

Exploring the Digitization of National Digital Currency (Omani Rial) Using Blockchain Technology for Future Financial Advancements in Oman

¹Taif Talal Yahya Al-Khusaibi

²Ammar Khalid Mohamed Al-Siyabi

³Amin Issam Qambar Al-Ajmi

⁴Musab Saif Said Al-Azri

⁵Tripti Sharma, <https://orcid.org/0000-0002-7368-6897>

^{1,2,3,4,5}University of Technology & Applied Sciences, Muscat, Sultanate of Oman

Corresponding Author: *Tripti Sharma (email: tripti.sharma@utas.edu.om)

Abstract— The most recent advances in technology have brought about significant changes in financial transactions and settlements through digital currency or cryptocurrency on a global scale. The proposed research aims to identify innovative technologies that could enhance Oman's current financial system by introducing digital currencies and leveraging cutting-edge technologies like blockchain. The research seeks to investigate the potential implementation of a national digital currency, the Omani Rial (CBDC), using blockchain technology. There are numerous aspects of the current financial system and government operations in Oman that could be enhanced through the use of blockchain technology. The study's focus is on understanding the reasons behind the reluctance of government and non-governmental organizations in Oman to embrace digital currency for their financial transactions. To achieve this, the study employs survey questionnaires and interviews as data collection tools. Subsequently, statistical analysis is conducted to derive the findings. Lastly, the study presents its findings, recommendations, and suggestions for the adoption of the Digital Omani Rial (CBDC) as a future means of conducting digital financial transactions in Oman, along with its associated benefits and legal considerations.

Index Terms: Blockchain, CBDC, Digital Currency, Cryptocurrency.

I. INTRODUCTION

Digital currencies, also known as cryptocurrencies, are forms of digital money created for the purpose of facilitating financial transactions. Cryptographic algorithms are utilized in the creation of digital currencies to ensure the security of transactions. Digital currencies typically employ a decentralized distributed ledger to store transaction histories. Instead of a central authority, a community of individuals known as "miners" is responsible for managing and processing transactions using blockchain technology.

Blockchain technology is an extremely secure method for storing data and information. Essentially, it involves linking blocks of data (such as cryptocurrency transactions) using specific hashing algorithms that incorporate the hash values of previous blocks into subsequent ones. Every participant's computer retains a copy of the entire blockchain, and if any copy is altered, the other participants will detect the change and correct the false information.

In the 1990s, discussions were held about creating a digital exchange that would not rely on trusted third parties such as financial institutions [1]. The first notable implementation of this concept came in the form of 'Bitcoin,' which was introduced as a decentralized electronic cash system [2]. Satoshi Nakamoto created Bitcoin, the first blockchain-based digital currency, in 2009. Over the past decade, Bitcoin's significance has grown significantly, attracting the attention of governments, private sectors, and the media. Apart from Bitcoin, other popular cryptocurrencies include Ethereum, Litecoin, Cardano, and Solana [3]. Various countries around the world are conducting research to establish their digital currencies with appropriate legal policies and regulations. This study conducted a comprehensive analysis of the digitalization of the Omani Currency, specifically the Omani Rial (OMR) as a central bank digital currency (CBDC) using blockchain technology and explored its advantages and disadvantages. Additionally, this research will delve into the future potential of CBDC in financial transactions for businesses and citizens. The current situation in Oman involves payment processors based in other countries taking around 2% of all transaction revenue as fees, acting as middlemen. This high fee is a significant burden for businessmen and small businesses, creating a need for a better alternative. Implementing a Central Bank Digital Currency (CBDC) can eliminate the middleman and enhance financial and economic activities in Oman. It is widely known that banks do not have sufficient reserves for all customer bank accounts, with most commercial bank assets reserves being comprised mainly of commercial papers and

loans, posing a risk. The 2008 financial system collapse serves as a reminder of the consequences of financial mismanagement, as banks held a large percentage of their assets reserve in risky loans, leading to an asset bubble and subsequent burst resulting in massive losses. Implementing a CBDC will eliminate the commercial bank's currency issuing process, enhancing security and trust in the currency. The use of cryptocurrency in Oman has stagnated since 2017, and there is no existing digital Omani currency technology. While the Oman Central Bank has studied the addition of digitalization to the local currency, no further studies have been conducted to implement the digital Omani Rial. The response of the national bank in our country to digitalizing the local currency indicates weak interest. Additionally, there is a lack of awareness among both technical and non-technical individuals about state-of-the-art technologies such as blockchain and its potential application in addressing financial issues.

