Does Web3 Application contribute to Poverty Alleviation?

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Abstract: This study proposes the contribution of Web3 application to poverty alleviation. A Web3-based digital application that utilizes blockchain technology to mining of digital currency assets for free without capital was also highlighted. Furthermore, the latest evidence linking Blockchain application to poverty reduction in Kampung Singaraja village in Buleleng Regency was discussed. The research was conducted using interviews to key informant and the results showed that the Web3 project considered the next generation of cryptocurrency, significantly increased asset ownership by key informant and impact on the success way to out of poverty. The Presence of Web3 applications, especially to underprivileged people, by helping to get out of the poverty trap is the real contribution of Blockchain for Development (B4D). This is expected to provide a real opportunity for poor people to consistently obtain digital assets in the form of digital currency for free to escape poverty by using smartphone.

Keywords: Blockchain Technology, Blockchain for Development, Web3 Project, Poverty Alleviation.

1. INTRODUCTION

Prior studies have focused on the role of information and communication technologies in development (ICT4D) such as the consideration of business, community, economic and financial, technological, as well as policy-related factors to indicate the complex role of Blockchain (Cunha et al., 2021; Appiah-Otoo & Song, 2021), poverty alleviation (Ning et al., 2021; Gu et al., 2022), and social welfare (Adera et al., 2014). Zhu et al. (2022) reported that disadvantaged women in rural China implemented poverty alleviation practices using internet technology, highlighting the potential of ICT in promoting inclusive development. Similarly Ofori *et al.* (2021) also found that ICT use, access, and skills are remarkable in reducing the severity and intensity of poverty. Moreover, Yang et al. (2021) showed that the use of mobile internet has a significant negative effect on multidimensional poverty. Overall, the internet and ICT play a crucial role in promoting and publicizing poverty alleviation efforts and ushering in an era of financial services (Tian & Zhao, 2020).

Blockchain is one of the outputs of internet technology and its effects on development have been examined in previous studies through the Blockchain for Development (B4D) concept (Pantielieieva et al., 2018; Mitchell, 2018; Cunha et al., 2020). Swan (2015) described the evolution of Blockchain in three different waves and these were combined with the analysis of Cunha et al. (2021) to explain the existing four waves. Wave 1, Blockchain 1.0 - Cryptocurrency, which was first introduced in 2009 with a focus on solving the problem of double spending and introducing cryptocurrencies such as Bitcoin followed by several others. Meanwhile, Wave 4 in 2019 was interoperability and scalability. Following the start of Wave 4 in 2019, a new Web3 Project known as Pi Network gained significant attention as a notable phenomenon. By using their own blockchain technology, it was first introduced on March 14, 2019. Pi Network is the first mobile Blockchain mining project with the mission to provide access to everyone to contribute to the cryptocurrency. Recently, Pi Network recorded 45 million members spread worldwide. It is important to note that several other Web3 Projects such as Core Network have emerged after the launch of Pi Network by adopting the same concept of free-playing cryptocurrency via mobile phones.

In an effort to know the implementation of ICT4D in a region, Buleleng Regency in Bali Province was selected as the case study location to determine the relationship between Blockchain and poverty alleviation. Bali is one of Indonesia's provinces with the lowest percentage of poor people. However, it has a relatively high ratio of poor people between regencies/cities. Bali Province has a poor population of 165,190 people according to 2020 data. The regency with the lowest number of poor people in Bali Province is Klungkung totaling 8,760 people while the highest is in Buleleng with 35,250 people. Buleleng has the highest number of poor people compared to other regencies in Bali province as indicated by the data from 2015 to 2020. Therefore, it was selected as the location for the case study. This research displays unique facts obtained from key informants who come from the case study area, namely Kampung Singaraja Village, Buleleng Regency, Bali Province, Indonesia.

