

From Cash to Code: The Transition to Central Bank Digital Currencies in Pakistan

Abstract. The introduction of Central Bank Digital Currencies (CBDCs) in Pakistan presents a transformative opportunity to enhance the nation's financial landscape by providing a more efficient, inclusive, and secure medium for financial transactions. CBDCs can facilitate cross-border payments, enhance financial inclusion and control for financial crime. However, the success of implementing digital currencies depends very much on society's acceptance of this idea. This study uses a quantitative descriptive design to explore public opinion, awareness and readiness to adopt the Central Bank Digital Currencies in Pakistan. A survey was conducted with respondents from diverse demographic backgrounds to assess their understanding of CBDCs, concern regarding privacy and financial security, and overall willingness to adopt digital currencies issued by the central bank. In this study, the factors that may influence or predict the success of Central Bank Digital Currency in Pakistan's economy are independent variables. The success of CBDC in usage and integration in Pakistan's economy is the dependent variable. Gender and profession are control variables. The analysis that was conducted highlights a generally positive outlook towards CBDC among the survey participants, tempered by notable concerns about trust and sustainability. However, the findings suggest that while there is cautious interest in CBDCs among common Pakistanis, substantial efforts are needed to address the knowledge gap and mitigate concerns about security and privacy. Digital education of the population is one of the key factors in successfully implementing digital currencies in any country, particularly Pakistan. In addition, trust issues remain a critical barrier, especially among those aware of CBDC's benefits. Thus, the results of this study will be useful for policymakers and financial institutions in the context of planning activities for implementing CBDC in Pakistan.

Keywords: digital currencies, central bank, Pakistan, monetary policy, digital economies.

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Від готівки до коду: перехід до цифрових валют центрального банку в Пакистані

Анотація. Запровадження цифрових валют центрального банку (CBDC) у Пакистані відкриває можливість для покращення фінансового ландшафту країни, надаючи більш ефективне, інклюзивне та безпечне середовище для фінансових операцій. Цифрові валюти можуть полегшити транскордонні платежі, покращити фінансову доступність і контроль за фінансовими злочинами. Однак, успіх впровадження цифрових валют дуже залежить від сприйняття цієї ідеї суспільством. У цьому дослідженні використовується кількісний описовий аналіз для вивчення громадської думки, обізнаності та готовності прийняти цифрові валюти Центрального банку в Пакистані. Було проведено опитування респондентів різних вікових груп, щоб оцінити їхнє розуміння цифрових валют, занепокоєність щодо конфіденційності та фінансової безпеки, а також загальну готовність прийняти цифрові валюти, випущені центральним банком. У цьому дослідженні фактори, які можуть впливати або прогнозувати успіх цифрової валюти Центрального банку в економіці Пакистану, є незалежними змінними. Успішність впровадження цифрових валют в економіку Пакистану є залежною змінною. Стаття і професія респондентів є контрольними змінними. Проведений аналіз підкреслює загалом позитивне ставлення до цифрових валют серед учасників опитування, пом'якшене помітним занепокоєнням щодо довіри та сталості такого засобу платежу. Однак отримані дані свідчать, що незважаючи на обережний інтерес до цифрових валют серед звичайних пакистанців, уряду потрібні значні зусилля для усунення прогалини в знаннях і подолання занепокоєння щодо безпеки та конфіденційності. Цифрова освіта населення є одним із ключових факторів успішного впровадження цифрових валют у будь-якій країні, зокрема в Пакистані. Крім того, питання довіри залишаються критичною перешкодою, особливо серед тих, хто знає про переваги цифрової

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Ключові слова: цифрові валюти, центральний банк, Пакистан, монетарна політика, цифрова економіка.

INTRODUCTION

CBDCs, as digital versions of national currencies underpinned and issued by central banks, have garnered substantial attention worldwide, with central banks globally seeking potential advantages linked to CBDC issuance. In Pakistan, a considerable segment of the population lacks access to conventional banking services and instead depends on informal financial channels. Implementing a Central Bank Digital Currency (CBDC) holds the promise of exerting a profound influence on Pakistan's economic landscape, mainly by providing a more efficient and secure medium for financial transactions. The introduction of CBDC can revolutionize how financial transactions are conducted, making them more accessible and secure for individuals and businesses.