Definitions:

Blockchain: Blockchain serves as a collaborative and unchanging record that enables the documentation of transactions and monitoring of assets within a business network. Assets may take the form of physical items (such as a house, car, cash, or land) or non-physical entities (like intellectual property, patents, copyrights, or branding). Almost any valuable item can be monitored and exchanged on a blockchain network, thereby diminishing risk and lowering expenses for all parties involved [6].

Cryptocurrency, which is a digital currency, is an alternative payment method that is generated using encryption algorithms. The use of encryption technologies enables cryptocurrencies to operate as both a form of currency and a virtual accounting system [7].

The goals of this research can be outlined as follows:

- To explore the extent of digital currency usage and awareness among the general public in Oman.
- To analyze the barriers to adopting digital currency in Oman.
- To examine potential technical challenges in implementing a Central Bank Digital Currency (CBDC).
- To assess the advantages of using digital currency for financial transactions and its impact on trading and the economy in Oman.

The following are the research questions that will be addressed in the proposed research study:

- 1) Are the citizens aware of the digital currency concept and new technologies such as Blockchain?
- 2) Are Oman's government or non-government business firms involved in financial transactions using any kind of digital currency?
- 3) Why could the central banks in Oman still not regulate or adopt digital currency?
- 4) What technologies could be used to implement CBDC (proposed digital Omani currency)?
- 5) What is the security & privacy concerns related to CBDC?

- 6) What are the benefits of digitizing the national currency to ordinary citizens and traders in Oman?
- 7) What are the potential risks involved in it?

II. MATERIALS AND METHODS

A systematic research methodology is followed in this research that involves the following steps:

A. Literature Review

This research is an exploratory study that includes a thorough literature review as discussed in the background study section to gather information regarding the evolution and emergence of cryptocurrency, the status of the use of digital currency in Oman, the Cryptocurrency Landscape, and its status in the Middle East countries, the technical perspective of digital currency along with regional trends and prospects. The data and information have been gathered from peer-reviewed research papers published in reputable journals, news articles from national newspapers, and reports from credible sources. The aim is to delve further into the various potential applications of digital currency, as well as the economic advantages and potential risks associated with it. All this information will help better understand all the aspects covered in this study and design the data collection tools used (survey and interview).

B. Data Collection

The study will collect the data from the following resources:

- **Survey Questionnaire:** A questionnaire is used to gather information in a survey. This survey aims to estimate the level of public awareness regarding digital currency and its utilization in Oman. The survey gives significant consideration to the participants' level of education. It also contains inquiries tailored for businesses engaged in daily financial dealings. This survey comprises both open-ended and closed-ended questions pertaining to their financial transaction processes, frequency of transactions, associated costs, their familiarity with digital currency, and the reasons for not adopting it

- **Interviews:** Prominent bank officials and businesses were interviewed in Oman to gather their insights on the digital transformation of Omani currency and the necessary regulations for its implementation.

C. Data Analysis

The findings from the review of research papers, articles, and reports will be used to investigate and analyze the use of digital currencies in different countries. The analysis of the collected data will explore the application of blockchain technology in digital currency implementation in Oman. Statistical analysis of survey and interview data will be conducted to address the research questions and will be presented in the results and discussions section.

III. RESULTS & DISCUSSION

In this section, we will review the discoveries and suggestions derived from our study, which is based on the examination of the outcomes. The results will shed light on Oman's current utilization of digital currency and explore the

potential for introducing a digitized Omani rial, known as a CBDC. The findings will propose how the central bank could gain from integrating a CBDC. Moreover, the findings and recommendations will underscore the importance of establishing legal and regulatory frameworks for digitizing the Omani rial to harness its benefits without facing legal repercussions, thereby enabling CBDC to become the future of financial transactions and exchanges in Oman.