Base on the unique facts that we obtained from key informants associated with the conditions of the key informant's residence which was classified as an area with a high poverty rate, the researcher was motivated to conduct a study that

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discussed the relationship between the ICT4D concept based on Web3 applications and poverty alleviation from key informants who belonging to a poor condition. The research was conducted using interviews to key informants and obtain several documents to assist the analysis phase. This study focuses on examining the special issue of the Blockchain for development to determine the effect of the Web3 Project on development, especially in relation to poverty alleviation. The main contribution of this research is expected to be able to show the real contribution of the presence of the Web3 Application based on the experiences of key informants to efforts to break free from the poverty trap that befell key informants before getting to know the Web3 Application.

This article is organized into six sections. Section 2 discusses the literature review, with a particular emphasis on the concepts of ICT for Development (ICT4D) and Blockchain for Development (B4D). Section 3 presents the methods used in the study, including the research design, data collection, and analytical framework. Section 4 presents the data obtained from semi-structured interviews and document analysis, with a focus on the contribution of the Web3 Project to poverty alleviation. Section 5 discusses the findings of the study and their implications, and Section 6 presents the conclusion.

2. LITERATURE REVIEW

The concepts of ICT for Development (ICT4D) and Blockchain for Development (B4D) emerged from the Capability Approach Theory (Sen, 1999) which explains the relationship between ICT and poverty alleviation. It focuses on "the expansion of human 'ability' to live" and interprets development as "the process of expanding real freedom." This serves as the theoretical basis for Sen's (1999) evaluation of ICT4D or ICT for development. Another study also showed that ICT positively contributes to poverty alleviation (Gu et al., 2022). Furthermore, the presence and capabilities of ICT4D are expected to contribute to the development of the economic sector (Nhamo et al., 2020; Appiah-Otoo & Song, 2021).

Sen's five instrumental freedoms used to explain the meaning of "capability" (Sen, 2000; Sumner & Tribe, 2008) include economic facilities, political freedom, transparency guarantees, social opportunities, and security protections. The essence of the development process is to ensure greater freedom which can enhance people's abilities to help themselves and affect the world (Sen, 1999). It has also been noted that ICT has the ability to achieve social and other development outcomes within the human paradigm (Heeks, 2018). Moreover, Sen (1999) highlighted the other dimensions of poverty to include security from violent and economic risks, opportunities, as well as empowerment to champion development (Alkire, 2007). The advocacy for growth was also observed to be important because each individual is responsible for their well-being through capability decisions (Grunfeld, 2007).

The five capital assets owned by the poor which can be utilized for sustainable livelihoods and avoid poverty include physical, natural, financial, human, and social assets. The presence of ICT is expected to support the availability of access to information and ease of access in obtaining the five capital assets. Meanwhile, improved communication and ICT networking can facilitate linkages between nature, economic sectors, and social welfare. This was confirmed by the findings of Adera et al. (2014) that the poor have the ability to obtain market information and communicate with economic partners using ICT facilities. Previous studies have investigated the relationship between ICT and poverty. For example, ICT4D was described using the empirical research conducted in five African countries including Tanzania, South Africa, Kenya, Namibia, and Rwanda. It is pertinent to outline the empirical evidence linking ICT to poverty alleviation is Pathways to Poverty Reduction edited by Adera et al. (Flor, 2014).

Zhu et al., (2022) examined the relationship between ICT and poverty alleviation and found that disadvantaged women implemented poverty alleviation practices in rural China using internet technology. It was further reported a user of social media to sell local products, a model of government leadership in building online learning, training and sales platforms, and a model designed to combine government guidance, enterprise empowerment, and media promotion. Moreover, Mora & Rivera (2021) found that Internet access is an additional mechanism for poverty reduction. Another finding by Ofori et al. (2021) showed that ICT usage, access, and skills are remarkable in reducing the severity and intensity of poverty. This was corroborated by Yang et al. (2021) that the use of mobile internet has a significant negative effect on multidimensional poverty. This means mobile internet is considered important in designing a strategy to reduce multidimensional poverty in rural households.

