, 2020a).

Zakat has the potential to alleviate financial distress in the lowest income groups, as research indicates that well-managed zakat programs can be effective in poverty eradication (Ariyani, 2016). Zakat plays a vital role in providing financial support to eligible recipients (known as the *asnaf*) in the country. Therefore, it may help alleviate poverty because of COVID-19, where the country is experiencing a recession and a hike in unemployment and poverty. From a macro-economic point of view, zakat can positively affect economic growth and inflation, as the more zakat distributed to zakat recipients will increase Indonesia's economic growth (Ridwan et al., 2019).

Indonesian zakat potential is enormous, although total absorption in 2018 was only 3.7% of the total potential.

The growth of total collection from the true potential each year has only been 0.5% - 1% from 2015. Zakat disbursement in 2018 was 89.8% of the total potential amount to be distributed (KNEKS, 2019). This data shows that Indonesia's major challenge facing the zakat system is the low zakat collection rate. Moreover, many researchers have discussed the effectiveness and the impact of zakat distribution in Indonesia. Almost all the research results showed that zakat distribution in Indonesia had positive implications and can effectively reduce poverty. The current impact, however, has not fulfilled its potential. Therefore, the zakat institution needs to revamp its strategy in advancing zakat collection to improve Indonesian zakat performance.

BAZNAS, as a major zakat institution in the country, has explored alternatives to boost zakat collection in Indonesia and adopted fintech as a collection strategy in 2017. Fintech is recognized to have a positive influence on the zakat collection in Indonesia. Hence, it may be advisable for BAZNAS to optimize fintech adoption to support zakat collection programs (Soekapdjo et al., 2019). As a result of the collaborations, an improvement in zakat collection was recorded, from 24.06% in 2017 to 30.42% in 2018 (BAZNAS, 2018). However, Figure 1 indicates that the trend of zakat collection has consistently increased from year to year, even without fintech application. Growth has fluctuated between 15% and 30%, while dropping in 2017 to 13%. The growth in 2018 was lower than in 2016. From the data, what we find is that there is no significant growth after the application of fintech.

Figure 1. Zakat Collection Growth

Source: (BAZNAS, 2018)
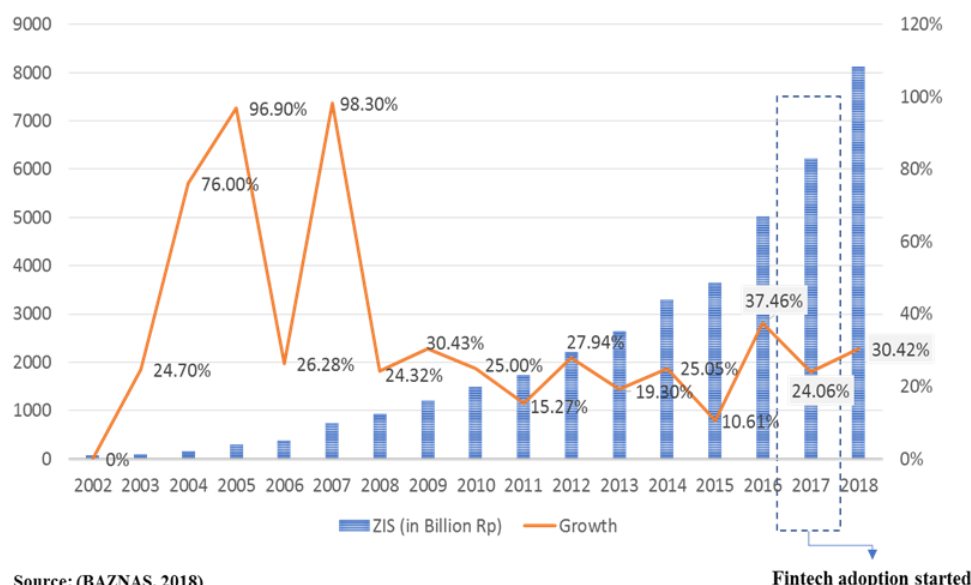
A survey conducted by BAZNAS on Indonesian zakat literacy indicated that 55% paid zakat, but 60% of these prefer to pay zakat to mosques or directly to recipients (Puskas BAZNAS, 2020). The research shows that accessibility and credibility are the significant factors for choosing Zakat Management Organization (OPZ) or a place to pay zakat. The problem of accessibility can probably be resolved through the adoption of basic fintech solutions. However, enhanced credibility and trust establishment require further improvement in the fintech offering or blockchain.

Blockchain is one of the technologies that can be explored to maximize zakat collection in the country.

Blockchain utilization in zakat collection is expected to enhance credibility by improving the zakat ecosystem's transparency, from collecting to the distribution to deserving recipients. Blockchain technology is a decentralized data series that is immutable, linking the data chain using cryptography that ensures its security. Therefore, blockchain technology's application within the existing digital payment platform can potentially enable the national zakat collection agency to elevate stakeholders' trust by providing higher levels of disclosure and reporting in the zakat system in Indonesia.

Charity Wall, an Italy-based social marketplace, is actual evidence of blockchain application in a charity organization. It successfully addressed the problem of heavy reduction in donor's confidence in funds donation due to traditional charity systems and critical consequences of COVID-19 through blockchain application. Furthermore, charity wall blockchain application allows greater security and higher efficiency in a transparent manner that can result in a more significant social impact (Rangone & Busolli, 2021). Therefore, the question arises that *is the level of fintech adoption at BAZNAS adequate, or is another advanced technology such as blockchain required?* This question has not been investigated before.

This study investigates whether applying blockchain within the existing zakat payment system will improve the zakat collection in Indonesia. The research also assesses zakat payers' perception in Indonesia's most prominent payment district, Jakarta concerning any issues in credibility and trust that blockchain may create. The research will analyse the potential for blockchain technology to answer the above problem since blockchain is known to reduce the trust deficit due to its immutable recording and proof of validation. It is expected to

provide preliminary evidence to the zakat management bodies in Indonesia in considering the viability of blockchain as an option for zakat collection.