Survey Result Analysis

This questionnaire gathered 120 responses through a Google Forms web-based survey. Since the survey consists of three sections, therefore results are also presented section-wise as follows:

Personal information section:

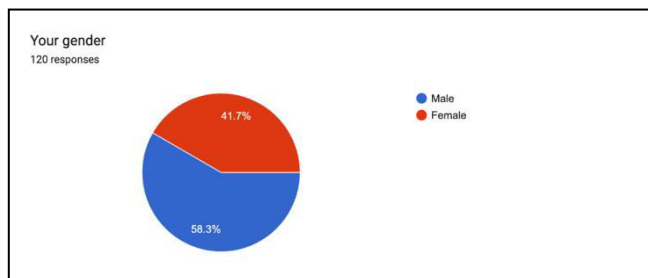


Fig.1. Question 1

As shown in (figure 1), 58.3% of Males examine the questionnaire, and the percentage of Females is 41.7%.

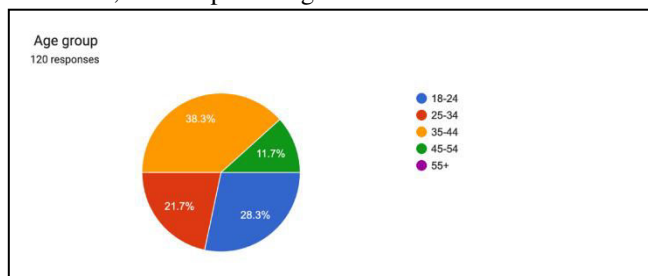


Fig.2. Question 2

Figure 2 reveals that the greater percentages of respondents are placed at 18 – 24. After that, this second cohort (21.7%) consists of people within the age range of 25-34 years old. In third place is another significant group, which falls in the 35–44 age bracket. The least respondents' group (11.7%) consists of people aged 45-54. Importantly, no answers came from people over fifty-five.

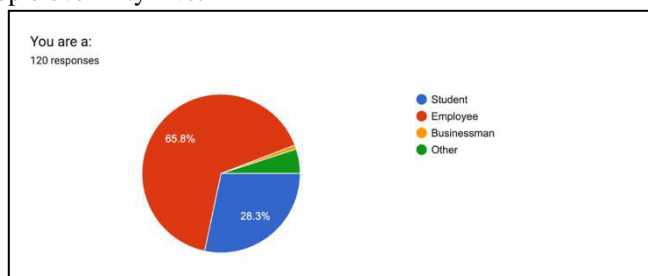


Fig.3. Question 3

As shown in (figure 3), demonstrates the occupation of the responders. the largest occupation is 65.8% which belongs to Employees. The second largest is Students with 28.3%. The

following are from other occupations with 6%. The least is the Businessman with approximately 0.8%.

Cryptocurrency Awareness Section:

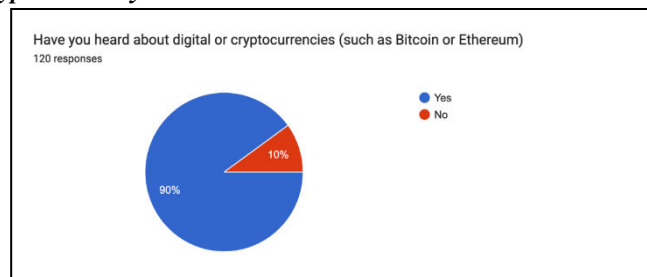


Fig.4. Question 4

As shown in (figure 4), 90% of the participants said that they heard about digital currencies or cryptocurrencies which is most of the responses. And 10% of them don't know about it.

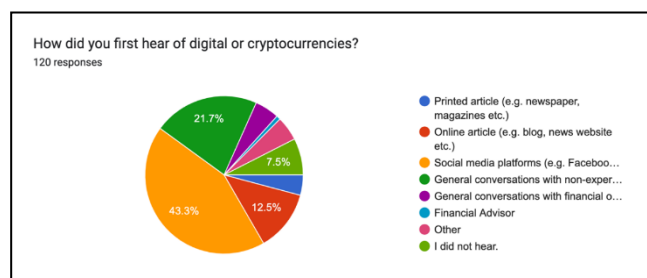


Fig.5. Question 5

In (figure 5), 43.3% heard about digital currencies from social media, 21.7% from general conversations, 12.5% from online articles, and 7.5% did not hear about it at all. The rest heard about it from financial advisors, general conversations with experts, and others.