According to a 2022 report from the World Bank, a mere 35% of Pakistan's adult population held accounts with formal financial institutions in 2017, significantly lower than the global average of 69% (World Bank, 2022). By offering a more convenient and safer alternative, CBDCs could help broaden the financial service reach for all beneficiaries currently reliant on cash-based transactions. Furthermore, CBDCs also promise to enhance the efficiency of monetary policy execution (Fanti, Lipsy, & Moehr, 2022).

Nonetheless, implementing a Central Bank Digital Currency ushers in many challenges. One of the foremost worries pertains to privacy, as using a CBDC would necessitate individuals to disclose personal information to the bank. This raises apprehensions about the government potentially exploiting this data for surveillance or other purposes. There is a looming threat of cyber-attacks that could compromise the CBDC system's security. Additionally, traditional banks may see their role as intermediaries in financial transactions diminish, reducing their profitability and possibly limiting their capacity to lend, as highlighted in a report by Central Banks in 2021. This, in turn, could adversely affect the overall health of the banking sector and the economy as a whole.

While Central Bank Digital (CBDCs) have garnered significant global attention, there is a notable lack of empirical research focusing on public perception, awareness and readiness for CBDCs in emerging markets like Pakistan. Existing studies primarily address developed economies, leaving a gap in understanding how factors such as privacy concerns, financial security and public trust influence the potential adoption of CBDCs in the unique socio-economic context of Pakistan. This study aims to bridge this gap by providing crucial insights for informing policy and strategic decisions regarding CBDC implementation in Pakistan.

The article's main objective is to show how much people in Pakistan know about CBDC. The secondary objectives for our quantitative research were to:

- Examine how CBDCs can improve the efficiency of financial transactions in Pakistan;
- Analyze the potential reduction in dependency on physical cash and the associated benefits;
- Study the implications of CBDCs for improving financial security;
- Study the level of trust that people have in cash vs digital currencies;
- Evaluate if digital currency could be a threat to privacy life;
- Investigate the role of CBDCs in increasing access to financial services.

LITERATURE REVIEW

The concept of CBDCs is not new, as it has been around for thirty years. More than ten years ago, several historical accounts of the emergence of e-money in the 1990s were recorded (Arnone & Bandiera, 2004; Ramasastry, 2008). In 1993, the Bank of Finland launched the famous Avant smart card, an electronic form of cash.

Although the idea was abandoned twenty years ago, people may still regard it as the world's inaugural Central Bank Digital Currency (Smith, 2022). Central banks across the planet are currently exploring the potential advantages, particularly the potential to enhance the efficiency and security of payment systems. Starting from July 2022, nearly 100 CBDCs found themselves either in the middle of the research or development phase, with two already launched: one in the Bahamas and the other in Nigeria. After the success of the 2019 pilot conducted in the Bahamas, the currency known under the name of "sand dollar" earned the distinction of becoming the world's inaugural nationwide Central Bank Digital Currency (Stanley, 2022). Furthermore, an ecosystem was established featuring Authorized Financial Institutions tasked with offering an array of services to retail customers, including but not limited to Know Your Customer and Anti-Money Laundering verifications, digital currency custody, and wallet services. The institutions above encompass money-transmitter businesses, commercial banks and payment service providers (Bharathan, 2019). Due to the country's geography, though, not all citizens have access to common financial services, which diminishes the attractiveness for traders seeking to generate profits.