Alimi & Okunade (2020) found that ICT diffusion proxied by internet penetration led to significant poverty reduction in the short term but did not have any effect in the long term. Tian & Zhao (2020) also showed that the internet plays an important role in promoting and publicizing poverty alleviation as well as conducting financial services. These findings indicate the possible application of the Internet as a national strategy, financial model, and positive energy for poverty alleviation. Aviles et al. (2016) also noted that the adoption of ICT changed the information-seeking pattern and improved the ability to acquire information and assets in low-income communities.

Several studies have also discussed the role of Blockchain in global poverty alleviation and provided evidence that it is an appropriate solution to address poverty challenges. For example, Ning et al. (2021) analyzed data from semi-structured interviews and public documents. The results showed that Blockchain-enabled government processes, through the coordination and accuracy features of the technology, can improve the efficiency of poverty alleviation work designed by regional governments. Blockchain technology adopted by many countries in different sectors such as business, finance, technology, education, and the public show the importance of this technology in advancing development. It is pertinent to note that less-developed countries can avoid the typical lag in adopting ICT and make a quantum leap to place them on par with more developed countries (Cunha et al., 2021).

Blockchain can overcome many of the barriers and challenges the Global South faces due to its ability to address multiple causes of poverty by strengthening the rule of law, helping enforce property rights, and creating opportunities for disadvantaged communities (Kshetri, 2017). It is currently

being used to secure the property rights of the poor in Georgia and India (Kshetri & Voas, 2018), provide disadvantaged groups access to banks in African countries, and protect against fraud and control corruption in China and India (Kshetri, 2017). Blockchain has also been used to track the flow of financial support to the poor and measure the effect of poverty alleviation in several developing countries (Thomason et al., 2018).

3. METHOD

An exploratory qualitative case study method was used to explain the phenomena being studied and examine the use of Blockchain in poverty alleviation in one of the regions in Indonesia (Ning et al., 2021). The case study is considered the most suitable method because it can be used to examine phenomena in one or more locations by applying qualitative techniques that allow in-depth understanding through data collection and analysis (Cavaye, 1996). It has been previously applied by several ICT studies (Leonardi et al., 2016; Qureshi & Xiong, 2017; Ning et al., 2021).

3.1. Data Collection

The primary data used were obtained from interviews and secondary data through public sources (Leong et al., 2016; Ning et al., 2021). The collaboration of these sources is considered capable of contributing to the validation of the study results (Yin, 2018; Ning et al., 2021). The primary data was retrieved from one key informant through in-depth interviews conducted from February to March 2023 using the both direct and indirect telephone as well as social media interview techniques. The key informant was selected based on certain criteria which include being a resident of Buleleng Regency, owning a smartphone, having an income below the poverty line (classified as poor), and having experience related to free cryptocurrency mining through smartphones. Furthermore, secondary data were retrieved from literature reviews, crosschecking information from general sources regarding Web3 Project-based Blockchain, and the experience with Blockchain in order to validate the results.

3.2. Analytical Framework

Qualitative analysis involves interpreting findings and drawing conclusions using logic or systematic reasoning. This study applied an interactive analysis model which has three components after data collection including data reduction, data presentation, and conclusion drawing or verification using interactive mode.

Data Collection. This stage focused on collecting data at the study location through observation, interviews, and documentation using the appropriate strategy. The aim was to determine the focus and deepen the data required in the process. Furthermore, the data reduction stage was used to summarize, select, and focus on important things such as the patterns and themes (Sugiyono, 2016) to provide a clearer picture and ensure easier data processing. It is important to note that the reduction process was initiated before the data collection, continued during the implementation, and up to the period the study was completed. The reduction activities during the collection period include formulating summaries, coding, focusing themes, making problem boundaries, and writing memos.

The data presentation stage focused on presenting the qualitative data as brief descriptions, charts, relationships between categories, flowcharts, and others (Sugiyono, 2016). It was also in the form of a sentence arranged logically and systematically to easily understand trends and implement certain actions. Data presentation is not only in the form of sentences but can also include different types of matrices, pictures or schemes, networks, activity links, and tables to support the narrative (Sugiyono, 2016). The stage of drawing conclusions was conducted after the study to clarify the indecipherable findings (Sugiyono, 2016). The data collected were summarized and interpreted to precisely and clearly describe the emerging problems.