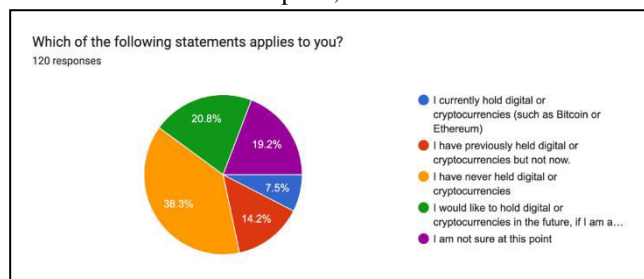


Fig.6. Question 6

As shown in Figure 6, 38.3% have never held digital/cryptocurrencies, 20.8% would like to hold in the future, 19.2% are unsure, 14.2% previously held but not now, and 7.5% are currently holding digital/cryptocurrencies (such as Bitcoin or Ethereum).

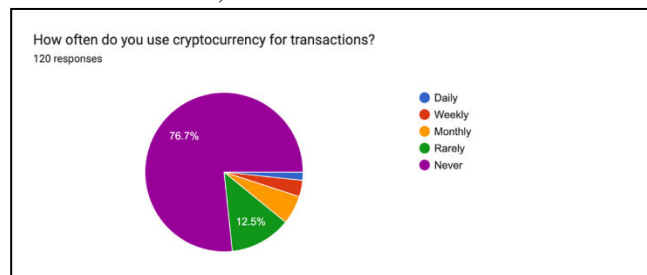


Fig.7. Question 7

Figure 7 shows the frequency of cryptocurrency usage for

transactions. 76.7% have never used cryptocurrency for their transaction. Next, 12.5% of responses indicated the rare usage of cryptocurrency for transactions. The lowest percentage, which was about 5.8%, used it monthly, 3.3% for weekly use, and 1.7% used it daily.

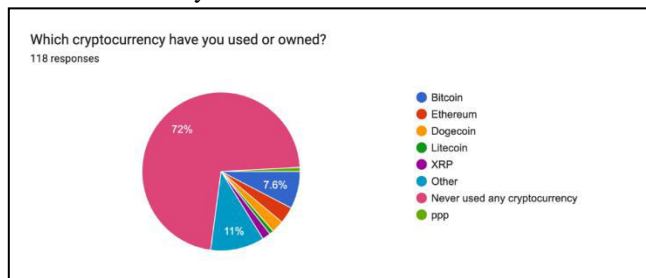


Fig. 8. Question 8

In the survey Figure 8, 72% of respondents have never used any cryptocurrency. 11% have used other cryptocurrencies not listed, while 7.6% use Bitcoin, 3.4% use Ethereum, and usage rates for Dogecoin, XRP, PPP, and Litecoin are lower.

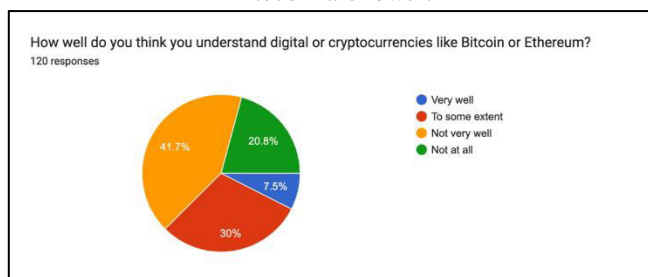


Fig. 9. Question 9

Figure 9 illustrates the self-assessment of understanding of cryptocurrencies such as Bitcoin or Ethereum. 41.7% reported not understanding cryptocurrencies well, 30% indicated a moderate understanding, 20.8% reported not understanding at all, and 7.5% claimed to have very good knowledge.

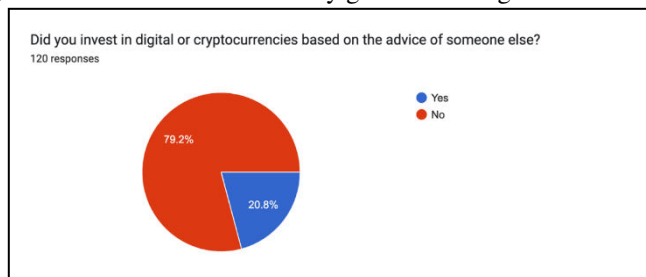


Fig. 10. Question 10

Figure 10 shows the responses to the 10th question which inquired about whether participants have invested in digital, or cryptocurrency based on the advice of someone else. 79.2% of participants invested in digital or cryptocurrency without external advice, while 20.8% followed someone else's advice.