In October 2021, Nigeria achieved the historic milestone of becoming the first African nation to introduce a Central Bank Digital Currency. The currency is stored in a digital wallet and is suitable for contactless in-store transactions and facilitating money transfers (Carstens, 2022). Similarly, countries within the Eastern Caribbean Union have created versions of digital currency to enhance transaction speed and present a new payment method to that category of the population who do not hold a bank account (Goetzman, 2017). Many pilot

projects are underway in countries all over the world. Among them, we find Sweden, where Riksbank has devised a proof of concept which promises to achieve great results and is currently assessing and testing the technology and the potential ramifications of Central Bank Digital Currencies to increase accessibility to digital currency in the future (CBC, 2021). In April 2020, China became the first major economy in the world to initiate a trial of a digital currency. The National Bank is thus placing its hopes on the future extensive adoption of the digital yuan within the country. As per the International Monetary Fund, it currently boasts over a hundred million individual users and handles transactions totalling billions of yuan.

Furthermore, following a successful pilot program conducted in 2021, the Bank of Jamaica shared its plans to launch its digital currency in 2022. Ukraine, too, has been contemplating doing the same for nearly a decade and is presently gearing up for a pilot test of its central bank digital currency. Other countries are in the middle of developing CBDC (Wright, 2022).

In Pakistan, a considerable segment of the population lacks access to conventional banking services and depends on informal financial channels (SBP, 2022). The introduction of a Central Bank Digital Currency (CBDC) has the capacity to transform the manner in which financial transactions are executed, rendering them more accessible and safe.

Moreover, Central Bank Digital Currencies can be a potent instrument for the State Bank of Pakistan to address the persistent challenges of money laundering and financial crime. By establishing a direct digital connection to the financial transactions of individuals and businesses, the SBP would improve its capacity to control and trace suspicious activities. This heightened vigilance would only bolster the SBP's ability to identify and thwart financial crime while at the same time elevating the overall security of the financial system, as stated in the official 2022 report (SBP, 2022).

Along with introducing CBDCs come all sorts of changes in the banking sector. We are highly likely to witness the diminishing of the roles traditional banks, as we know them, play as intermediaries. This could lead further to a reduction in their capacity to make a profit and potentially limit their ability to lend, as highlighted in a report by Central Banks in 2021. It is one of those turning points that could severely affect the well-functioning of banks and the economy as a whole.

RESEARCH METHODOLOGY

The study employs a quantitative research approach using a descriptive survey design. The method allows for the systematic collection and analysis of data from specific populations to understand their perceptions, attitudes and readiness regarding adopting Central Bank Digital Currencies (CBDCs) in Pakistan. The data of this study was collected using a structured questionnaire, which was carefully developed based on a comprehensive review of the existing literature on CBDCs, digital currency adoption and financial technology emerging markets. The questionnaire was designed to capture the

key variables of interest, including awareness of CBDCs, privacy and security concerns, perceived efficiency and willingness to adopt. The questionnaire comprised 15 questions (Table no. 1), a mix of closed-ended and Likert scale items to ensure clarity and facilitate quantitative analysis. The questionnaire was in both English and Urdu and distributed online via social media platforms and email, targeting a diverse group of respondents across different demographic segments. A total of 159 valid responses were collected during this period, proving a sufficient sample size for the statistical analysis.

The categorizations of the variables are carefully chosen based on the questionnaires into independent, dependent, and control variables based on our hypotheses. Independent variables are the factors that may influence or predict the success of Central Bank Digital Currency (CBDC) in Pakistan's economy.

The tested hypotheses for our quantitative research were:

H1: CBDC will gain success in usage and integration in Pakistan's economy.

H0: CBDC may not gain success in usage and integration in Pakistan's economy.

RESULTS

The survey participants are roughly evenly distributed in terms of gender, with a slightly higher proportion of males. Professions vary widely, suggesting diverse perspectives on CBDC. The analysis performed with SPSS over the results from the survey using Descriptive Statistics resulted in the following:

- A significant portion of participants are aware of CBDC. There is a general belief in the potential benefits of CBDC and its role in strengthening the currency, although opinions are somewhat spread out.

- Respondents believe several factors are critical for the success of CBDC, with a notable emphasis on trust and infrastructure readiness.

- Privacy concerns and government control are significant issues for respondents, indicating areas that need addressing for successful CBDC implementation.

- There is moderate confidence in the role of CBDC during economic uncertainty and its overall success, with responses indicating cautious optimism.

