

Comparative Analysis of Central Bank Digital Currency Development Across Continents: Drivers, Challenges, and Policy Implications

Abstract

The Central Bank Digital Currencies (CBDCs) has become one of the most significant developments in the global financial system. Many central banks seek to modernize payment infrastructures, strengthen monetary sovereignty, improve financial inclusion, and respond to the rapid growth of digital finance, CBDC initiatives have expanded across all seven continents. This study provides the status, determinants, challenges, and policy implications of CBDC development across 196 sovereign countries distributed among Asia, Africa, Europe, North America, South America, Oceania, and Antarctica. Using secondary data obtained from the Atlantic Council CBDC Tracker, International Monetary Fund (IMF), Bank for International Settlements (BIS), World Bank, and central bank publications, the study categorizes countries according to their stages of CBDC development, including research, development, pilot testing, and implementation. A comparative analytical framework is employed to evaluate the influence of digital infrastructure, financial inclusion, economic development, regulatory readiness, and technological innovation on CBDC progress. The findings indicate that Asia leads global CBDC development, Europe emphasizes monetary sovereignty and payment resilience, Africa prioritizes financial inclusion, while North and South America exhibit diverse implementation strategies. Oceania focuses on wholesale and cross-border CBDC experimentation. Although Antarctica has no sovereign monetary authority, it is included as a geographical continent for completeness. The study contributes to the growing literature by providing a comprehensive seven-continent and 196-country perspective on CBDC development and offers policy recommendations for sustainable implementation.

Keywords: CBDC, Digital Payments, Financial Inclusion, Monetary Policy, Digital Finance, Global Comparative Analysis

1. Introduction

The global financial system is undergoing a profound transformation driven by technological innovation, digital payments, fintech ecosystems, and changing consumer preferences. Traditional monetary systems increasingly face competition from cryptocurrencies, stablecoins, and private digital payment platforms. In response, central banks worldwide have accelerated efforts to develop Central Bank Digital Currencies (CBDCs), representing digital forms of sovereign money issued and regulated by monetary authorities. CBDCs combine the efficiency of digital payments with the trust and stability associated with central bank-issued currency. Unlike cryptocurrencies, CBDCs maintain legal tender status and are backed by national governments. Consequently, they have emerged as strategic instruments for enhancing payment efficiency, promoting financial inclusion, strengthening monetary policy transmission, reducing transaction costs, and preserving monetary sovereignty. As of 2026, approximately 196 sovereign countries exist globally, and more than 130 countries representing over 98 percent of global GDP are actively exploring CBDCs. Several countries, including the Bahamas, Nigeria, Jamaica, and the Eastern Caribbean Currency Union, have launched operational CBDCs, while major economies such as China, India, Brazil, Russia, and members of the European Union continue extensive pilot programs. Despite widespread interest, significant differences exist among countries regarding CBDC objectives, implementation strategies, technological architectures, and regulatory frameworks. Therefore,

a comprehensive comparative analysis covering all seven continents and 196 countries is necessary to understand the global landscape of CBDC development.

2. Literature Review

Sergio Luis Náñez Alonso, Miguel Ángel Echarte Fernández, David Sanz Bas and Jarosław Kaczmarek (2020): This paper analyses the current debate around central bank-backed digital currency. A comparative study was carried out considering countries for and against implementing a CBDC and their reasons, looking for common causes, divergences, etc. The conclusion was that there are opposite tendencies between defenders and detractors of establishing a CBDC. And taking into account the positions of three large banking institutions the Federal Reserve of the United States of America, the Bank of Japan and the Bank of England on establishing (at least in the short-term CBDC)—it seems that large-scale implementation is still far. On the contrary, the Chinese Central Bank and banking systems of other countries that have less weight in the world, such as Uruguay, Lithuania and the Bahamas, seem to go against the trend of rejection and are seriously considering its implementation. Although this matter has been dealt with in the theoretical field.