4. RESULTS

The extracts of the interview conducted from April 2022 to March 2023 with the key informant selected based on the aforementioned predetermined criteria are presented. The summary of the interview results was presented by modifying the sentences in line with the coding of the data reduction.

4.1. Determination of Key Informant

The interview was conducted with an informant presumed to have accurate information because the person is (1) from (2) Buleleng Regency, (3) owns smartphones, (4) has income below the poverty line, and (5) has experience related to free cryptocurrency mining through smartphones. These criteria were observed to be satisfied by the key informant used in this study:

I am a native of Buleleng Regency who was born in Kota Singaraja [B3]. I graduated from Senior High School and I am unemployed [B2]. I do not have a regular income and I depend on my parents who are also economically insufficient [B38]. I started mining after downloading the application [B4] on my Android phone [B5] through the download link I obtained from my acquaintance on Twitter [B5].

The coding section B3 (first sentence) of the extract confirmed the source meets criteria 1 and 2 which include being an individual from Buleleng Regency. B2 (second sentence) and B38 (third sentence) showed that the informant meets criterion 4 because the informant does not have personal income and comes from a family with poor economic conditions.

B4 (fourth sentence) also showed that the informant satisfies criterion 3 concerning smartphone ownership and B5 (fourth sentence) indicated the fulfillment of criterion 5 on having experience in mining free cryptocurrency through a smartphone. These results showed that the informant fulfilled all the requirements needed to participate in this study.

4.2. From Smartphone-Internet to the Application Free Mining Cryptocurrency

The application of a smartphone owned by the key informant to mine cryptocurrency for free is presented in this section

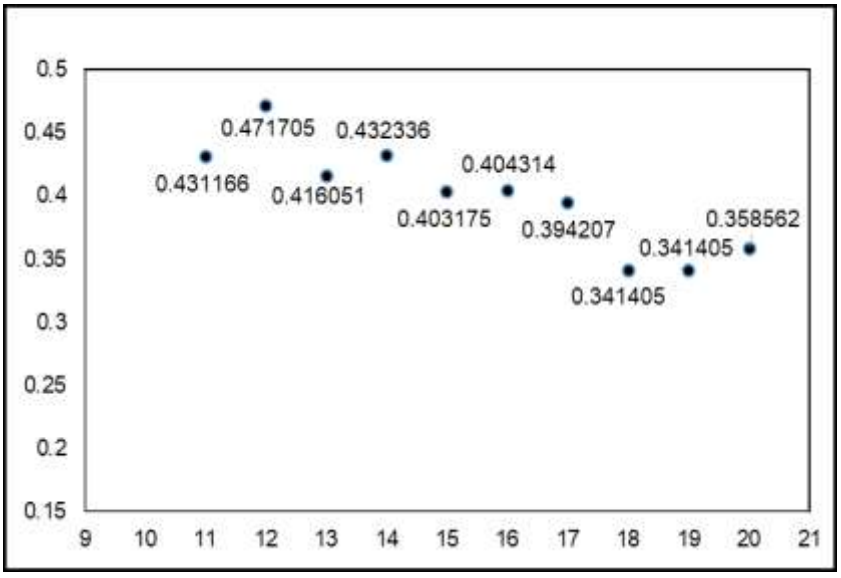

Fig. (1). Asset additions through the CORE Staking Program for the period 10 - 20 February 2023.

and this can be inferred from the response provided as follows:

That's right, I downloaded an application on my smartphone, Satoshi, through a link from my acquaintance on Twitter and registered [B4]. This application is only available for Android users but not for iPhone users [B5]. My acquaintance on Twitter explained the process of registering for a Satoshi account [B6]. I initially thought I downloaded and registered on the Pi Network application which allows free mining of a crypto coin called Pi with the mathematical symbol of Pi. Meanwhile, Satoshi has a similar system but Pi Network was the first pioneer of free crypto mining using applications on smartphones [B7]. Initially, Satoshi mined BTCs, but now it mines CORE, which is represented by the symbol BTC [B12]. The cryptocurrency changed its name to avoid any association with Bitcoin.