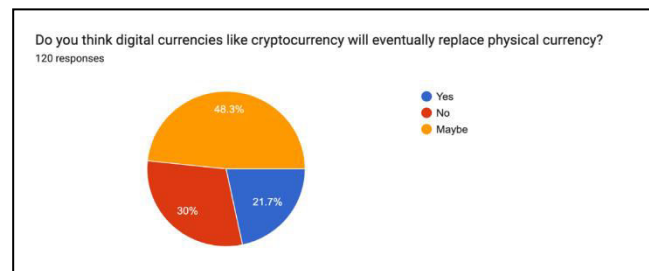


Fig. 11. Question 11

Here's a shorter version of the text:

Figure 11 shows participants' perspectives on cryptocurrencies replacing physical currencies. 48.3% were unsure, 30% disagreed, and 21.7% believed cryptocurrencies could replace physical currencies.

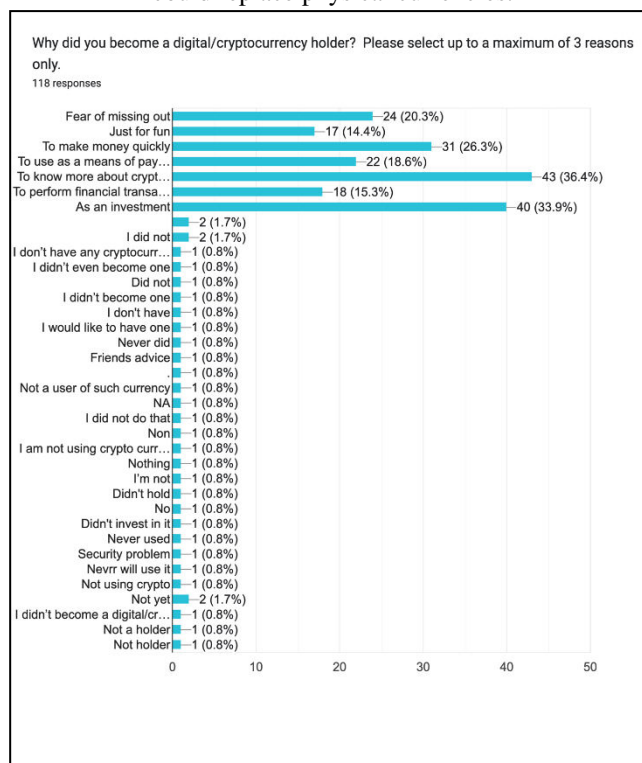


Fig. 12. Question 12

As shown in Figure 12, the participants asked why they became digital/cryptocurrency holders by mentioning 3 reasons. Participants mentioned three main reasons for becoming digital/cryptocurrency holders. The top reasons were wanting to learn more about cryptocurrencies (36.4%) and making an investment (33.9%), followed by wanting to make money quickly (26.3%). FOMO (fear of missing out) accounted for 20.3%. Other reasons included using it for online payments and purchasing (18.6%), financial transactions (15.3%), and just for fun. Some participants did not use it at all.

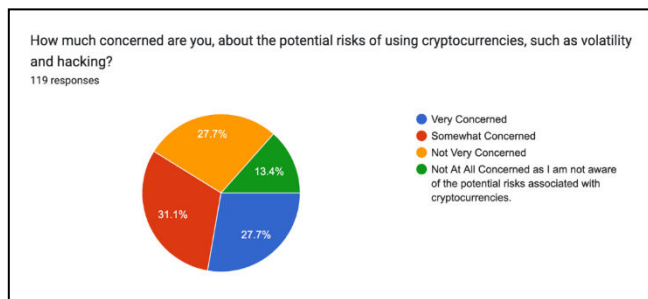


Fig. 13. Question 13

Question 13 explored participants' concerns about potential risks associated with using cryptocurrencies. A substantial 31.1% expressed some concerns about cryptocurrency risks, 27.7% were not very concerned, and another 27.7% were very concerned. Additionally, 13.4% were not concerned due to lack of awareness.