The following chapters are presented as follows: Chapter 2 exhibits a review of related literature on zakat, which includes the role of zakat, zakat management, and blockchain. Chapter 3 describes the research methodology. Chapter 4 outlines the findings and presents people's and zakat institution's readiness in the zakat system. Finally, chapter 5 provides the conclusion, recommendation, and limitation of the study.

LITERATURE REVIEW

Zakat and its Role in Economic Perspective

The zakat system is stipulated to support the needy to reduce inequality and reach socio-economic stability (Malik, 2016). Zakat is proven to influence economic growth both long and short term. Zakat distributed for consumptive assistance has provided a significant multiplier effect (Suprayitno, 2020). It has a positive relationship in GDP enhancement, and researchers document that zakat causes an increase in consumption by improving the lives of the very poor and deprived (Alam Choudhury & Syafri Harahap, 2008). Zakat may influence the investment positively by directing some of the zakat funds into grassroots development projects to enrich the very poor (Alam Choudhury & Syafri Harahap, 2008). Besides alleviating poverty by reducing unemployment through rise in consumption and investment and reducing the inflation rate by imposing zakat on people, zakat can also be a catalyst for economic growth. Hence, the more intensive the zakat based redistribution and subsequent spending is, the better the economic condition (Sarea, 2012).

Further, the principle of zakat is in line with the Sustainable Development Goals (SDGs) agenda number 1 and 2, which are 'no poverty' and 'zero hunger'. Moreover, BAZNAS proved that zakat could also support SDG 6 in Kendel, Boyolali, by upgrading the local population's life quality in hygiene practices and access to clean water (Fahmi Ali Hudaefi et al., 2020). While, in the time of COVID-19, it is proven that in 12 World Zakat Forum (WFZ) countries, zakat made a relevant contribution to the asnaf, in various aspects including health protection, food, and cash donation (F. A. Hudaefi et al., 2020).

Zakat Risk Management

Studies show that the zakat system's transparency, including financial record and distribution, delivered in an effective manner will increase muzakki's trust towards the financial institution (Firmansyah & Devi, 2017). It is also proved that transparency has a positive relationship with the reputation of zakat institution, while reputation and transparency influence muzakki's intention in paying zakat (Mukhibad et al., 2019). Aligned with research that proved the value of zakat transparency of institution, the transparency of zakat institution has a positive and significant impact on muzakki's satisfaction and loyalty in paying zakat (Yuliafitru & Khoriyah, 2016).

The transparency and credibility described above are influenced by zakat risk management. Risks in zakat are identified as inevitable potential events that negatively impact the trust level, sharia compliance, and sustainable business processes. Some risks that need attention and relevant to these problems are reputation risk: potential losses for zakat institutions caused by negative perceptions, which can affect ability to perform well; Zakat Fund Management Risk: Associated with the process of managing zakat funds; Management of Zakat Fund Distribution Risk: Associated with the process of zakat institutions channelling their zakat funds; Crime / Fraud Risk: Any illicit actions committed by anyone involved in the operation of zakat institutions intentionally for personal or group purposes, and which can harm the institution and damage its reputation; Reporting risk: A situation experienced by zakat institutions when they are unprepared to report all their activities to stakeholders (Ascarya et al., 2018).

The mentioned risks lead OPZ to be a low credibility/inefficient zakat institution, resulting in low zakat collection. Zakat distribution apparently cannot be separated from the effectiveness of zakat collection. A study has proven that it is accurate that zakat distribution influences poverty reduction, while the zakat collection variable will affect the distribution of zakat (Rini et al., 2020). Another research has proven that the small amount of zakat collected by BAZNAS cannot make an exclusive economic growth, as it cannot support a significant amount of reducing unemployment and income gap (Khasandy & Badrudin, 2019).

Zakat, Islamic Fintech, and Blockchain

Islamic fintech can be defined as the technologies deployed in Islamic finance to uphold and embed Islamic values to build a just, resilient and sustainable economy. It utilizes all the necessary technical elements, disrupting cumbersome processes, bottlenecks, and inaccessibility of funds by the underserved segments of society (H. Mohamed & Ali, 2019). Illustrated by another research about technology enhancement, every technological innovation has its unique benefits, which will help resolve existing zakat practice issues (Muneeza & Nadwi, 2019). BAZNAS, as a national zakat institution, has explored alternatives to boost zakat collection in Indonesia and adopted fintech as a collection strategy in

2017. By 2021, BAZNAS had a zakat payment application called Muzakki corner and eight zakat payment channels (internet banking, SMS banking, EDC, E-cash Mandiri, Doku wallet, E-pay BRI, virtual account, and T- cash). BAZNAS also collaborates with eight e-commerce companies (Elevania, Bibli, Shopee, Tokopedia, Lazada, MatahariMall, JD.ID, Bukalapak), 13 fintech application including QR code zakat payment (KitaBisa, Gopay, Gopoints, Gotix, OVO, Tcash, Kaskus, Invisee, Lenna, Mcash, Wisata, Muslim, Oorth, Asuransi Jasindo Shariah), and two social media sites (Oy Indonesia, Line (Zaki)). It provides solid confirmation that BAZNAS is very adaptive to technological changes in response to fintech (Fahmi Ali Hudaefi et al., 2019).

Blockchain is a peer-to-peer public ledger maintained by a distributed network of computers that requires no central authority or intermediaries. It consists of three key components: a transaction, a transaction record, and a system that verifies and stores the transaction. The blocks are generated through open-source software and record the information about the time and the transaction sequence (B. H. Mohamed, 2016). The blockchain that is transparent, immutable and auditable, eliminates the risk of fraud in the system, as the chain of information is secured in a series of chain and requires an enormous effort to alter or to hack the data or information stored in the system (Muneeza & Mustapha, 2019).