It was discovered from the summary that the key informant utilized smartphone ownership and internet access to download free cryptocurrency mining applications and start the mining experience after registering an account. Moreover, two free cryptocurrency mining applications, Pi Network with Pi Coin and Satoshi with CORE coin, were downloaded.

4.3. Ownership of Assets Through the Free Mining Application

The quantity of cryptocurrency mined by the key informant was identified as follows:

Pi Network's cryptocurrency cannot be exchanged for dollars or rupiah currently but the newly obtained results from Satoshi mining are already available [B9]. Satoshi originally mined BTCs, but now it mines CORE and changed its name to differentiate from Bitcoin, symbolized by BTC [B12]. I click the claim mining results button daily and receive one result every ten minutes, which used to be as little as 0.00046578; I used to save screenshots for reference [13]. The coins obtained from mining CORE can now be used as currency as their value is based on dollars [B10]. I have been mining CORE since April 2021, and my current balance is about 335 CORE [B21], with one CORE almost equaling three dollars [B22]. Initially, I was skeptical that it could have any real value, but since it was free and harmless, I continued mining daily. As it turns out, CORE has a significant price [B23].

The summary shows that the key informant already has 335 CORE crypto assets through a free cryptocurrency mining application called Satoshi. When the key informant began mining CORE, he knew that the cryptocurrency did not yet have a set value. However, the ownership of the mined assets has now paid off, as the cost per unit of CORE is approximately three dollars since its introduction into the marketplace.

4.4. Consistency of asset addition through the Staking Program

The key information obtained additional assets consistently through the program offered by CORE Blockchain after the ownership of crypto assets through the free mining cryptocurrency applications. This was observed in the following information:

Currently, I am blessed to receive regular additional CORE assets as a result of mining, Alhamdulillah [B26]. I can provide you with data on the amount I receive daily, just let me know [B29]. I have also “staked” my CORE on the Coredao.org website, which means I am holding onto it as an investment [B30]. In fact, I staked my CORE on February 10, 2023, as shown in the history section [B32]. I plan to continue mining until all the coins are depleted, which will take some time since there are still 2.1 billion coins available outside of Satoshi's application [B34]. Having this additional monthly asset is quite beneficial [B37].

It was discovered that the informant continued staking CORE daily to have more assets after owning crypto assets from the free cryptocurrency mining application. The additional assets were verified using the attached documents provided by the informants and visualized in Fig. (**1**). An addi-