Next, the correlation matrices provided more insight into the strength and direction of relationships between the different pairs of variables. Positive correlations indicate that as one variable increases, the other variable tends to increase, while negative correlations indicate that as one variable increases, the other tends to decrease.

Understanding the Correlation Coefficients:

- Positive correlation: Values close to +1 indicate a strong positive relationship;

- Negative correlation: Values close to -1 indicate a strong negative relationship;

- No correlation: Values close to 0 indicate no relationship.

The analysis reveals intriguing correlations between various factors, offering insights into how these elements interact.

Table 1. Research Variables

Independent Variable	Dependent Variable	Control Variable
Awareness of CBDC (Question 3): This could influence opinions about the success of CBDC.	Success of CBDC in usage and integration in Pakistan's economy (Question Nos. 4, 5 and 15)	Gender
Perceived benefits of CBDC (Questions 4, 7): These could influence perceptions of CBDC's success.		Profession
Perceived impact on currency stability (Questions 5, 8): This relates to the perceived success of CBDC.		
Perceived sustainability of CBDC (Question 9): This is a factor that may influence the long-term success.		
Factors considered important for CBDC to work (Question 10): This explores what respondents consider crucial for success.		
Trust in currency (Question 11): Trust in CBDC could impact its success.		
Infrastructure readiness (Question 12): The state of infrastructure could influence the success of CBDC.		
Privacy concerns (Question 13): Concerns about privacy could affect the acceptance of CBDC.		
Perception of government control (Question 14): This variable may influence opinions on success.		
Perception of CBDC's role in economic uncertainty (Question 15): Opinions about CBDC during economic uncertainty could impact its success.		

Firstly, gender exhibits a moderate positive correlation with sector (0.4601), implying that gender distribution tends to vary moderately across different sectors. This suggests that certain sectors may have a higher representation of one gender over another. Additionally, a moderate positive correlation exists between gender and perceptions of infrastructure readiness (0.3315). This indicates that gender can influence how individuals perceive infrastructure readiness, potentially reflecting differing priorities or experiences between genders. Furthermore, the correlation between gender and views on government control is weak but positive (0.2368), suggesting that gender slightly influences how government control is perceived. When examining the sector variable, a weak positive correlation is observed with awareness of Central Bank Digital Currency (CBDC) (0.1208). This shows a slight relationship between the sectors in which an individual works and their awareness of CBDC, suggesting that awareness levels might differ slightly across sectors. The sector also exhibits a weak positive correlation with perceptions of infrastructure readiness (0.1692), indicating that an individual's sector may slightly influence their views on how prepared the infrastructure is. Similarly, there is a weak positive correlation between the sector and perceptions of government control (0.1677), suggesting a minor influence of the sector on views regarding government control.

Awareness of CBDC shows several moderate correlations with other factors. There is a moderate positive correlation with the perceived benefits of CBDC for Pakistan (0.2999), indicating that greater awareness of CBDC is associated with a stronger belief in its benefits for the country. Additionally, awareness of CBDC has a moderate positive correlation with the belief that CBDC will strengthen the rupee (0.3626). This suggests that individuals more aware of CBDC are more likely to believe in its potential to enhance the national currency. A weak positive correlation exists between CBDC awareness and perceptions of infrastructure readiness (0.2568), implying that awareness of CBDC slightly influences how prepared individuals believe the infrastructure is.

The perceived benefits of CBDC for Pakistan strongly correlate with the belief that CBDC will strengthen the rupee (0.6451), indicating that those who see benefits in CBDC also strongly believe it will bolster the rupee. There is also a moderate positive correlation between the perceived benefits of CBDC and the belief that it will replace paper money (0.3453). This suggests that individuals who perceive benefits in CBDC are more likely to believe it will eventually replace traditional paper money. Interestingly, a moderate negative correlation is observed between the perceived benefits of CBDC and trust in CBDC (-0.2623), indicating that those who see benefits in CBDC may have lower trust in it.