Thus, smart contracts through blockchain technology claimed can be used to enhance the image and increase zakat system efficiency (Mahomed, 2018). This claim is aligned with the explanation from Alam et al. (2019) about the smart contract of blockchain. As programming languages built into blockchain to automatically execute contract terms when conditions are met, the smart contract will make the execution of contracts

straightforward, secure, and immutable. Moreover, from Shariah's perspective, smart contract through blockchain does not violate Shariah objectives (Maqasid Shariah) as it supports the realization of benefits, including transparency and avoidance of harm. Smart contracts executed also cannot contain any haram elements, such as riba, gharar (uncertainty), maysir, and haram products (Alam et al., 2019; H. Mohamed & Ali, 2019; Muneeza & Mustapha, 2019)
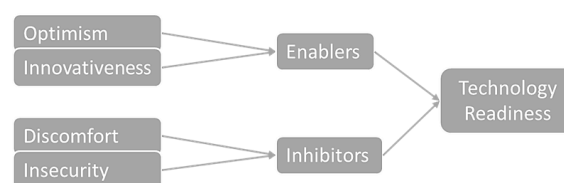

Figure 2. Technology Readiness Index (TRI) Model

Source: (Parasuraman, 2000)

Technology Readiness Index 2.0 (TRI 2.0)

Technology Readiness Index is described as people's propensity to embrace new technology (Parasuraman, 2000). This measurement becomes essential as there is a tendency towards the growth of technologically advanced sophisticated products, leading fundamental transformations in company's interaction with the customer (Cunha et al., 2011). TRI 2.0 facilitates understanding the dynamics behind adopting various technologies by providing measures of the four technology readiness dimensions: optimism, innovativeness, discomfort, and insecurity (Parasuraman & Colby, 2015).

Technology Acceptance Model (TAM)

Technology Acceptance Model measures two significant factors that influence people to accept or reject technology. Those factors are perceived usefulness and perceived ease of use (Davis, 2013). TAM, which conceptualized the two major factors influencing people in technology

acceptance, is a vital framework leading to adopting a new system (Lee et al., 2003).

Gap Analysis

The above review represents the attempt at introducing financial technology solutions in Indonesia. Nevertheless, there is still need for enhancement to maximize zakat's benefit in the country. Subsequently, the review elaborates how blockchain solutions, with no friction in Shariah law, can enhance transparency and minimize fraud risk in a system aligned with the problem presented in zakat management as data in the blockchain is immutable and auditable. Thus, it will also result in zakat efficiency. Moreover, this research will concentrate on how ready zakat system users (both zakat payers and zakat institutions) embrace new technology since a new sophisticated system may lead to significant transformation or rejection from users. The TRI and TAM review also explained how this method effectively assesses people's readiness to adopt and embrace new technology.

ANALYTICAL FRAMEWORK AND RESEARCH METHODOLOGY

To answer research questions of blockchain potential and adoption readiness between zakat payers and zakat institution, both quantitative and qualitative analysis using primary data sources is used, as follows:

Quantitative Research

The study uses Technology Readiness Index (TRI) to measure Zakat Blockchain Readiness of the chosen market in Indonesia. This model is considered the most appropriate model that is in line with the study. In a multi-dimensional way, this model measures people's tendency towards cutting-edge technology and segments consumers based on their positive and negative beliefs in technology

(optimism, innovativeness, discomfort, insecurity).

The research includes primary data to evaluate the technology readiness index of a sample of zakat payers using an electronic survey questionnaire. The purposive sampling was being concentrated in Jakarta as it is the largest city with the most significant potential of zakat on salary (BAZNAS, 2020). The survey criteria were Muslim, age 18 and above, paying zakat regularly, or has the intention to pay zakat in the future. Therefore, this research is expected to capture customers of zakat institutions from the zakat payers' side comprehensively by including not only the people who already have been paying zakat regularly, but also potential customers who may pay zakat soon.

The survey was divided into two parts. The first part of the survey uncovered the readiness of zakat blockchain usage using TRI, including the sentiment of zakat payers toward blockchain adoption in increasing OPZ credibility through optimism questions in the TRI part. Furthermore, the second part determined their perception of the OPZ's current ecosystem. Hence, the survey can determine the perception of credibility and trust of zakat payers with the existing structure, level of literacy and adoption of fintech and blockchain-based fintech.

Qualitative Research

This study uses Technology Acceptance Model (TAM) as the basis of measurement. This research applies TAM because BAZNAS (as sampled zakat institution in Indonesia) already applied blockchain zakat in a rudimentary manner. This model is expected to assess how blockchain zakat can help BAZNAS (perceived ease of use) and how they see the future of this technology application to boost zakat collection (perceived usefulness).

Qualitative analysis with primary data was conducted to measure the institution's acceptance of blockchain zakat. In-depth interviews with the IT head division of BAZNAS were conducted to determine the readiness from the zakat institution side. The interview will also provide insight into the preferences of BAZNAS in the development of a future blockchain model.

FINDING AND ANALYSIS

Readiness and donor literacy for the use of digital payments based on blockchain for zakat.

This section presents research findings of quantitative analysis based on responses to the survey about readiness and donor literacy for the use of digital payments based on blockchain for zakat, as follows: (i) descriptive statistical analysis of the survey; (ii) zakat preference of the respondents; (iii) blockchain literacy of the respondents; (iv) Technology Readiness Index (TRI) of respondents in adopting new technologies in general and (v) correlation between subgroups with zakat preference and segmentation of technology readiness.

(i) Descriptive statistic - Demographic

From 312 survey respondents, 197 respondents (63%) reside in greater Jakarta, which is the main focus of this research. Subsequently, 262 respondents (84%) of this research are in productive age or before retirement age (above 20, below 50), while 52% of them (133 respondents) are still in the very active age group, 21-39 years old. Female respondents dominated the survey. However, it is not an issue because being a zakat payer is not gender-restricted. The most considerable portion of the respondents

(94 people) has an income lower than IDR 36 million per year, which means lower than IDR 3 million each month (< USD 209.91), while 56 respondents have no income. Nevertheless, more than 70% of them claim that they pay zakat regularly, while the rest stated they have the intention to pay zakat in the future.

