

REVIEW ARTICLE

A review on governance principles of cross-border Central Bank digital currency interoperability: A case study of Project Dunbar

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ABSTRACT - Cross-border central bank digital currency (CBDC) interoperability projects involving multiple CBDC (mCBDC) initiatives through collaboration among central banks have increased due to fintech innovation. In response to the governance concerns raised by Project Dunbar, one of the pilot initiatives, this study attempted to assess its compliance with the principles of cross-border Central Bank Digital Currency (CBDC) interoperable governance. Despite the study's reliance on grey literature, the interoperable governance enhancements that Project Dunbar requires were highlighted based on the following principles: (1) transparency and accountability, (2) oversight authorities, (3) user accessibility and inclusion and (4) inter-jurisdictional cooperation. The study proposes further studies on the development of implementation strategies and review of other initiatives as case studies.

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1. INTRODUCTION

Interoperability of Central Bank Digital Currency (CBDC) is vital to fintech innovation as it enables seamless cross-border transactions and minimizes barriers in the global financial system (Sumual et al., 2023). Interoperability requires the establishment of technological, regulatory, and governance standards to provide seamless interactions among various payment systems (Kumar et al., 2024). As a crucial strategy to attain cross-border CBDC interoperability, the Bank for International Settlements (BIS) has developed a conceptual model that entails a jointly operated multiple CBDC (mCBDC) payment system that can host multiple CBDCs named the BIS Model 3. According to Themistocleous et al. (2023), Project Dunbar, led by the BIS Innovation Hub is at the forefront of pioneering the utilization of BIS Model 3 approach. The project, in partnership with the Central Bank of Malaysia, the Reserve Bank of Australia, the Monetary Authority of Singapore, and the Reserve Bank of South Africa, intends to explore the possibility of mCBDC interoperability using distributed ledger technology (DLT). This initiative aligns with the G20 roadmap for enhancing payments made across international borders which was developed by the Financial Stability Board (FSB) in coordination with the BIS Committee on Payments and Market Infrastructures (CPMI) and other international bodies (BIS, 2021) (BIS, 2022b).

As one of the pioneer pilot studies in mCBDC exploration, Project Dunbar identified the fundamental governance-related capabilities and considerations that should be considered for a mCBDC common platform, as shown in Figure 1.

Governance				
1. Participants and stakeholders				
1.1 Commercial banks	1.2 Central Banks	1.3 Regulators	1.4 Operators	1.5 Corporates
2. Onboarding of members				
2.1 Account Setup			2.2 End-to-end onboarding process	
3. Legislation, rules and policy				
3.1 Governance structure	3.2 Legislation and regulations		3.3 Rules and compliance	3.4 Policy

Figure 1. Governance outline of Project Dunbar [BIS, 2022a]

The project adopted a design strategy that emphasized autonomy and universality. The goal of governance structures and decision-making authority is to assure equal representation of varied stakeholders and the fair and equitable making of collective decisions. Additionally, central banks are given authority within the limitations and regulations of a global platform-level structure. Despite the technical feasibility, Project Dunbar sparked concerns related to governance matters that needed further study. This led to the question: What framework for governance might give nations sufficient confidence to share crucial national infrastructure such as a payment system? (BIS, 2022a). Thus, this study explores these governance concerns via the lens of CBDC interoperability, utilizing Project Dunbar as a case study. The remainder of this paper is organized as follows: Section 2 provides a concise overview of CBDC interoperability and governance of cross-border interoperability, as part of the literature review. Section 3 elaborates on the discussion of this study, focusing

on the principles of governance in cross-border interoperability and the governance compliance of Project Dunbar. Section 4 concludes the study.

2. LITERATURE REVIEW

2.1 Central Bank Digital Currency Interoperability

The rise of Central Bank Digital Currencies (CBDCs) and their potential for cross-border transactions have spurred discussions on interoperability (Auer et al., 2021). Interoperability refers to the ability of different CBDC systems to seamlessly transact with each other across borders, enhancing efficiency and reducing friction in international payments. BIS (2022b) established five criteria for establishing a CBDC to achieve cross-border interoperability: ensuring CBDCs cause no harm, improving efficiency, strengthening resilience, encouraging financial inclusion, and assuring coexistence and interoperability with non-CBDC systems. In line with that, several experiments on the interoperability of CBDCs for cross-border scenarios have been conducted accordingly. Table 1 provides a summary of existing cross-border CBDC Interoperability projects.