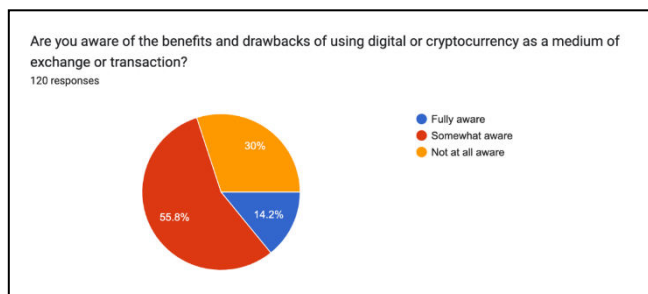


Fig. 14. Question 14

In the responses to question 14 which describes the participants' awareness of the benefits and drawbacks of using cryptocurrencies as a medium of transaction. Most of the responses a somewhat aware with 55.8%. 30% of the participants were not aware of all the benefits. The lower percentage of the users were fully aware of the benefits of using digital currencies as a medium of exchange.

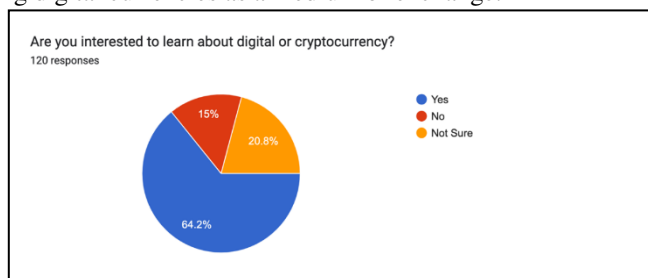


Fig. 15. Question 15

As shown in Figure 15, the question measures the participants' interest in learning about digital currencies. Most responses indicate a high interest, with 20.8% expressing uncertainty and 15% showing no interest.

Blockchain Section:

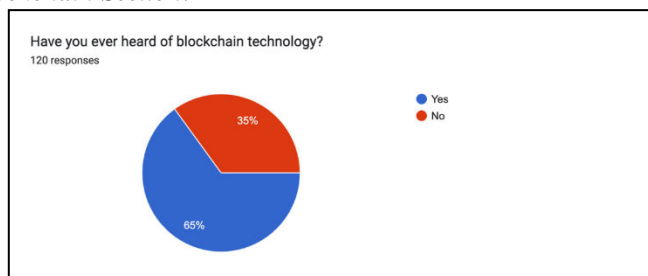


Fig. 16. Question 16

As shown in (figure 16), 65% of the participants said that they heard about blockchain technology which was most of the responses. 35% have not heard about it before

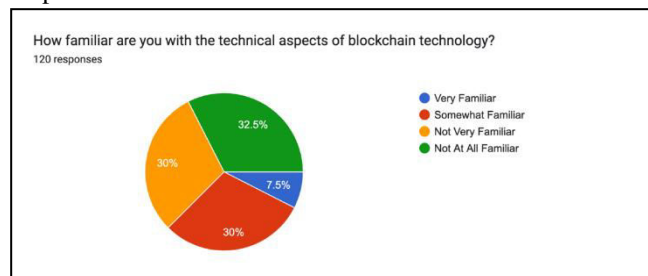


Fig. 17. Question 17

Question 17 explored participants' familiarity with the technical aspects of blockchain technology. About 32.5% of the responses were not at all familiar. The next was 30% somewhat familiar. They were followed by the next 30% who are not very familiar. The last responses were 7.5% very familiar with the technical aspects of blockchain technology.

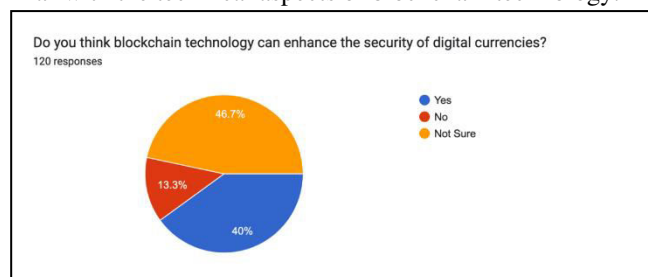


Fig. 18. Question 18

As shown in Figure 18, the 18th question concerns the potential of blockchain technology to enhance the security of cryptocurrencies. 46.7% of the participants were not sure of this. Next, 40% of them agreed that blockchain technology can enhance security in terms of digital currencies. The lowest percentage was 13.3%, who did not agree.