The survey results show a similar result to the survey conducted by Puskas BAZNAS in (2020) that less than 20% of zakat payers pay their zakat through BAZNAS. Meanwhile, other zakat payers pay their zakat directly to zakat recipients through the mosque or other zakat institutions. From the survey, 40.5% responded that they are unwilling to move to BAZNAS to pay zakat. However, 87.3% answered that they are willing to move to BAZNAS if they employ a system that improved BAZNAS's accountability and credibility. These results confirmed this research's prior assumption that zakat payers demand credibility and accountability from zakat institutions.

(ii) Zakat preference

The respondents are not only people who have been paying zakat regularly, and it explained why only 87% of the respondents are already paying zakat regularly. However, all non-zakat payer respondents intend to pay zakat. Thus this study captured not only BAZNAS's existing customers but also the potential customers. Aligned with Puskas BAZNAS (2020) finding, only a tiny portion of zakat payers, 62 respondents (13%), pay zakat through BAZNAS. Moreover, 127 respondents (28%) pay zakat through OPZ other than BAZNAS; while another 266 respondents (57%) pay zakat through the mosque and directly to the recipients.
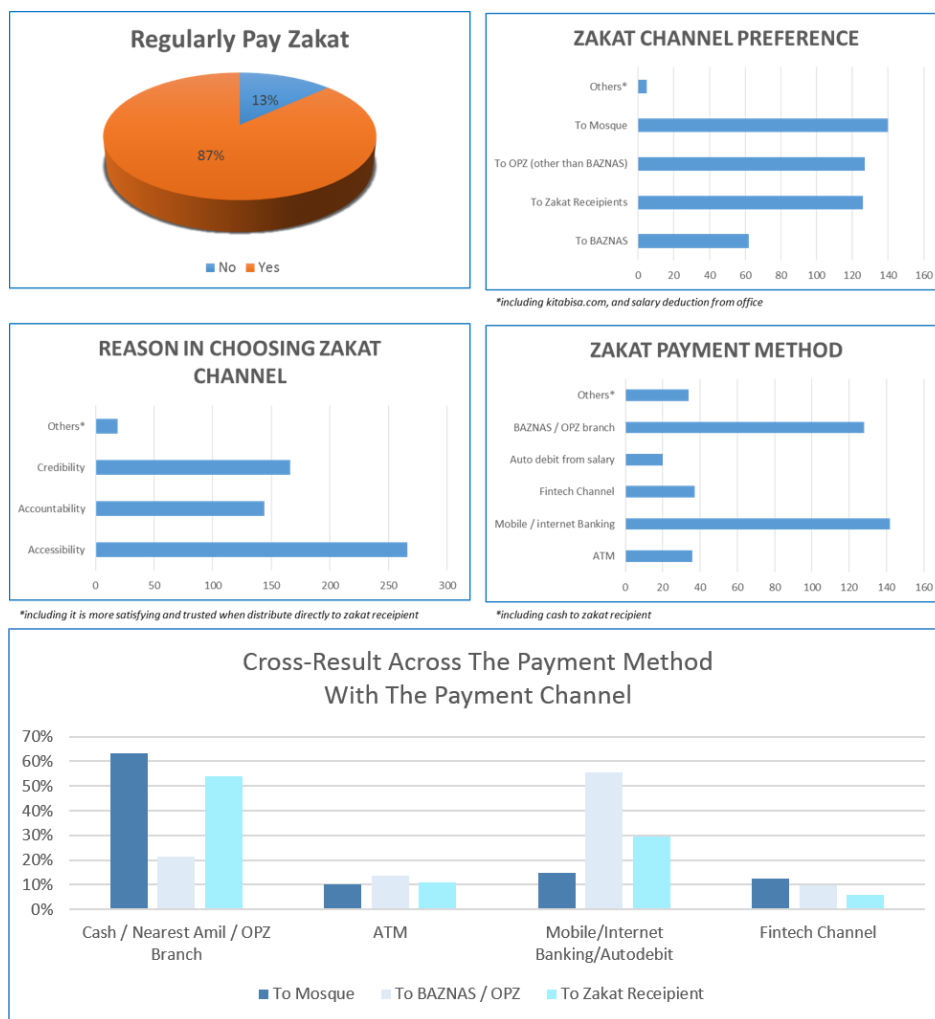
Figure 3. Zakat Preference

In choosing the zakat channel, zakat payers look at the accessibility, making them easier to pay zakat. Subsequently, they will also pay attention to the credibility and accountability of the zakat channel. A small portion of people even stated that it is more trusted option to pay zakat directly to zakat recipients, which means they demand credibility. The most preferred zakat payment method is mobile / internet banking, followed by going to zakat institution branch in their areas. In contrast, only 9% of the respondents pay zakat through the fintech channel. Strengthened by the cross-result channel, only 10% of zakat donors who pay zakat to OPZ/BAZNAS choose fintech as their zakat payment method while most zakat payers pay zakat to BAZNAS / OPZ preferring Mobile / Internet banking / Auto debit, which shows importance of accessibility. This finding is aligned with the problem statement in this research that it is immature to claim that fintech development in BAZNAS successfully pushes up the growth of zakat collection. Only a tiny portion of zakat payers use the fintech channel to pay zakat currently including donors which pay zakat to OPZ/BAZNAS.