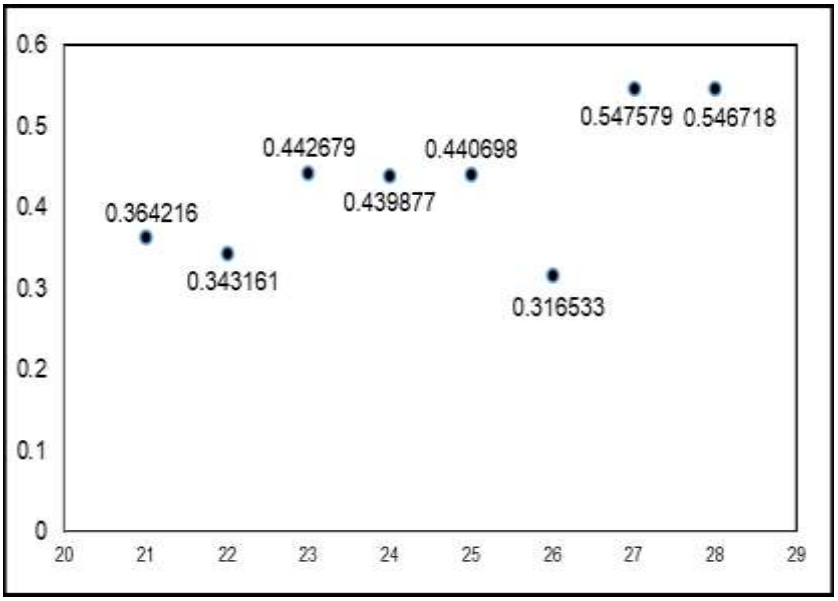

Fig. (2). Asset Addition through CORE Staking Program period 21 - 28 February 2023.

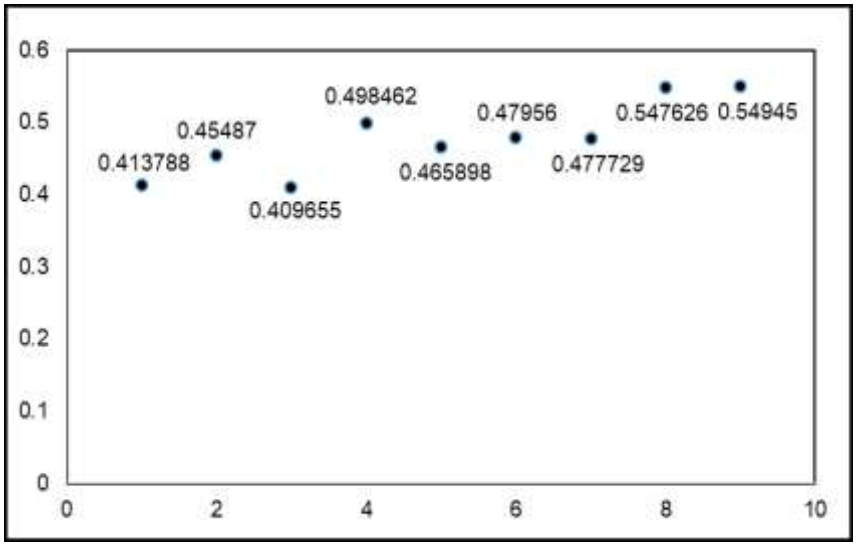

Fig. (3). Asset Addition through CORE Staking Program period 1 - 9 March 2023.

tional 3.994326 CORE assets were obtained by the informant during a 10-day period, 10th to 20th February 2023, of participating in the CORE staking program.

The data visualized for an 8-day period from 21st – 28th February 2023 in Fig. (**2**) showed that the informant obtained an additional 3.441461 CORE assets.

The data visualized for a 9-day period from 1st – 9th February 2023 in Fig. (**3**) showed that the informant obtained an additional 4.297038 CORE assets

The overall data presented in Fig. (1-3) showed that the total additional CORE assets received by the key informant through the CORE staking program for 1 month, February 10 - March 9, 2023, was 11.732825 CORE. This means the total additional dollar asset of the key informant is $35,198 or equivalent to IDR545,569 based on the assumption that one CORE is 3 dollars.

5. DISCUSSION

The economic conditions of the key informant stated in subsection 4.1 to be poor with incomes below the average poverty standard and a special experience in the field of ICT, especially Blockchain technology, indicated the fulfillment of the criteria to provide valid and reliable information. This is in line with the observation of previous studies (Thomason et al., 2018; Kshetri & Voas, 2018; Kshetri, 2017) that the poor are the main target of poverty alleviation efforts implemented through the use of Blockchain technology. The key informant explained and emphasized the lack of a regular income and the family's financial insufficiency before knowing blockchain technology.

ICT presence was assessed based on the ownership of a smartphone. The key informant was observed to have an Android-based smartphone with internet access. This was

used to support the financial status by downloading applications on free cryptocurrency mining and this is considered a proactive effort to avoid poverty. This observation supports the findings of Zhu et al. (2022) that disadvantaged women in rural China were able to be free from poverty using internet technology. Mora & Rivera (2021) also showed that Internet access is an additional mechanism to reduce poverty levels. Moreover, Ofori et al. (2021) found that ICT usage, access, and skills are remarkable in reducing the severity and intensity of poverty. Yang et al. (2021) also reported the ability of mobile internet usage to significantly negatively influence multidimensional poverty.