Table 1. CBDC interoperability projects [Themistocleous et al., 2023]

Project	Country and Collaborators	Status
1. Aber	The United Arab Emirates and Saudi Arabia.	Pilot Stage – Concluded in 2020
2. Dunbar	BIS, Monetary Authority-Singapore, Reserve Bank-South Africa, Reserve Bank-Australia, Central Bank-Malaysia, R3, Partior, DBS Bank, JP-Morgan, Temasek and Accenture.	Pilot Stage – Concluded in 2022
3. Helvetia Phase II	BIS, the Swiss National Bank, SIX digital exchange, Citi, Credit Suisse, Goldman Sachs, Hypothekbank Lenburg and UBS.	Pilot Stage – Concluded in 2021
4. HSBC	The Bank of France (BdF), HSBC, IBM	Pilot Stage – Concluded in 2021
5. Jasper-Ubin	Bank of Canada, Bank of England, Monetary Authority of Singapore.	Pilot Stage – Concluded in 2019
6. Jura	BIS, Bank of France (BdF), Swiss National Bank (SNB), private sector businesses.	Pilot Stage – Concluded in 2021
7. MAS	France and Singapore.	Pilot Stage – Concluded in 2021
8. mBridge	BIS, Hong Kong Monetary Authority, People's Bank of China, Central Bank United Arab Emirates, Bank of Thailand, private sector partners.	Pilot Stage – Concluded in 2022
9. Prosperus	France and Tunisia.	Pilot Stage – Concluded in 2021

All nine projects were completed between 2019 and 2022, indicating that they were in the preliminary study stage. Besides, all the cross-border CBDC initiatives commonly leverage DLT and explore various technical approaches to achieve interoperability, such as decentralized interoperability protocols, cross-chain communication, and inter-ledger protocols. BIS (2022b) paper has emphasized several key advantages, such as increased effectiveness, more financial access, decreased risk from other parties, and stronger adherence to regulations in international payments. Nevertheless, there are still considerable obstacles to overcome when implementing advanced interoperability models into practice. These issues include the requirement for widespread international collaboration, the necessity to align standards, and the possibility of relinquishing autonomy (Themistocleous et al. 2023).

2.2 Governance of Cross-Border Interoperability

Interoperability governance is defined by Wimmer et al. (2018) as a form of governance that offers an enabling framework, processes, and managerial and steering functions, including the reference architecture and support instruments with regard to decision-making. As defined earlier, interoperability governance also ensures that the interoperability enablers and artefacts are in compliance with the interoperability objectives established at the policy level. In alignment with this objective, several pivotal measures were globally implemented to bolster the governance framework surrounding cross-border interoperability. Primarily, according to the focus of this study, which is Project Dunbar's governance framework, the team has identified key participants and stakeholders and defined their roles and responsibilities, as well as considerations for access to the mCBDC platform as part of strengthening cross-border interoperability governance (BIS, 2022a). The project examined decision-making concerns, including governance structures and frameworks, to gain a deeper understanding of how to make decisions that ensure the representation of diverse stakeholders equitably and fairly. Project Dunbar also investigated the possibility of granting autonomy to central banks within the constraints and parameters of a universal platform-level framework.

Moreover, the Interoperable Europe Board has been established to foster strategic collaboration and offer guidance on implementing the Regulation (European Commission, 2024). Its responsibilities include adopting guidelines for assessing interoperability, analyzing information to enhance cross-border interoperability, and suggesting measures to encourage the sharing and using of interoperability solutions. Apart from this, the governance of cross-border interoperability for platforms like Project Nexus entails building a multilateral framework with a Nexus Scheme Organization (NSO) comprising central banks, payment network operators, and pertinent supervisory bodies to coordinate regulatory requirements, remove legal obstacles, and guarantee the safe and effective running of the cross-border payments network (World Economic Forum, 2023a).

2.3 The Governance Principles

Adhering to the concept of this paper, this review focuses on selected governance principles relevant to the context of the interoperability of digital currency. These principles will be further deliberated in the upcoming discussion section. Firstly, the governance principle of transparency and accountability is considered essential, as scholar Malik et al. (2023) noted that blockchain technology enhances trustworthiness through secure data exchange. However, cryptocurrencies, a form digital currency, often suffer from weak governance frameworks, necessitating a "comply or explain" approach to boost transparency and flexibility (Hacker, 2019). Secondly, the oversight authority governance principle is deemed vital for addressing complex data sharing and regulatory challenges in cross-border digital payments (Li, 2022). Central Bank Digital Currencies (CBDCs) face legal and jurisdictional hurdles, requiring a balance between intervention and facilitation (Duque, G. G., & Torres, J. D. Z., 2020). Thirdly, the governance principle of user accessibility and inclusion is acknowledged as important, involving various factors and balancing privacy with compliance (Gasser, 2015). Lastly, the inter-jurisdictional cooperation and governance principle faces challenges such as data sovereignty and market concerns. So, multilateral frameworks and innovative mechanisms are suggested for effective governance (Li, 2022).