Respondents were asked about their willingness to move to BAZNAS as their preferred zakat channel. However, 42% of the respondents did not want to move, and 5% specified they do not trust BAZNAS. The survey

shows that 18.5% of the respondents do not know BAZNAS. Moreover, 73.2% of them stated they are already comfortable with their current zakat channel, since most of them paid directly to the zakat recipient. They feel more assured that the payment is distributed right on the target. The

respondents were questioned about their willingness to move if BAZNAS developed a system that increases accountability and credibility. Respondents promptly react differently, with 87% of them saying yes to move to BAZNAS.
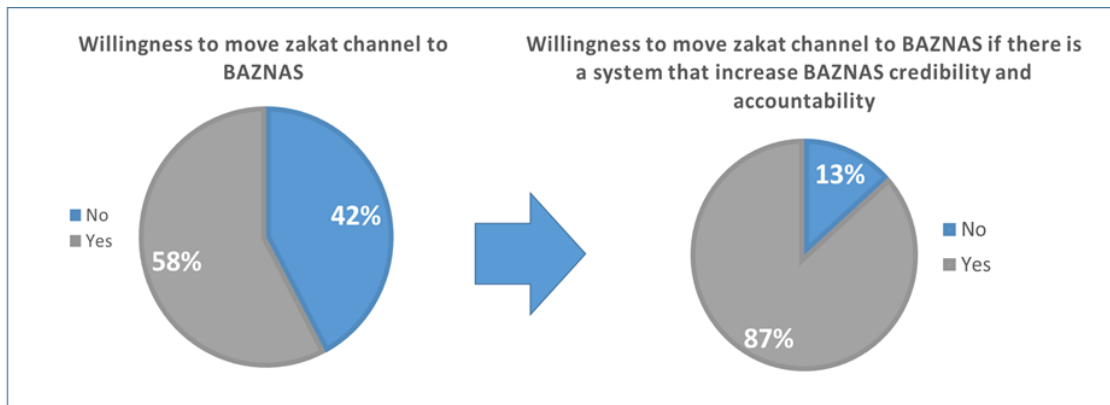
Figure 4. Willingness to Move Related to Credibility and Accountability

(iii) Blockchain Literacy

Blockchain is relatively new in Indonesia. It is proven that only 111 respondents (36%) claim to have ever heard about blockchain technology, while 201 respondents (64%) admit that they know nothing about blockchain. However, 36% of respondents claimed to be familiar with blockchain and primarily associated blockchain with

digital money, e-wallet, bitcoin, and cryptocurrency, as illustrated in Figure 5. As a matter of fact, blockchain is beyond that. It indicates that most Indonesian Zakat payers (and potential zakat payers) do not have a holistic view of what blockchain is. A simple explanation about blockchain and how blockchain works will help disseminate information related to blockchain.
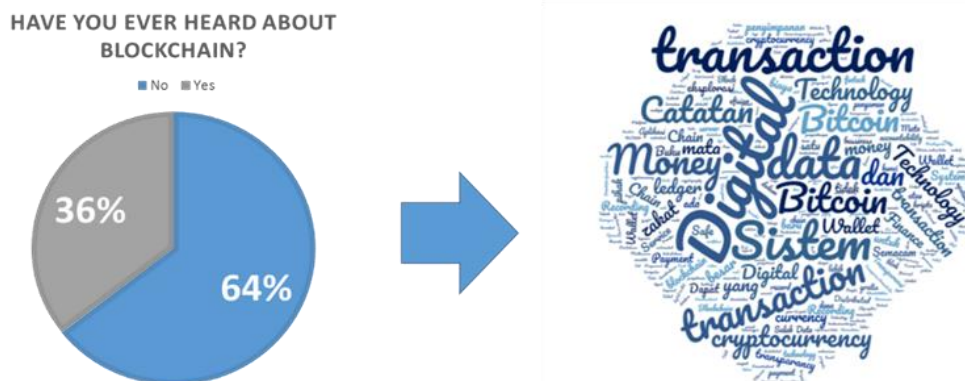
Figure 5. Blockchain Literacy

(iv) Technology Readiness Index (TRI 2.0)

This part analyses people's readiness to accept new technology in general. TRI

measures readiness through four dimensions, namely: optimism, innovativeness, discomfort, and insecurity. The questionnaire used 7 points Likert scale, where 1 indicates strongly disagree, 7 indicates strongly agree, and 4 is the midpoint or neutral. This research uses Cronbach's alpha to measure the reliability of the data. The generally accepted rule is α of 0.6-0.7 is considered as an acceptable level of reliability, and 0.8 or greater than that deemed as an excellent level (Ursachi et al., 2015). While the overall Cronbach's alpha value of this research is 0.93,

each of the construct individually shows α with no less than 0.82.

Based on the Pearson correlation test for validity, the t-table for the below table is 1.96. The computed t-value of all questions to measure optimism, innovativeness, discomfort, and insecurity are above 10.00, which shows that all are above the t-table value. This result means that all questions are significantly correlated to technology readiness. A detailed descriptive summary can be seen in Appendix 3, while the below table shows the summary of TRI analysis.

Table 1. TRI 2.0 Results Summary

	Mean	*Validity (Pearson Test)*	*Reliability (Cronbach Alpha)*
OPTIMISM	6.16	Valid	0.966
INNOVATIVENESS	5.33	Valid	0.904
DISCOMFORT	4.27	Valid	0.916
INSECURITY	5.18	Valid	0.872

α of the enablers parameter are 0.9 (more than 0.6), which shows that data has a high degree of reliability. The mean value of the optimism variable is 6.16 and 5.33, close to the highest point (strongly agree). It implies that the characteristic of optimism of the samples in the research is high. It implies that the characteristic of innovativeness of the samples in the research is high. It denotes that the enabler factors of technology readiness of zakat donors in the sample survey are high.

At the same time, α of inhibitors parameter are 0.916 and 0.872 (more than 0.6), which shows that data has a high degree of reliability. The mean of the optimism variable is 4.27 and 5.18, which are higher than the midpoint. It means that the characteristic of the discomfort of the samples in the

research is high. It signifies that the inhibitor factors of technology readiness of zakat donors in the sample survey are also high.