Miguel Ángel Echarte Fernández, Sergio Luis Náñez Alonso, Javier Jorge-Vázquez (2021): This article analyses the monetary policy of major central banks during the economic crisis generated by the COVID-19 pandemic. Rising public debt in many countries is being financed through asset purchases by monetary authorities. Although these stimulus policies predate the pandemic, they have been significantly boosted as many governments face large financing needs. We have been in a low-interest rate environment for years and some governments have issued debt securities at negative rates. In addition, the rise of decentralized cryptocurrencies, based on blockchain technology, has created greater competition in the international monetary system and many governments have considered the creation of centralized virtual currencies, known as central bank digital currencies and analysed some relevant cases, with an emphasis on the digital euro project. The methodology is based on the analysis of the evolution of monetary variables. Pearson's correlation will be used to establish some relationships between them. There is a strong similarity in the expansionary monetary policies of central banks. Although the growth of the money supply has not been passed on to the CPI, it has been passed on to the financial markets and the price of assets such as Bitcoin or gold.

Alper Koparan (2025): This paper provides details regarding How the global adopted Central Bank Digital Currencies (CBDCs) represents a pivotal shift in monetary systems and study aims to identify the determinants of digital currency adoption across 116 countries, using logistic regression to analyse the effects of economic, technological, institutional, and financial factors. The results show that higher GDP levels significantly increase the likelihood of active CBDC adoption by 332.1 percent and pilot adoption by 212.6 percent, reflecting the role of economic development. Greater internet usage improves the odds of active adoption by 12.7 percent and pilot adoption by 13.4 percent, while financial inclusion indicators, such as account ownership, increase the likelihood of adoption by 59 percent for active initiatives and 141 percent for pilot projects. Monetary freedom positively influences active adoption by 31.1 percent, and higher interest rates increase the odds by 20.8 percent. Conversely, business freedom negatively affects active adoption by 27.5 percent and pilot adoption by 29.1 percent, suggested that countries with strong private-sector digital payment solutions may rely less on CBDCs. These findings represent the transformative potential of digital currencies to improve financial inclusion and economic participation. Policymakers should prioritize investments in

digital infrastructure and financial inclusion initiatives to facilitate the integration of digital currencies into national economies and empower underserved populations globally

Lee, D. K., Yan, L., & Wang, Y. (2021): This paper discussed about the key considerations of CBDC design to balance benefits and risks and presents best practices in CBDC design from a global perspective. Using China's CBDC as an illustration and discussed two-tier or multi-tier ledger design also proposes ten enablers of mass adoption and successful implementation. That proposed design allows central banks to manage the process flow, focus on the monitoring and control, without bearing all the load or exposing to over-centralized risks. It concludes that CBDC will be the primary tool in the future digital economy, and countries that are conversant with the technology will have a competitive advantage. Learning from the implementation, continuously reviewing the existing regulation, and improvising whenever international dynamics change the landscape are vital attributes of a successful implementation.

Shkliar, A. (2020): This Paper tells upon the phenomenon of the emergence of central banks' digital currencies (CBDC). Forms of digital money as means of exchange have been identified, and differences between central banks' digital currencies and other forms of central bank money such as physical money and reserves have been analysed. Key causes of digital currency development by central banks were highlighted: the approach to the cashless economy, Central banks of the world have been grouped based on the CBDC development principles, and public justifications for the need for CBDC implementation. The four existing options for the introduction of the CBDC were analysed, each of which has individual features. The combined efforts of the world's central banks to study and test various aspects of the technical implementation of the CBDC in the form of joint projects were systematized.

3. Research Gap

Even though various studies examine CBDC implementation in individual countries or regional blocs, limited research provides a comprehensive comparative assessment covering all seven continents and 196 countries. This study addresses this gap by offering a global perspective on CBDC development.

4. Research Objectives.

1. To Identify the status of CBDC development across 196 countries.
2. To Classify countries according to stages of CBDC development.
3. To Compare CBDC progress across seven continents.
4. To Examine determinants influencing CBDC adoption globally.
5. To Analyse challenges associated with CBDC implementation and Provide policy recommendations for effective CBDC deployment.