3. DISCUSSION

3.1 Principles of Governance in Cross-Border Interoperability

World Economic Forum (2023b) published a white paper on June 2023 analysing CBDC from a regional standpoint to identify special features influencing CBDC design in every country based on multistakeholder and Forum Digital Currency Governance Consortium (DCGC) CBDC Regional Roundtable series inputs. Rooting from these inputs, principles for CBDC interoperability were derived encompassing both broad principles applicable to interoperability as well as specific principles for interoperable governance, legal and regulatory frameworks, identification and authentication systems, diverse payment systems, and technical solutions. As the focus of this study, which is to explore the principles of governance in cross-border interoperability, were set as Diagram 1.

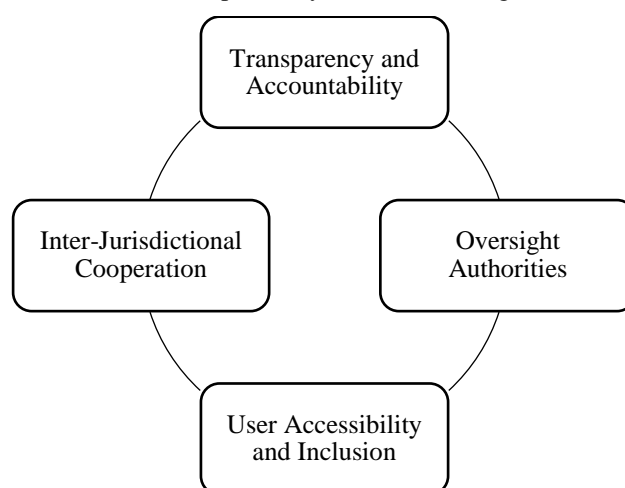


Diagram 1. Principles of governance in cross-border interoperability [World Economic Forum, 2023b]

The suggested principles in Diagram 1 are believed to set up the foundation for creating an agreed-upon set of CBDC interoperability standards by the contributors of the World Economic Forum (2023b) paper. In accordance with the stated intention, several standard-setting initiatives are currently in progress, including the International Telecommunication Union-hosted Digital Currency Global Initiative (DCGI), which examines the requirements for technical standards for stablecoins and central bank digital currencies (Sethaput and Innet, 2023).

As illustrated in Diagram 1, firstly, it is of utmost importance for the governance of CBDC to be transparent, with accessible policies, rules, and procedures. Decision-making should involve accountability mechanisms for responsible management. Jurisdictions should clearly define access, use, and whether centralized or decentralized ledgers are used, including retail, wholesale, and digital settlement instruments. Secondly, it is essential for every jurisdiction to establish a dedicated authority to oversee CBDCs in a sovereign capacity. The goal should be to reach a consensus on a governance body that can address cross-border aspects and ensure frictionless interoperability. Thirdly, regardless of socioeconomic

status or technological literacy, CBDCs should be inclusive and easily accessible for everyone, ensuring equitable access to services for marginalized populations and underserved areas, and clearly defining entry processes for all users. Lastly, Central banks should collaborate to establish common standards, protocols, and frameworks for cross-border payments, ensuring the successful implementation of CBDCs across borders. Figures should be self-explanatory and contain a short but adequately detailed caption. Figures should be provided in one of the following formats: PNG, EPS, TIFF, JPEG, BMP. The figure(s) should have a resolution of 600 dpi for grayscale and 300 dpi for colour. All figures must be numbered sequentially in the text in the same order in which they appear (e.g. Figure 1, Figure 2). Figure 1(a) and Figure 1(b) are examples of multi-part figures in which each component should be labelled. The figure(s) caption should be written in sentence cases and placed underneath the image, centre aligned, with no period at the end of the caption.

3.2 Governance Compliance of Project Dunbar

Project Dunbar has made significant strides in demonstrating the feasibility of a mCBDC platform. Nonetheless, when assessed against the governance principles of transparency and accountability, oversight authorities, user accessibility and inclusion, and inter-jurisdictional cooperation, some areas need improvement. With regard to transparency and accountability in governance, Project Dunbar highlights the need for a clear and equitable governance framework which fosters transparency and equated decision-making for all stakeholders. Still, there is a lack of detailed discussion concerning the specific approaches for monitoring, reporting, and ensuring accountability among participants. In order to enhance its performance, Project Dunbar should consider implementing comprehensive reporting mechanisms and clear accountability frameworks that are coherent with the roles and responsibilities outlined earlier for each stakeholder involved. This suggestion aligns with studies by Tountopoulos et al. (2014) that presented an accountability-based governance framework for cloud computing data governance and Docksey et al. (2023) that reported on basic elements for greater interoperability at international level from an accountability perspective.

Subsequently, pertaining to compliance with oversight authorities' governance principle, Project Dunbar proposes a governance structure that includes multiple levels of decision-making, involving strategic, tactical, and operational decisions. This structure aims to balance universality and autonomy, ensuring that central banks have control over their domain areas while adhering to universal rules. Table 2 illustrates the governance structure of Project Dunbar at a conceptual level.