Consequently, as all means of four dimensions in the TRI test exceeds the midpoint, it indicates higher value in all aspects, both in enabler factors and inhibitor factors of adopting the technology. The population tested in this research can be classified as 'pioneers' or early adopters in technology readiness. Pioneers tend to hold high both strong positive and negative views of technology. People's nature in accepting technology are divided into four: explorers (high motivation, low inhibition), sceptics (low motivation, low inhibition), paranoids (moderate motivation, high inhibition), and laggards (low motivation, high inhibition)

(Parasuraman & Colby, 2015). Pioneers are defined as individuals with high optimism and innovativeness who tend to see technology as a good thing; hence they have a stronger motivation to accept new technology and more willing to use new technology (Nugroho & Andryzal Fajar, 2017). Moreover, combined with the fact that surveyed zakat payers demand credibility and accountability, blockchain essentially can cater to their need for credibility, accountability, and even accessibility. Thus, blockchain can be an excellent solution to boost zakat collection.

This research also confirmed that the BAZNAS fintech channel is not necessarily contributing to the zakat growth collection. Only less than 40 respondents stated that they use the fintech channel in making their zakat contribution (Figure 3). Meanwhile, most respondents prefer to go directly to the institution, such as directly to BAZNAS or OPZ branches, or using transfers. This finding verified the problem statement of this research about the insignificant growth after fintech adoption. It emphasizes that the BAZNAS fintech adoption level is inadequate, and other technologies such as blockchain are required.

(v) Correlation between subgroups with zakat preference and segmentation of technology readiness

Research mapped the blockchain literacy, zakat channel preference and consideration, and technology adoption segments against demographics. This research only considers three demographic elements in the regression analysis. The geographic variable was not considered in plotting the correlation, as the research population is focused on the greater Jakarta area. Seven estimation equations were made to observe the relationship between blockchain literacy, zakat channel preference, and consideration and technology adoption segments with the demographic.

- BLOCKCHAIN_LITERACY = $C(1) + C(2)*AGE + C(3)*INCOME + C(4)*GENDER$
- BAZNAS = $C(1) + C(2)*AGE + C(3)*INCOME + C(4)*GENDER$
- CREDIBILITY = $C(1) + C(2)*AGE + C(3)*INCOME + C(4)*GENDER$
- OPT = $C(1) + C(2)*AGE + C(3)*INCOME + C(4)*GENDER$
- INN = $C(1) + C(2)*AGE + C(3)*INCOME + C(4)*GENDER$
- DIS = $C(1) + C(2)*AGE + C(3)*INCOME + C(4)*GENDER$
- INS = $C(1) + C(2)*AGE + C(3)*INCOME + C(4)*GENDER$

This research is interested more in the significance of each independent variable to the dependent variable. $\alpha = 0.05$ is used in this research. For blockchain literacy, it can be seen from the above table that only age and income have statistically significant impact, and they are significant at 5%. The relationship of blockchain literacy with age is inverse, in which the younger the age, the higher the blockchain literacy. At the same time, income has a positive correlation with blockchain literacy. The higher the income, the higher the blockchain literacy. It is aligned with the previous research of fifteen countries, where younger adults and the more educated are more likely to engage in the cryptocurrency market (Panos & Atkinson, 2020). Income is positively correlated with credibility in zakat channel, implying that an increase of

1% in income will cause an increase in credibility of 0.05%.

Table 2. Regression Summary

	Blockchain Literacy		BAZNAS as Zakat Channel		Credibility		Optimism		Innovativeness		Discomfort		Insecurity	
	Coeff.	Prob.	Coeff.	Prob.	Coeff.	Prob.	Coeff.	Prob.	Coeff.	Prob.	Coeff.	Prob.	Coeff.	Prob.
C	0.52	0.00	0.28	0.00	0.44	0.00	5.97	0.00	5.77	0.00	4.47	0.00	5.29	0.00
Age	-0.07	**0.01**	-0.03	0.21	-0.02	0.50	-0.05	0.29	-0.16	**0.00**	0.03	0.69	-0.01	0.82
Income	0.04	**0.01**	0.01	0.71	0.05	**0.01**	0.08	**0.02**	0.04	0.32	-0.13	**0.00**	-0.08	**0.02**
Gender	-0.10	0.10	-0.02	0.64	0.05	0.41	0.26	**0.03**	-0.09	0.51	0.01	0.94	0.15	0.24
R-squared	0.04		0.01		0.02		0.03		0.03		0.03		0.03	
Adjusted R-squared	0.04		0.00		0.01		0.02		0.02		0.02		0.02	
Prob. (F-Statistic)	0.00		0.64		0.06		0.03		0.03		0.01		0.02	

In technology readiness index segmentation, optimism segmentation positively correlates with income and gender, as seen from the above table. When income is higher, the person is more optimistic about new technology. Furthermore, the table also shows that female respondent is more optimistic about new technology. While innovativeness has a negative correlation with age, the younger generation is more innovative about technology. For the inhibitor elements, both discomfort and insecurity have a negative correlation with income. When income is lower by 1%, the discomfort will be lower by 0.13%, and the insecurity will be lower by 0.08%.

Preferences, literacy and readiness by the major zakat collection agencies in applying blockchain within the existing zakat payment model

This section presents research findings based on an interview with BAZNAS - IT Head Division about preferences, literacy, and readiness of BAZNAS as the primary zakat collection agency in applying blockchain within the existing zakat payment model. BAZNAS was used in this research as the significant zakat institution in Indonesia because BAZNAS is the only authorized zakat institution that manages zakat nationally and other zakat institutions (OPZ) are formed under BAZNAS supervision. The research findings are presented as follows: (i) Blockchain in primary zakat agency (BAZNAS); (ii) Technology Acceptance Model, and (iii) Consideration for further blockchain development.

(i) Zakat and Blockchain application in primary zakat agency (BAZNAS)

BAZNAS has already been using the blockchain platform since 2020. It uses a rudimentary blockchain platform for digital approval systems (not in the zakat collection/distribution process). In this case, BAZNAS has been developing blockchain internally without engaging a third-party blockchain service provider. According to the BAZNAS IT head, this institution is required to keep up with technology development. However, BAZNAS cannot expend large amounts of money on IT development due to budget constraints.