4. Research scope and Methodology.

This study adopts a descriptive and comparative research approach to explore the global development of Central Bank Digital Currencies (CBDCs) across different regions of the world. The analysis covers 196 sovereign countries distributed across Asia, Africa, Europe, North America, South America, Oceania, and Antarctica. To ensure reliability and accuracy, the study uses secondary data obtained from credible sources such as the Atlantic Council CBDC Tracker, the International Monetary Fund (IMF), the Bank for International Settlements (BIS), the World Bank, central bank reports, government

publications, and peer-reviewed academic journals. The study period extends from 2020 to 2026; This timeframe captures the transition of many countries from conceptual discussions to pilot projects and implementation stages. Descriptive statistics are used to summarize CBDC developments, while comparative analysis helps identify regional differences and similarities.

5. Limitations of the Study.

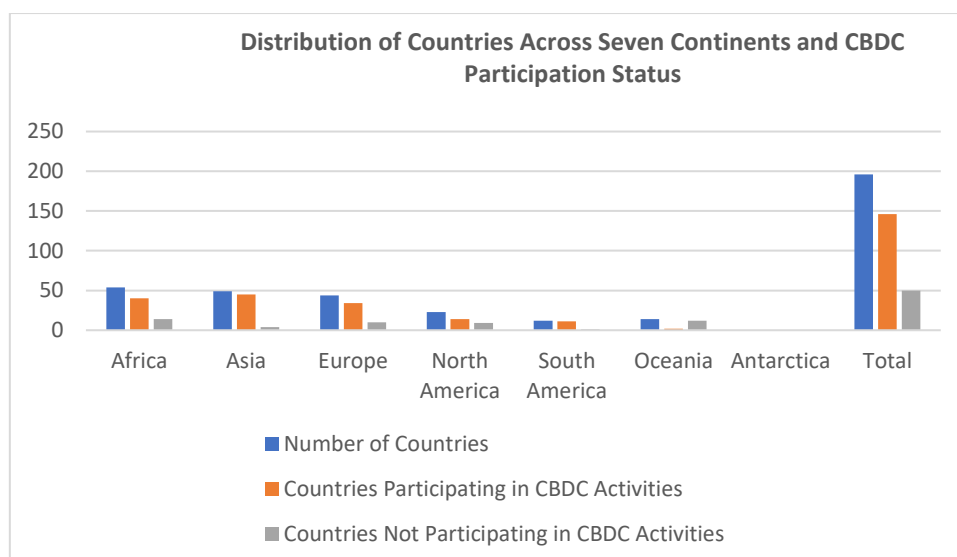
This study is primarily based on secondary data obtained from international organizations, central banks, and published literature, which may contain inconsistencies across sources. and developments occurring after the data collection period may not be fully reflected in the findings. In addition, reporting standards and disclosure practices vary significantly among countries, making cross-country comparisons challenging. The limited availability of reliable adoption and usage statistics, particularly in pilot-stage economies, may also affect the comprehensiveness of the analysis.

6. Data Analysis and Interpretation.

Table 1. Distribution of Countries Across Seven Continents and CBDC Participation Status

Continent	Number of Countries	Countries Participating in CBDC Activities	Countries Not Participating in CBDC Activities
Africa	54	40	14
Asia	49	45	4
Europe	44	34	10
North America	23	14	9
South America	12	11	1
Oceania	14	2	12
Antarctica	0	0	0
Total	196	146	50

Source: (<https://www.atlanticcouncil.org/cbdctracker>).



Interpretation of Continent-wise CBDC Participation

The table highlights the growing global interest in Central Bank Digital Currencies (CBDCs), with 146 out of 196 countries actively involved in some stage of CBDC exploration, development, pilot testing, or implementation. This indicates that nearly three-fourths of the world's countries have recognized the importance of digital currencies in shaping the future of financial systems. Asia emerges as the leading continent, with 45 of its 49 countries participating in CBDC initiatives. This strong engagement reflects the region's rapid digital transformation, technological advancement, and increasing focus on modernizing payment infrastructures. Africa also demonstrates significant progress, with 40 out of 54 countries exploring CBDCs, highlighting the continent's efforts to promote financial inclusion and expand access to digital financial services. Europe records 34 participating countries out of 44, indicating substantial interest among European nations in developing secure and efficient digital payment ecosystems. In North America, 14 of the 23 countries are engaged in CBDC-related activities, suggesting a cautious but growing approach toward digital currency adoption. South America exhibits one of the highest participation rates, with 11 of its 12 countries actively pursuing CBDC initiatives, reflecting strong regional interest in payment innovation and monetary modernization. In contrast, Oceania shows relatively limited participation, with only 2 out of 14 countries involved in CBDC activities, while the majority have not yet initiated formal projects. Overall, the findings suggest that CBDCs have evolved into a global policy priority, although the level of engagement varies considerably across continents depending on economic development, technological readiness, regulatory frameworks, and national policy objectives.