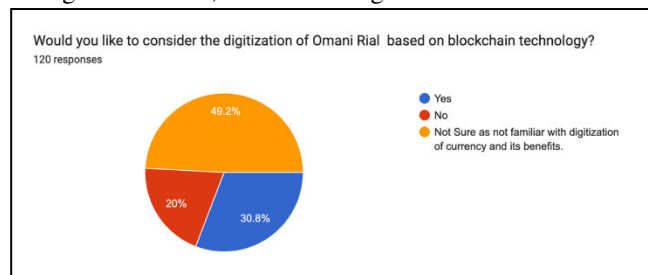


Fig. 19. Question 19

The responses to question 19 (Figure 19) show the different perspectives on digitalizing the Omani Rial based on blockchain technology. The highest percentage was 49.2% for those who were unsure because they were unfamiliar with cryptocurrencies and their benefits. 30.8% of the answers were agreed. Only 20% did not agree.

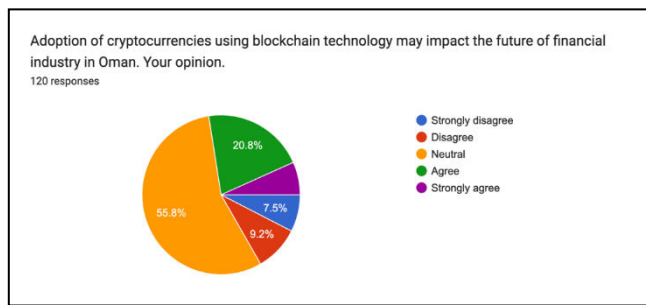


Fig. 20. Question 20

As shown in Figure 20, the question inquired about the range of opinions about how the adoption of cryptocurrencies using blockchain technology may impact the future of the financial industry in Oman. Where 55.8% of the answers are Neutral. 20.8% agreed that it can impact this industry in the future. About 9.2% are disagree. And only 7.5% strongly disagree.

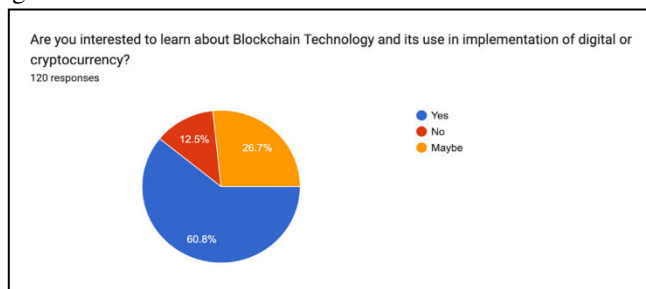


Fig. 21. Question 21

As shown in Figure 21, the question shows the participants' interest in learning about blockchain technology and its use in the implementation of digital currencies. The most of participants show an interest in learning about it. 26.7% were not sure of it and only 12.5% were not interested in learning.

Interview Results Analysis:

Around 8 companies, including banks and business firms, were interviewed for the data collection. Apart from the general questions, specific questions related to their mode of financial transactions, awareness of cryptocurrency advantages, reasons for not adopting cryptocurrency, and their opinion towards the future use of it. The following results present the cryptocurrency-related responses of the interviewees.

How are you handling your financial transactions and are there any plans to use cryptocurrency in the future?

8 responses

No
Am using banking atm or transactin via mobile , no i dont think ill ever use cryptedcurrency
Managing it on my own and i don't have any planes to deal with cryptocurrency
Banks in line app I don't trust crypto yet
Local Bank And Application from local bank. May be we will use it in the future if it understandable and easy to use
In a traditional way however more electronically than using cash. Sure why not.
Cryptocurrency transactions are typically handled through a decentralized network of computers using blockchain technology. When someone initiates a transaction, it is verified by network nodes through cryptography, recorded on a public ledger (the blockchain), and then confirmed. The transaction is considered complete once it's added to the blockchain.

Fig. 22. Interview Question 1

Here we see that they are mostly handling their transactions through traditional means, and some showed that cryptocurrency could be used in the future once it is understood more.

Are you aware of the advantages of cryptocurrency?

8 responses

No
Yes, time, privacy, accuracy
Not really.. but i think i am aware of its risks more
Not that much..
Yes and the disadvantages as well
Global Transactions: Cryptocurrencies facilitate international transactions without the need for currency conversions or dealing with multiple banking systems. This can streamline cross-border trade and transactions.