(ii) Technology Acceptance Model (TAM)

a. *Perceived of usefulness*

At this point, BAZNAS still perceived blockchain's usefulness as low. Currently, BAZNAS only applies a rudimentary blockchain in one system, not interlocked with its central database. BAZNAS sees blockchain platform as merely a platform below another central platform. BAZNAS

believes, even without blockchain, the institution can still run the system with no problem. However, BAZNAS admits that blockchain contributes more value to transparency. Moreover, as the data is immutable, it also has a high degree of credibility and accountability. This benefit is how BAZNAS believes blockchain will create more value. Therefore, even BAZNAS is not applying blockchain, as they believed it would not create any issue to their business process as usual. BAZNAS even doubts that blockchain will enable it to save time and enhance its productivity in work.

Blockchain will also allow BAZNAS to have a massive database for analysis and data mining. Thus, BAZNAS agrees that blockchain can improve BAZNAS's job performance in the future, not only in the collection system but also in the whole zakat system. On the other side, BAZNAS also recognizes that even in this early stage of blockchain adoption, blockchain technology could cater its needs in digital approval, especially in this COVID-19 time, when digital approval is highly required. The data is immutable, so no one can change or delete the data, as there will be an indicator when the data is revised or deleted to prevent fraud.

b. Perceived ease of use

As BAZNAS is still in the early stage of using blockchain, it barely experienced problems. The blockchain platform system that BAZNAS has set up did nothing but receiving and storing the data. The blockchain does not need to give any feedback to other servers. Thus, people who are in touch with blockchain have no complaint about using blockchain at the moment. Further, from the in-depth interview with the BAZNAS Head of IT department, it can be concluded that at

this point, BAZNAS can accept blockchain technology well. Thus, it can be said that BAZNAS can perceive ease of use of this technology, as perceived ease of use in blockchain technology implies using blockchain is free of effort, difficulty, or tremendous effort (Davis, 2013).

(iii) Consideration for further blockchain development

In general, there are four primary considerations in further blockchain development stated by BAZNAS. These four primary considerations are IT knowledge regarding blockchain implementation, Indonesia infrastructure, data privacy issues that can influence zakat payers' sentiment, and budget allocation. These four factors have been the major concern in blockchain development.

a. Technical IT knowledge in the implementation

Discussion about blockchain in an organization must permanently attach to the IT department as the leading player of blockchain development. BAZNAS IT team is fully aware of the benefit of blockchain applications. BAZNAS agrees with the fact that blockchain can change future zakat management. However, the IT team still needs various questions regarding blockchain development, such as how is blockchain implementation from the technical IT perspective? How is the coding work? How to create BAZNAS's own network? How to ensure the chains are healthy? How to calculate consensus? Furthermore how to implement it correctly? Blockchain has not been very popular in Indonesia. The understanding of blockchain is still vastly limited. Thus, the BAZNAS IT team needs to do their homework thoroughly before doing further blockchain development.

Other than those questions that need to be answered by the IT team, more human resources are also required in this blockchain development because the current BAZNAS IT team has a limited number of people. BAZNAS needs an IT knowledge enhancement regarding blockchain development. IT team as blockchain activator in BAZNAS surely needs more support from the upper management to learn as to how blockchain works. However, at this point, BAZNAS seems to see blockchain as mere immutable data storage mechanism. However, blockchain can be more than immutable data storage tool.

b. Infrastructure

As Indonesia is an archipelago country, BAZNAS has comprehensive coverage in maintaining zakat in the country. There are 314 regional BAZNAS at the city district level, 34 regional BAZNAS at the province level, and a considerable number of OPZ under BAZNAS. Once BAZNAS applies blockchain, its channels need to be able to use this data or incorporate it within the network. In this case, they need to prepare a server and have a steady internet connection. However, the problem occurs when it comes to some areas in Indonesia. Especially eastern Indonesia areas such as Sulawesi, East Kalimantan, and Papua. These Eastern region areas are the weakest areas when it comes to infrastructure. Even without blockchain, BAZNAS is still trying to find the best way to accommodate them to access the BAZNAS information system database (SIMBA). In some areas, OPZ expects SIMBA can be accessed offline, as a good internet connection can only be reached in the middle of the night. However, BAZNAS still cannot cater to that.

c. Budget Constraint

Enhancing IT team's knowledge in blockchain development, enlarging human resources in blockchain development, and enhancing infrastructure, especially in the eastern area, to implement blockchain applications requires investment. The investment is not only made by BAZNAS but also by OPZ and regional BAZNAS. Both OPZ and regional BAZNAS need to enhance their infrastructure to keep up with blockchain technology (especially when BAZNAS decides to implement it in the zakat management system). However, BAZNAS (and other OPZ, especially in eastern areas) have limited budget allocation in developing technology in the institution. The teams inside BAZNAS are required to be as creative as possible in implementing blockchain. Thus, most of them are self-taught, including in developing blockchain. Not only investment is required at the beginning of blockchain implementation, but the budget has to be available to meet the needs of increasing number of networks and data storage in the blockchain.

d. Data Privacy and Muzakki (zakat payers) sentiment

The blockchain that BAZNAS currently adopts is entirely open-source, where the data is open and can be seen by the public without even log in. The open-source aspect of the blockchain will increase BAZNAS's transparency, credibility, and accountability. However, this open-source system requires maintaining zakat payers' data privacy by BAZNAS. This factor may lead to zakat payers' apprehensive sentiments once BAZNAS implements blockchain in its whole zakat system. Implementing an extremely transparent system is like having a sword with two sides. Some people will see BAZNAS

as a credible and accountable institution as it applies a high standard of transparency in the system. However, some may consider it a data privacy violation. This issue needs to be cleared before blockchain development in the BAZNAS's zakat system.

BAZNAS's reservation regarding data privacy was aligned with the survey results, in which respondents' insecurity is relatively high. More than 65.5% are insecure about data privacy through digital platforms, and they agree that giving personal information through digital platforms is not safe. Moreover, 71.4% agree that other parties can misuse their information inputted on the internet. It confirmed that data privacy is a severe issue that needs to be addressed in implementing a blockchain system in zakat collection to prevent the risk of a bad sentiment from zakat payers.