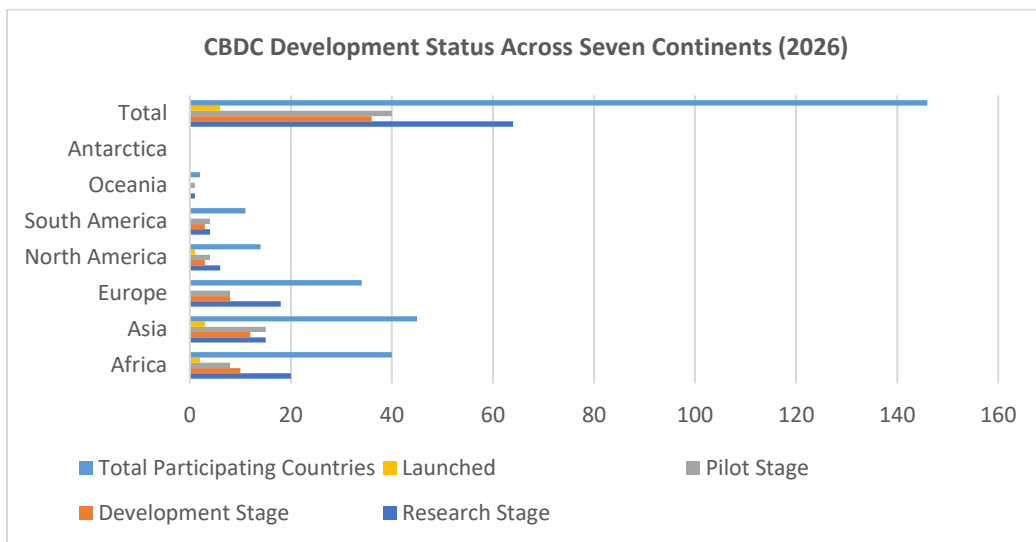
Table 2. CBDC Development Status Across Seven Continents (2026)

Continent	Research Stage	Development Stage	Pilot Stage	Launched	Total Participating Countries
Africa	20	10	8	2	40
Asia	15	12	15	3	45
Europe	18	8	8	0	34

Continent	Research Stage	Development Stage	Pilot Stage	Launched	Total Participating Countries
North America	6	3	4	1	14
South America	4	3	4	0	11
Oceania	1	0	1	0	2
Antarctica	0	0	0	0	0
Total	64	36	40	6	146

Source: (<https://www.atlanticcouncil.org/cbdctracker>).

Continent-wise Status of CBDC Development (Based on Atlantic Council CBDC Tracker, 2026)



Interpretation of Continent-wise Status of CBDC Development

The table presents the distribution of countries across different stages of Central Bank Digital Currency (CBDC) development worldwide. Out of 196 sovereign countries, 146 are actively engaged in CBDC-related activities, demonstrating the growing global interest in digital forms of central bank money. Asia stands out as the most active region, with 45 participating countries. The continent also records the highest number of countries in the pilot stage (15) and launched stage (3), indicating that many Asian economies have moved beyond research and are actively testing or implementing CBDCs. Africa follows with 40 participating countries, where a significant number remain in the research stage, reflecting a strong interest in exploring the potential of digital currencies to enhance financial inclusion and payment efficiency. Europe shows substantial engagement, with 34 countries participating in CBDC initiatives. Most European countries are concentrated in the research and development stages, suggesting a cautious and policy-oriented approach toward CBDC implementation. North America records 14 participating countries, with activity spread across research, development, pilot, and launch stages, indicating gradual progress in digital currency adoption.

