

Chapter 2: International experience including Japan

- Modality of CBDC
- Global trend
- Impact of CBDC for stakeholders
- Technology
- Key projects and discussions
- **Summary (*including how to proceed with PoC*)**

Key consideration points for CBDC from global discussions

From the viewpoint of global discussion on CBDC, modality, concept and features are good reference for considering the modality of CBDC in Vietnam

Modality	Motivation/ need	For emerging and developing countries, <u>financial inclusion and enhancement of payment system</u> seems to be main topics
	Issuance model	<u>Indirect model (Two-tier model)</u> seems to be main-stream for considerations in order not to reduce impact on the financial systems. (but there are several ledger types and validation type)
	Technology	For the retail CBDC, <u>It is not mainly focusing on DLT technology</u> from the viewpoint of performance. From the viewpoint of cross-border, there are several experiment projects about DLT for CBDC
	Safety of Funds	In normal and <u>crisis periods</u> , the distinguishing features of central bank money relative to other forms of money could make a difference for user's adoption
Concept	Reduced cost for users	Consumer's utility is affected mostly by the transaction cost of the payment instrument. <u>There should be little or no (explicit) cost to the CBDC end user</u>
	Security	Several factors affect an end-user's overall perception of security. Tamper resistance and it is needed to eliminate unauthorized transactions
	Privacy (Anonymity)	Protecting an individual's privacy from both commercial providers and governments. Anonymity
	Accessibility	<u>CBDC end-user devices (smartphones, accounting system and point of sales for merchant)</u> could be designed to improve on accessible digital interactions
Features	Offline	A CBDC could allow users to maintain the <u>cash-like experience(portability, simplicity)</u> from the perspective of universal access and resilience
	Interest	<u>Interest rate bearing</u> is one of the consideration points for the design of CBDC. It should be carefully considered from the monetary policy perspective
	Limitation of amounts	<u>Limitation of usage and storage of holders of CBDC</u> would be considered from the financial stability viewpoint
	Interoperability	<u>Interoperability with private payment systems</u> and follow the <u>international standards</u> for both data format and data item (ISO 20022) and elements of technology for CBDC

Source: MRI analysis, based on BIS papers

Summary of PoC and Pilot

There are 4 category and its small categories to summarize the activities of PoC and Pilot projects

	Stage			Functionality				Leger		Participants		
	PoC	Pilot	Go-live	Interbank payment and settlement		Retail payment		Centralized	DLT	CB	FI	Others
				Interbank Fund (RTGS)	Delivery versus Payment	Cross-border	Others	Online	Offline			
 Project Hamilton ph1	●							●		●*2		●
	*1							●		▲		●
 Project Stella Ph1	●			●						●		●
Ph2					●					●		●
Ph3						●				●		●
Ph4							●			●		●
Retail CBDC ph1								●		●		
Project Ubin ph1				●						●	●	●
ph2				●						●	●	●
ph3					●					●	●	●
ph4						●				●	●	●
ph5							●			●	●	●

PoC : Experimental approach to confirm the concept for CBDC and/or new technology, Pilot: Approach to invite consumers/merchants and financial institutions to assess retail CBDC and payment system, CB: Central Bank, DLT: Distributed ledger technology

*1. A digital Euro is under planning

*2. Despite using ideas from blockchain technology, FRB(boston) found that a distributed ledger operating under the jurisdiction of different actors was not needed to achieve their goals

Summary of PoC and Pilot (2)

	Stage			Functionality					Leger		Participants		
	PoC	Pilot	Go-live	Interbank Fund (RTGS)	Delivery versus Payment	Cross-border	Others	Retail payment	Centralized	DLT	CB	FI	Others
 Project Inthanon ph1	●			●						●	●	●	
 Ph2	●				●		●			●	●	●	
 Ph3	●					●				●	●	●	
 Bakong			●	●				●		●	●	●	●*2
 e-CNY Pilot		●						●	●	*1	●	●	●
 e-krona pilot ph1	●	●						●		●			
 ph2		●						●		●			