The belief that CBDC will strengthen the rupee shows a moderate positive correlation with the belief that it will replace paper money (0.4240), suggesting that those who believe in the strengthening effect also tend to believe in replacing paper money. Additionally, a moderate negative correlation exists between the belief that CBDC will strengthen the rupee and trust in CBDC (-0.3682), indicating that those who believe in the strengthening effect may have less trust in CBDC. Belief in replacing paper money by CBDC correlates moderately with perceptions of infrastructure readiness (0.4450), indicating that those who believe in the replacement also tend to believe that the infrastructure is ready for CBDC. There is a weak positive correlation between this belief and privacy concerns (0.2588), suggesting that individuals who think CBDC will replace paper money also have some privacy concerns.

Perceptions of infrastructure readiness show a moderate positive correlation with privacy concerns (0.3532), indicating that those who believe the infrastructure is ready also tend to have privacy concerns. There is also a moderate positive correlation between infrastructure readiness and views on government control (0.3585), suggesting that perceptions of infrastructure readiness are associated with views on government control.

Finally, views on government control exhibit a moderate positive correlation with privacy concerns (0.4176), indicating that privacy concerns are associated with perceptions of government control. There is a weak positive correlation between views on government control and perceptions of economic uncertainty related to CBDC (0.0806), suggesting a slight relationship between these views. These correlations provide a nuanced understanding of how gender, sector, and awareness influence perceptions and beliefs about CBDC, infrastructure readiness, government control, and privacy concerns.

Key observations:

Awareness and perception: Awareness of CBDC is moderately related to its benefits and potential to strengthen the rupee.

Trust issues: There is a negative correlation between trust in CBDC and various perceived benefits, indicating that, despite recognizing potential benefits, there might be trust issues that need to be addressed.

Privacy concerns: Privacy concerns are related to perceptions of infrastructure readiness and government control, highlighting the importance of addressing these concerns for successful implementation.

Infrastructure readiness: Belief in infrastructure readiness is crucial as it positively correlates with several

other factors, including perceived benefits and the potential for CBDC to replace paper money.

DISCUSSION

The analysis of the survey data provides several key insights into public perceptions and the potential impacts of Central Bank Digital Currency (CBDC) in Pakistan. The survey data reveals the participants have a relatively high mean awareness of CBDC, scoring 1.40 on a scale where 1 indicates awareness. This suggests that most respondents are familiar with the concept of CBDC. Additionally, participants have positive perceptions regarding the benefits of CBDC, the potential for CBDC to strengthen the currency, and the future replacement of paper money, with mean scores of 1.55, 1.70, and 1.73, respectively. These scores indicate a generally favourable outlook towards CBDC, though there is some variability in these perceptions. However, the scores for trust in currency (2.27) and sustainability (2.23) reflect more mixed opinions, highlighting some uncertainty and concerns among respondents. These mixed opinions suggest that while there is optimism about the benefits of CBDC, there are also significant reservations about its trustworthiness and long-term viability.

The analysis identifies significant positive correlations between awareness of CBDC and various positive perceptions. Specifically, greater awareness of CBDC is associated with perceived benefits (correlation coefficient of 0.299), the belief that it will strengthen the rupee (0.362), and the readiness of infrastructure to support it (0.257). These correlations suggest that as people become more aware of CBDC, they tend to view its potential benefits and infrastructure preparedness more favourably. Conversely, trust in CBDC shows negative correlations with perceived benefits (-0.262) and the belief that it will strengthen the rupee (-0.368). These negative correlations indicate that trust issues persist and must be addressed to enhance the perceived benefits and acceptance of CBDC. Additionally, the readiness of infrastructure to support CBDC is positively correlated with both perceived benefits (0.364) and the belief that CBDC will replace paper money (0.445). This underscores the critical role of infrastructure readiness in fostering positive perceptions and facilitating the adoption of CBDC.

The ANOVA results indicate (Table 2) that gender significantly impacts the dependent variable ($F(1, 150) = 9.056, p = 0.00307$), suggesting meaningful differences between genders. The profession does not show a significant effect ($F(6, 150) = 0.412, p = 0.86990$), implying that any differences observed across professions are likely due to random chance.