Table 2. Governance structure of Project Dunbar [BIS, 2022a]

Levels of decision-making	Applicable forums	Relevant parties
Strategic and platform decisions	<ul style="list-style-type: none"> Governance bodies 	Central banks, the BIS, selected commercial banks, operator
Tactical decisions	<ul style="list-style-type: none"> Business management; governance-related bodies Technology- and architecture-related bodies Risk- and compliance-related bodies Innovation- and research & development-related bodies 	Central banks, the BIS, selected commercial banks, operator
Day-today operational decisions	<ul style="list-style-type: none"> Business operations team Technology team Risk and compliance team Innovation and research & development team 	Central banks (or their appointed operator), operator

Nevertheless, forming an independent oversight body with comprehensive monitoring and enforcement capabilities is essential to ensure impartial governance and compliance with established rules and policies. Wimmer et al. (2018) suggested three relevant bodies for interoperability governance: the controlling body, the preparatory body for strategic decision making and the public service provider. As for Project Dunbar, although the BIS Innovation Hub is leading the initiative, an independent authority body has yet to be determined. To ensure proper oversight and due diligence, third-party authorities should be assigned in line with the recommendation of Wimmer et al. (2018).

To delve deeper, as for the governance principle of user accessibility and inclusion, the project includes diverse industry participants from the fintech sectors, as well as commercial banks users; however, these are not defined. While a general focus is on inclusivity, detailed strategies to cater to less technologically advanced participants are not explicitly outlined. As Project Dunbar is yet to launch, user accessibility and inclusion is critical to be reviewed. So, it is crucial to ensure all users can effectively participate in and benefit from the platform. User accessibility and inclusion governance principle have been also emphasized by Campmas et al. (2022) as a need to account for user needs in coordinating interoperability initiatives. Additionally, the Greek National Interoperability Framework has a provision that is of common practice regarding the principle of Inclusion and Accessibility due to law 3979/2011 (Kalogirou et al., 2020). Thus, Project Dunbar should consider the practical implementation of user accessibility and inclusion governance principles.

Lastly, concerning the inter-jurisdictional cooperation governance principle, Project Dunbar acknowledges the complexity of jurisdictional boundaries and the need for harmonized legal and regulatory frameworks. It promotes collaboration through workshops and shared decision-making structures to address these challenges. Nevertheless, Ofa et al. (2023) argued that gaps and inconsistencies are created by the lack of global coordination in Project Dunbar, which leads the team to find ways to handle different regulations and national requirements in testing cross-border settlement processes. On the contrary, the same team of Project Dunbar (excluding the Reserve Bank of South Africa) that joined up with Bank of Korea and has progressed to consecutive alliance to explore the feasibility of encoding jurisdiction-specific policy and regulatory requirements into a standard protocol for cross-border use cases through Project Mandala (BIS, 2023 & 2024). The successful launch of both projects will serve as a critical indicator of the effectiveness of inter-jurisdictional cooperation and governance principles. The alliance of both Project Dunbar and Project Mandala are shown in Figure 2 and Figure 3 respectively.



Figure 2. Alliance of Project Dunbar [BIS, 2022a]



Figure 3. Alliance of Project Mandala [BIS, 2023 & 2024]

4. CONCLUSIONS

In a nutshell, this study reports the assessment towards the compliance of governance principles associated with Project Dunbar to ensure nations involved in this collaboration of cross-border CBDC Interoperability have sufficient confidence to share crucial national infrastructure like a payment system. Alongside, the discussion highlighted several key governance improvements needed for Project Dunbar. In consequence, Project Dunbar presents a promising step towards establishing a comprehensive governance framework to ensure effective governance compliance of cross-border CBDC interoperability. Notwithstanding, it is essential to acknowledge certain limitations that may have impacted the interpretation and generalizability of the study. The literature review compiled reveals a notable constraint, predominantly characterized by the prevalence of grey literature in the examination of cross-border Central Bank Digital Currency (CBDC) interoperability, a phenomenon previously investigated by Themistocleous et al. (2023). Future research should focus on developing detailed implementation strategies for these governance principles and examining their practical impacts on cross-border payment systems. Additionally, exploring case studies of other mCBDC initiatives could provide valuable insights and best practices for improving governance in such complex international projects of cross-border interoperability.

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AUTHORS CONTRIBUTIONS

Anusha Annathurai (Writing - original draft; Resources; Conceptualization)

Norwazli binti Abdul Wahab (Formal analysis; Supervision)

Nurul Syafidah binti Jamil (Literature Review; Finalizing the paper)

AVAILABILITY OF DATA AND MATERIALS

The data supporting this study's findings are available on request from the corresponding author.

ETHICAL STATEMENT

Not applicable.

CONFLICT OF INTEREST

The authors declare no conflicts of interest.

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