Fig. 23. Interview Question 2

As for the Advantages, we got mixed results on their knowledge of the advantages. This can be because of the incomplete knowledge of cryptocurrency and its pros and cons.

If you are not using cryptocurrency, why haven't you adopted it yet?

7 responses

Trust are nit there yet, and still valid rules and regulatii. Not clearin omsn
Not available to me
Lack of interest in such products
It's not officially announced by my government so it's risky
I don't trust it
Not clear concept and not trustable
Trust issue. I don't trust it yet and so far i didn't cross a situation where i really needed it.

Fig. 24. Interview Question 3

In this instance, none used cryptocurrency, and this was mainly due to the lack of trust evident in the responses.

Do you think digital currencies like cryptocurrency will replace traditional physical currency in the future?

8 responses

still
No
May be
Yes
It will
That's why I use -somehow- trusted bank digital transactions
Yes.
Yes however when it is better regulated and adopted by official financial institutions.
The potential for cryptocurrencies to replace traditional currency is a subject of debate and speculation. While cryptocurrencies offer certain advantages, there are challenges and factors that make it unlikely for them to completely replace traditional currencies in the near future.

Fig. 25. Interview Question 4

In this question, again we see mixed results, however, the results that were not in favor of cryptocurrency replacing traditional currency weren't against the idea and were not negative. This means there is potential, and it could be done once understood and regulated better.

Findings:

Following findings can be deduced from the above discussed results and analysis:

a. General Findings:

- **Economic and Technological Potential:** Digital currencies, especially CBDCs, offer opportunities for economic growth, as seen in Oman's alignment with Vision 2040 and the potential to enhance financial transactions.
- **Challenges in Regulation and Public Perception:** A lack of clear regulatory frameworks in Oman leads to uncertainty and potential risks for users and investors.
- **Environmental Concerns and Technological Challenges:** The environmental impact of cryptocurrency mining, primarily due to energy consumption, is a significant concern. Technological challenges such as scalability, security, and regulatory compliance also present barriers to widespread adoption.

b. Findings Based on the conducted interviews and survey

- **High Awareness, Varied Understanding:** A significant percentage of respondents are aware of digital currencies, but their understanding varies, indicating the need for more in-depth educational initiatives.
- **Investment Decisions and Concerns:** Many respondents have invested in cryptocurrencies without external advice, and there is a balanced view of concerns about the risks associated with cryptocurrencies.
- **Interest in Blockchain and Digital Currencies:** Most respondents show interest in learning about digital currencies and blockchain technology, highlighting a potential for increased engagement in these areas.

Recommendations:

- **Establish Clear Regulatory Frameworks:** Oman should

develop clear and comprehensive legal frameworks for digital currencies, drawing inspiration from successful models as in the UAE and Bahrain.

- **Invest in Education and Awareness:** Governments, financial institutions, and educational bodies should collaborate to increase public awareness and understanding of digital currencies and blockchain technology.
- **Develop Robust Technological Infrastructure:** Investment in infrastructure, including secure and efficient cryptocurrency exchanges and wallets, is essential for facilitating access and trade in digital assets.
- **Encourage Public and Private Sector Collaboration:** Foster collaboration between governments and private sector entities to drive innovation in digital currency applications and blockchain technology.
- **Enhance Public Education:** Develop targeted educational programs to increase public understanding of digital currencies and blockchain technology.
- **Promote Safe Investment Practices:** Provide resources and guidance for safe investment in cryptocurrencies, emphasizing the importance of understanding risks and benefits.
- **Support Blockchain Innovation:** Encourage innovation and research in blockchain technology to foster its adoption and application in various sectors.

IV. CONCLUSION

Based on the findings and analysis presented, it is evident that digital currencies, particularly CBDCs, offer significant economic and technological potential for Oman. However, challenges such as regulatory uncertainty, environmental concerns, and technological barriers need to be addressed to facilitate the widespread adoption and usage of digital currencies in the country.

Considering these findings, several key recommendations have been given in the previous section. By implementing these recommendations, Oman can harness the potential of digital currencies and blockchain technology while addressing the associated challenges effectively. This will not only facilitate economic growth but also promote a safe and informed ecosystem for the usage of digital assets within the country.

V. ACKNOWLEDGEMENTS

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