Table 2. ANOVA Model

	Df	Sum Sq	Mean Sq	F value	Pr(>F)
Gender	1	8.01	8.008	9.056	0.00307 **
Profession	6	2.19	0.365	0.412	0.86990
Residuals	120	132.65	0.884		
Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1					

Source: Processed Data (2024).

The ANOVA model reveals that gender significantly impacts perceptions related to CBDC. With $F(1, 150) = 9.056$ and a p-value of 0.00307, the data indicates meaningful differences between male and female perceptions or experiences concerning CBDC. This finding suggests that gender-specific factors influence how CBDC is perceived, which could be crucial for targeted communication and policy-making efforts. On the other hand, the profession does not significantly affect perceptions of CBDC, as indicated by $F(6, 150) = 0.412$ and a p-value of 0.86990. This lack of significance suggests that differences in perceptions or experiences across various professions are likely due to random chance rather than systematic variation. This insight implies that professional background may not be a major determinant of CBDC perceptions, allowing for more generalized strategies in awareness campaigns.

CONCLUSION

The introduction of Central Bank Digital Currencies (CBDCs) in Pakistan presents a transformative opportunity to enhance the nation's financial landscape by providing a more efficient, inclusive, and secure medium for financial transactions. As detailed in this paper, CBDCs can facilitate cross-border payments, enhance financial inclusion, and control financial crime. CBDCs offer a cost-effective alternative that aligns well with Pakistan's need for a modernized financial system by reducing the dependency on physical cash and lowering transaction costs.

Implementing CBDCs can also bolster Pakistan's efforts to combat money laundering and terrorism financing, aligning with international standards and improving the country's standing in the global financial community. However, the journey towards adopting CBDCs is not without challenges. Issues related to privacy, security, and the potential disruption to the traditional banking sector must be addressed proactively. Protecting personal information and safeguarding it against cyber threats is paramount to gaining public trust and acceptance. Moreover, the risk of disintermediation, where consumers might move their money from bank accounts to CBDCs, poses a challenge for the traditional banking sector. A well-designed two-tier system, where the central bank provides the infrastructure while commercial banks manage the wallets and accounts, could mitigate these risks and ensure a balanced approach.

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To successfully implement CBDCs, the State Bank of Pakistan must engage in comprehensive research and collaborate with stakeholders. By doing so, Pakistan can leverage the advantages of CBDCs while mitigating potential downsides. With careful planning, robust safeguards, and a collaborative approach, CBDCs can be powerful tools in shaping a more resilient, efficient, and inclusive financial ecosystem, driving economic growth and stability in the digital age.

The State Bank of Pakistan could be more precise in directing its focus on particular economic segments by deploying Central Bank Digital Currencies. For instance, the SBP might choose to employ CBDCs to deliver targeted economic stimulus to specific sectors when faced with economic downturns. This approach would further enhance the transmission mechanism of monetary policy, enabling the central bank to exert a more influential control over interest rates and the money supply.

Overall, the analysis highlights a generally positive outlook towards CBDC among the survey participants, tempered by notable concerns about trust and sustainability. The significant correlations between awareness and positive perceptions suggest increasing public knowledge about CBDC could enhance its acceptance. However, the negative correlations with trust underscore the need to address these trust issues proactively. Gender differences in perceptions also highlight the importance of considering demographic factors in implementing and promoting CBDC. While professional background has minimal impact, infrastructure readiness remains a critical factor in shaping positive perceptions and facilitating the adoption of CBDC in Pakistan.

The survey data indicates that awareness and perceptions of CBDC in Pakistan are generally positive but mixed, with significant differences noted between genders. Greater awareness is linked to positive perceptions regarding benefits and infrastructure readiness, highlighting the need for targeted awareness campaigns. Trust issues remain a critical barrier, especially among those aware of CBDC's benefits. The lack of significant differences across professions suggests that professional background does not play a substantial role in shaping perceptions of CBDC, indicating a uniform need for education and trust-building across all sectors. Addressing these issues is crucial for successfully implementing and accepting CBDC in Pakistan.

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