The results highlighted the impact of digital asset ownership on the financial condition of the key informant. It was discovered that the key informant did not possess any valuable assets before the involvement with the Web3-based free cryptocurrency mining application. However, the contributions to the mining application resulted in the ownership of digital assets with a significant positive impact on the financial situation. This finding represents a novel contribution to the study, as it demonstrates the positive effects of Web3-based digital applications on digital asset ownership, which in turn can help lift individuals out of poverty. The key informant's assets have steadily increased since the end of the free distribution of digital assets through the cryptocurrency mining application. Based on the poverty standard set by the Indonesian Central Bureau of Statistics that the Poverty Line as of September 2022 was recorded at IDR 535,547/capita /month (BPS, 2023), the key informant's daily increase in assets means he is now considered non-poor. This highlights the potential of Web3-based digital applications to have a positive impact on poverty reduction.

This study makes a novel contribution to the application of the Capability Approach Theory (Sen, 1999) to the concept of ICT4D by introducing the new concept of B4D. It shows that poor individuals with limited access to information about free mining cryptocurrency can greatly benefit from the initiatives of Blockchain technology developers producing Web3 applications based on free mining cryptocurrency. This new concept highlights the potential of Web3-based applications to enhance the capabilities of poor individuals by enabling them to improve their economic situation through the ownership of digital assets.

This study offers several novel findings related to the positive impact of Blockchain innovations and Web3 applications on increasing digital assets and improving economic conditions for miners. Firstly, it is the first in the world to reveal the positive contribution of Web3 applications based on free mining cryptocurrency to add a person's digital assets, which has a significant impact on their economic conditions. Secondly, the study provides new evidence on the use of Blockchain technology to address poverty issues in Indonesia. It also demonstrates the positive effect of ICT utilization, particularly through smartphones and internet access, on increasing digital currency asset ownership, which ultimately helps individuals escape poverty. Furthermore, it highlights the novel fact that Blockchain can be used to distribute digital currency for free, leading to improved economic conditions and a higher likelihood of escaping poverty. Lastly, the study presents new evidence on the exchange of digital currency through a massive barter system worldwide, involving the results of free mining cryptocurrency through Web3 applications. These findings contribute significantly to the Capability Approach Theory (Sen, 1999) on the ICT4D concept, and its derivative concept, B4D. Meanwhile, the limitation of this study is the need for a comparison of conditions from key informants from other regions to strengthen facts about Web3's contribution to missile alleviation.

CONCLUSION

Web3 application is the latest innovation in the Blockchain world that creates digital applications based on free mining cryptocurrency. It is considered capable of increasing the digital assets of an individual mining cryptocurrency through a smartphone.

The study presents the latest evidence linking the use of Blockchain to address poverty in Indonesia. This was achieved by highlighting the ability of a Web3-based digital application to utilize Blockchain technology in increasing the ownership of digital currency assets free of charge. The semi-structured interviews and documents analyzed showed that the Web3 project, considered the next generation of cryptocurrency, significantly increased people's asset ownership. It was also observed to have provided a real opportunity for the poor to consistently obtain digital assets in the form of digital currency for free in order to escape poverty.

There is a need for regions dealing with the stability of the poverty index to start making real contributions from the micro or individual level. This can be achieved through the provision of literacy studies on the contribution of Blockchain technology through Web3-based applications to allow the poor to consistently own digital assets that can significantly affect individual poverty conditions. Moreover, relevant stakeholders need to consider the contribution of Blockchain technology, especially the Web3 project, as a quantum leap in poverty alleviation. It is also necessary to publicize information on trusted Web3 applications to the people, especially those living below the poverty line, to increase public confidence in the real contribution of B4D.

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