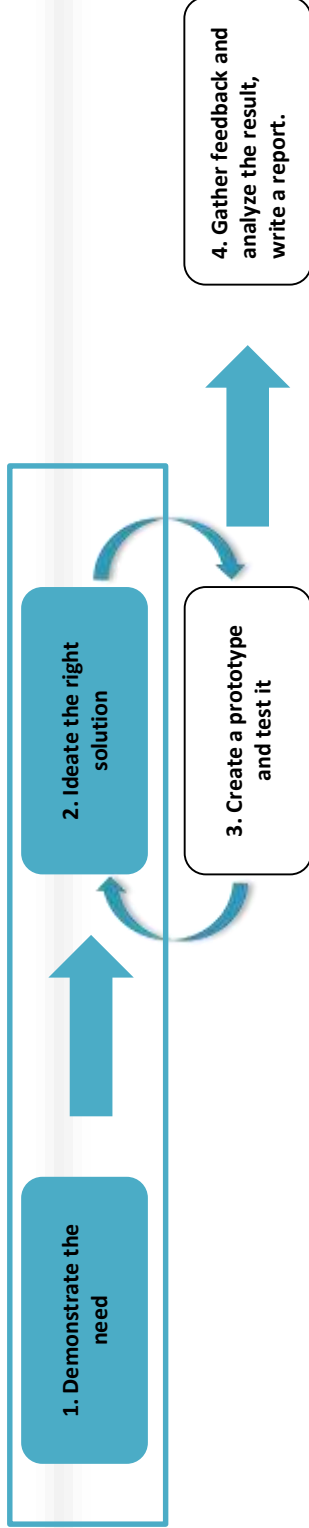
*1. the adoption of ledger for e-CNY is not confirmed because PBOC set the requirement performance for e-CNY should be 300,000/tps at the minimum. In this regard, there is an issue of performance for DLT

*2. Payment service providers and microfinances are joining the Bakong network

Source: MRI analysis

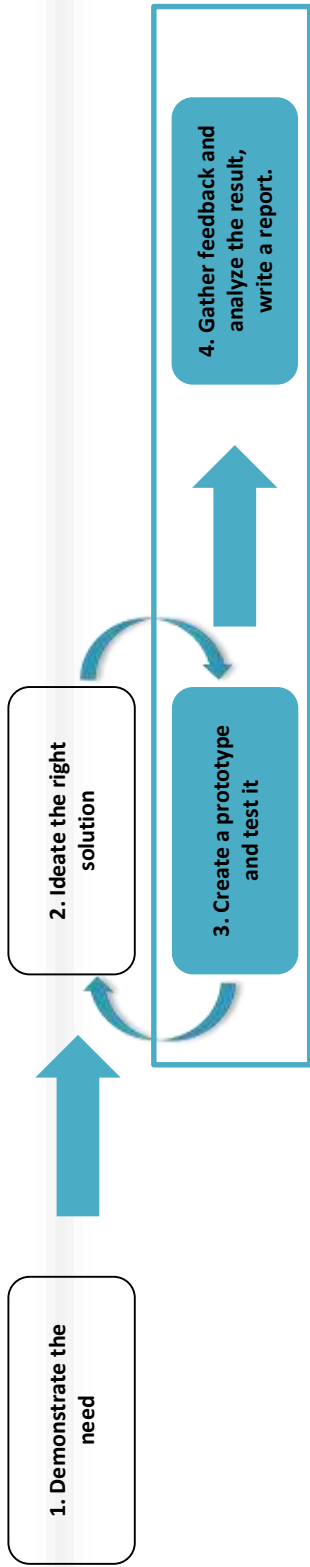
How to proceed with PoC

Normally, it takes few months to one year including preparation for PoC. There are 4 steps for proceeding with PoC



No.	Step(typical duration)	Description	Example
1	Demonstrate the need (A few months)	- Before starting a PoC, it is necessary to gather information over current situation and analyze what is a pain point of the situations. The analysis should be based on publications and/or surveys. In other words, it should not be imaginary to the analyst but firmly exist - It is also advisable to consider what benefit society could receive and what goal should be set to determine that the pain point can be solved	- Current situation: The emergence of distributed ledger technologies (DLT) in recent years has spurred discussions around the future of financial market infrastructures (FMI) supporting payments and securities settlement - Pain point: While the demand for cross-border payments is on the rise, they are often characterized as slow and costly when compared with domestic payments. As it is shown that delivery versus payment (DVP) could safely executed on DLT ledgers by using new technologies, central banks have not adopted those ledgers
2	Ideate the right solution (A few months)	- After figuring out the need and pain point, the project manager must consider about solutions for the goal of PoC. - It is advisable to find the most appropriate measures among a wide range of solutions by interviewing experts and/or brainstorming	- The first solution should be an open-source and publicly available DLT as support from a company that pushes specific DLT(s) could raise concerns about lack of neutrality - The primary choices are Hyperledger Fabric, Corda, and Element. There are several new technologies that are trying to improve the interoperability between ledgers, but most of them are not including centralized ledgers in their scope. With that said, Inter-ledger Protocol (ILP) seems to be the most appropriate among currently accessible measures

How to proceed with PoC (2)