South America demonstrates a relatively high level of participation considering its size, with 11 countries involved in CBDC projects. Several countries in the region have advanced to pilot testing, reflecting increasing efforts to modernize payment systems and improve financial accessibility. Oceania exhibits limited participation, with only two countries actively engaged in CBDC development, highlighting a comparatively slower pace of adoption. Overall, the findings reveal that while CBDC exploration has become a global phenomenon, the level of progress varies considerably across continents. Most countries remain in the research and development phases, whereas a smaller number have advanced to pilot projects or full-scale launches. This suggests that central banks worldwide continue to evaluate the technological, regulatory, and economic implications of CBDCs before committing to widespread implementation.

Continental Analysis

Asia: Asia represents the global leader in CBDC development. China's Digital Yuan (e-CNY), India's Digital Rupee, and pilot projects in South Korea, Japan, Thailand, and Singapore demonstrate strong regional commitment. High internet penetration, advanced fintech ecosystems, and widespread mobile payment adoption contribute significantly to CBDC progress.

Africa: African countries primarily pursue CBDCs to improve financial inclusion and reduce reliance on cash-based transactions. Nigeria's eNaira remains one of the most prominent operational CBDCs globally. Several African nations continue feasibility studies and pilot programs.

Europe: European countries focus on monetary sovereignty, payment resilience, and strategic autonomy. The Digital Euro project led by the European Central Bank represents one of the world's most significant CBDC initiatives.

North America: North America exhibits diverse approaches. Caribbean nations have pioneered operational CBDCs, while the United States and Canada continue extensive research and experimentation.

South America: Brazil leads CBDC innovation in South America through its Digital Real initiative. Other countries remain in research and pilot phases, emphasizing payment modernization and financial inclusion.

Oceania: Australia and New Zealand focus primarily on wholesale CBDCs and cross-border payment innovations. Pacific Island nations are exploring CBDCs to improve financial accessibility.

Antarctica: Antarctica has no sovereign states, central banks, or monetary authorities. Consequently, no CBDC initiatives exist on the continent. However, Antarctica is included in this study to provide a complete seven-continent geographical framework.

Table: Key Drivers, Challenges, and Policy Implications of CBDC Development

Category	Major Factors	Explanation
Drivers of CBDC Development	Payment System Modernization	Countries are developing CBDCs to create faster, safer, and more efficient digital payment systems.
	Financial Inclusion	CBDCs can provide access to financial services for unbanked and underbanked populations, particularly in developing economies.
	Digitalization of Economies	Growing use of digital technologies and declining cash usage encourage CBDC adoption.
	Monetary Sovereignty	CBDCs help central banks maintain control over national monetary systems and reduce dependence on private cryptocurrencies.
	Reduction of Informal Economy	Traceable digital transactions can improve transparency and reduce illicit financial activities.
	Cross-Border Payment Efficiency	CBDCs have the potential to lower transaction costs and improve international payment systems.
Challenges of CBDC Development	Cybersecurity Risks	CBDC systems may become targets for cyberattacks, data breaches, and digital fraud.
	Privacy Concerns	Users may worry about government monitoring and the security of personal transaction data.
	Bank Disintermediation	Large-scale migration of deposits from commercial banks to CBDC wallets could affect banking sector stability.
	Limited Public Adoption	Consumers may continue using existing digital payment platforms instead of CBDCs.
	Technological Infrastructure Gaps	Many countries lack adequate digital infrastructure to support CBDC implementation.
	Regulatory and Legal Issues	Existing legal frameworks may require significant changes to accommodate CBDCs.
Policy Implications	Phased Implementation Strategy	Central banks should begin with pilot projects before moving toward full-scale deployment.
	Strong Regulatory Frameworks	Clear legal guidelines and governance mechanisms are necessary for successful implementation.
	Data Privacy Protection	Robust privacy and consumer protection measures should be incorporated into CBDC design.
	Collaboration with Commercial Banks	CBDCs should complement rather than replace the existing banking system.
	Investment in Digital Infrastructure	Governments should improve internet access, digital connectivity, and payment infrastructure.
	Public Awareness and Financial Literacy	Educational initiatives are needed to build public trust and encourage CBDC adoption.
	International Cooperation	Countries should work together to improve cross-border interoperability and establish common standards.