CONCLUSION AND RECOMMENDATION

First, this study has presented evidence that zakat payers demand the credibility of zakat institutions, while the level of BAZNAS's fintech adoption is inadequate. Therefore more advanced technology such as blockchain is required. Based on this study's results, zakat payers in Jakarta are ready to accept new technology, considering themselves pioneers in technology adoption. However, blockchain literacy is still relatively low, and blockchain is often associated with digital money, cryptocurrency, and bitcoin. BAZNAS needs to spread information about what blockchain is, how blockchain works, and blockchain's benefits among zakat payers, as the higher the users' knowledge level about the consequence in technology usage, the more likely they will form a positive attitude towards technology utilization (Dinev & Hu,

2007). There are many approaches that BAZNAS can use to spread information about blockchain. One of the channel campaigns that BAZNAS can consider is social media, where research indicates that businesses can increase awareness of their brand by being creative when engaging customers on social media sites (Husain et al., 2016)

Second, this study showed that some demographic indicators, especially income, correlate with the assessed factors in the research. It shows that the higher the income, the more they demand credibility, and the more familiar they are with blockchain. Similarly, the trend applies to the technology readiness index. When the income is high; people tend to be more optimistic and less impacted by inhibiting factors such as discomfort and insecurity to adopt new technologies. The income factor is an excellent indicator for BAZNAS to adopt blockchain for the zakat management system. Therefore, when BAZNAS plans to boost zakat collection, it first has to aim at the customer that contributes to higher zakat, for instance, people with higher income. This research confirms that credibility improvement is required to target the muzakki (zakat payers) with higher income. A blockchain application can be a positive alternative as this technology offers credibility and accountability enhancement. This research indicates that this group of people are most likely to adopt new technology.

Third, as a significant zakat agency in Indonesia, BAZNAS has already applied blockchain, yet it is not in its primary zakat management system. BAZNAS perceived ease of use in blockchain applications. However, it still cannot perceive blockchain usefulness, as this institution is still in the early stage of blockchain application. It believes that without blockchain, BAZNAS can function fine without disruption. In his research, Davis (2013) stated that the

usefulness relationship to technology usage is significantly more potent than the ease-usage relationship. Since, mainly, users are driven to adopt an application because of the application's function, and secondly because it is easy for them to use, as they are willing to handle complexities to use systems that contribute critical value to their work/life. Therefore, this perspective can hinder BAZNAS from utilizing blockchain further in the future. Trapped in a business-as-usual attitude can be problematic in business transitioning. To achieve sustainability, the institution should consider undergoing a substantial shift in the business approach to evolve and grow (Kemper et al., 2019). BAZNAS needs to see blockchain as more than immutable data storage. Blockchain also covers smart contracts in ethereum that can be adopted as automation of zakat payers 'contract' to BAZNAS. For example, zakat money distribution and the report are reproducible for zakat payers to maintain BAZNAS's accountability and credibility. These contracts are protocols that automate the verification, execution, and enforcement of specific terms and conditions of an agreed-upon arrangement among all nodes, subject to consensus and stored in a ledger (Fenwick & Kaal, 2018; Khan, 2020). Even though BAZNAS would not accept bitcoin/cryptocurrency for zakat payment, BAZNAS should look at possible avenues in utilizing blockchain applications in zakat system tokenization. Zakat system tokenization will help zakat payers tremendously, as the zakat payer only needs to top up his/her e-wallet with a token for zakat payment. This method also allows the financial transaction and flow to happen inside the blockchain.

Fourth, two of BAZNAS's primary concerns of applying blockchain are technical knowledge of blockchain and budget constraints. These obstacles require further attention. It is recommended that the BAZNAS's IT team participates in capacity building and self-development, using free resources around blockchain.

This method can be effective only if self-study is guided by professional training and learning. Furthermore, BAZNAS also considers that it will need more human resources in the IT department in developing blockchain. IT outsourcing can be a viable alternative to overcome this problem. IT outsourcing can offer cost reduction, higher quality, the ability to focus on the core area and meeting the short-term requirement of highly skilled resources (Dhar & Balakrishnan, 2006). BAZNAS mentioned that it is afraid that it will not get the full exposure of blockchain applications if BAZNAS outsourced the blockchain development. However, BAZNAS will need to incur more costs, involve more human resources, and require more time to develop blockchain by itself.

Fifth, infrastructure can be the most challenging obstacle in developing blockchain. As stated in the findings that BAZNAS agrees, it will be challenging to channel East Indonesian areas in the blockchain network as these areas have a minimal internet connection. In this case, BAZNAS needs to look into the alternatives of offline blockchain, if any. Collaboration with telecommunications companies and the government to facilitate these transactions in less developed areas could also be considered.

Sixth, data privacy is one issue that is most frequently concerned when it comes to technology. This issue is also one of the main concerns from BAZNAS that also matches with its customers' concerns. However, this issue should not be a concern in blockchain, as blockchain users' identities will remain anonymous. According to Khan (2020), one of the blockchain characteristics is confidentiality, in which the technology is public, yet the identities of the users remain pseudonymous. Different blockchain, such as ancile, enigma, dash, etc., will have different approaches to data privacy. It requires further study to match

between each blockchain privacy approach and BAZNAS's needs in the privacy-preserving blockchain.

Lastly, this study indeed has some limitations. First, the pieces of evidence was obtained from the sampled respondents that focused on greater Jakarta, and people in greater Jakarta may be more aware of the technology. While BAZNAS's coverage in the zakat collection is all over Indonesia, and the characteristics of technology awareness in each region can be different, with a huge gap, especially in East Java. Further research is required to capture the uncovered geographical scope of this research. Second, blockchain literacy is still limited to digital money, cryptocurrency, and bitcoin. A more robust result can be obtained when the study provides an overview of the blockchain model for blockchain zakat applications.

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