Source: Compiled from the literature review and findings of Auer et al. (2020, 2022), Alonso et al. (2021), Claessens et al. (2024), Zhang (2024), Koparan (2025), Muhammad et al. (2025), Surpiah et al. (2025), Bai et al. (2025), and other studies reviewed in the research.

7. Findings

1. Asia leads global CBDC development due to advanced digital infrastructure and fintech ecosystems.
2. Africa prioritizes financial inclusion and reduction of cash dependency.
3. Europe emphasizes monetary sovereignty, privacy protection, and payment resilience.
4. North America demonstrates mixed approaches ranging from operational CBDCs to exploratory research.
5. South America increasingly views CBDCs as tools for payment modernization.
6. Oceania focuses on wholesale CBDCs and cross-border payment systems.
7. Cybersecurity, privacy, and interoperability remain universal challenges.
8. Regulatory readiness significantly influences CBDC implementation success.
9. Financial inclusion remains the primary motivation in developing economies.
10. Cross-border payment efficiency is emerging as a major driver of CBDC adoption globally.
11. The analysis shows that countries are increasingly exploring Central Bank Digital Currencies (CBDCs) to modernize payment systems, promote financial inclusion, and strengthen monetary sovereignty. While regions differ in their objectives, challenges such as cybersecurity risks, privacy concerns, and potential impacts on the banking sector remain significant barriers to successful implementation.

8. Suggestions

1. Develop international standards for CBDC interoperability.
2. Strengthen cybersecurity and digital identity frameworks.
3. Enhance public awareness and digital literacy programs.
4. Establish comprehensive legal and regulatory structures.
5. Promote collaboration among central banks and international organizations.
6. Encourage public-private partnerships for technological innovation.
7. Conduct phased implementation through pilot projects before nationwide deployment.
8. Ensure privacy protection while maintaining regulatory compliance.
9. Invest in digital infrastructure to support CBDC ecosystems.
10. Develop contingency mechanisms to mitigate financial stability risks.
11. Governments and central banks should adopt a phased approach to CBDC implementation supported by strong regulatory, privacy, and security frameworks. Investments in digital infrastructure, financial literacy, and international cooperation are also essential to encourage public adoption and ensure the effective functioning of CBDCs.

9. Future Research Directions

1. Econometric analysis of CBDC determinants across 196 countries.
2. Consumer acceptance studies using behavioral models.
3. Impact of CBDCs on monetary policy effectiveness.
4. CBDC implications for banking sector stability.
5. Comparative analysis of retail and wholesale CBDCs.
6. Cross-border interoperability and international payment systems.
7. Artificial intelligence integration within CBDC ecosystems.
8. Longitudinal studies examining CBDC adoption trends over time.

10. Conclusion

Central Bank Digital Currencies represent one of the most transformative innovations in modern monetary systems. This study examined CBDC development across seven continents and 196 countries, highlighting substantial differences in objectives, implementation strategies, and technological readiness. Asia currently leads global CBDC experimentation and deployment, while Africa focuses on financial inclusion and Europe prioritizes monetary sovereignty and payment resilience. North and South America exhibit diverse approaches, whereas Oceania concentrates on wholesale and cross-border applications.

The findings demonstrate that successful CBDC implementation depends on a combination of technological infrastructure, regulatory preparedness, financial inclusion objectives, cybersecurity frameworks, and public trust. As CBDC initiatives continue to expand globally, policymakers must balance innovation with financial stability, privacy protection, and interoperability requirements. The study contributes to the growing body of CBDC literature by providing a comprehensive seven-continent and 196-country perspective on the future of sovereign digital currencies.

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AUTHOR CONTRIBUTIONS

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CONFLICT OF INTERESTS

Both the authors of this research paper confirm that there is no conflict of interest for this publication.

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