No.	Step(typical duration)	Description	Example
3	Create a prototype and test it (Up to a half year)	• The project manager must arrange for members and implementation personnel within the bank. If they cannot be arranged in-house, procurement for those is necessary • In general, changes to the prototype specifications are likely to occur in PoC, so agile development is required. In this case, it is desirable for the manager and/or other members in the bank to have some technical knowledge • If the prototype and tests have not provided enough proofs that the idea improve the pain point, the members should consider to back previous steps	• ILP has two implementation, v2 and v4. Payment Channel is proposed in ILP v4, but it depends on a specific implementation of Bitcoin core and that implementation is in testing, thus experiments with Payment Channel should be excluded from the scope • ILP v2 supports general Centralized ledger but does not support Fabric. The project team has developed a centralized ledger implementation and a connector program for Fabric
4	Gather feedback and analyze the result, write a report.	• The project member must compile the result and summarize what can be said from the PoC into a report • The members must distinguish between those documents, based on the expected reactions from public, that can be published or not. Since it is important to get the public's attention, the members should plan public relation activities such as scheduling a press conference or giving presentations in advance • In addition, Having individual meetings with interested organizations and/or companies after the public announcement could help gathering reactions	• Publicizing the report at Fintech-related events and discussing them with companies that handle international money transfers could allow the members to share awareness of the pain point and gather information about ongoing projects in the companies, so bringing our own results will be useful to advance the research to the next stage

Implications from PoC and Pilot in other countries

Regarding the PoC and Pilot situation in each country, there are some implications for considering CBDC in Vietnam. In Vietnam, retail payment might be the first target of considerations about study and PoC

Criteria	Findings	Implications for Vietnam
Stage	Many countries has been started considerations about retail CBDC since 2020 and cross-border payment among central banks in the world	Central banks defined the target and objective of PoC and Pilot for identifying issues of technology, operation, performance etc. <u>Considering the issues in financial sector in Vietnam, the scope of PoC should be decided</u>
Functionality	Interbank payment and settlement	<u>Maturity of current payment system in Vietnam should be examined.</u> If there are no functions about liquidity saving and DvP, the scope of PoC is limited
	Retail payment	<u>Based on two-tier model</u> , several ledger types and account/token model should be examined through study or PoC
	Cross border payment	In Vietnam, cross-border payment of PoC should be conducted <u>after study or PoC about interbank payment and settlement, if needed</u>
Ledger	From the performance perspective, DLT is not focused on retail CBDC. DLT is one of the possible solutions for cross border payment.	<u>DLT is not precondition of implementation for CBDC</u> Central Bank should select appropriate technology based on the role of the central bank and the design of the ledger
Participants	Central Bank is the main entity, and the FI is a voluntary participant, but FI participation is required for pilot. The participation of FIs seems to be determined by the cost and manpower of the authorities	<u>It may take cost and time to invite financial institutions</u> on the PoC, but it would be effective considering future PoC and Pilot. And it is needed to confirm <u>the maturity of ICT system</u> in FIs (such as <u>ISO 20022 compliance/API connection</u> etc.)

Chapter 3: Possibility of issuing CBDC in Vietnam

- **Impact of CBDC in Vietnam (hypothesis)**
- (To be continued)

Financial inclusion

If Vietnam issues a retail CBDC, non-cash payments can be promoted nationwide thanks to some features of CBDC. However, the result would not be effectively immediately to the disadvantaged and ethnic minorities

Subject	Issued to be considered	Impact	How?
Promotion of non-cash payment	Uneven distribution to last-mile areas (poor internet, no POS, few branches)	Positive	• Availability: Continued access to CBDC is ensured even when access to cash is unavailable • Offline usage: CBDC has an offline functionality, which can be used in an environment with no internet (island areas), mobile network coverage or no electricity (mountainous areas). <i>Experiences: e-CNY's hardware wallet of China; BoG's offline smart card</i>
	Low speed of transactions		
	High fees of some current payment channels (e-wallets, bank card, remittances)		
The effectiveness of CBDC to the disadvantaged and ethnic minorities	Financial literacy	Negative	• As a public goods, the circulation of CBDC is free of charges. Experiences: Bahamas's Sand Dollar initiative, the ECCB's DCash pilot of Ghana. • As for cross-border payment, CBDC would decrease transaction fees by eliminating credit risks between FIs participating in a cross-border transaction, because payments are made using a direct liability of the central bank, which is the safest and most liquid settlement asset
	Reliance on cash payment		
	The price of CBDC's holding devices		
			• It would be difficult for them to understand what CBDC is and how to use it due to low level of financial literacy. E.g. Lack of technical knowledge of ICT tools and education, etc. • Rural and remote residents still prefer cash payment thanks to some of its features such as anonymity, instant finality of payment, no explicit cost, etc. • ash would still more preferable than CBDC as a non-cash payment. This is because the uneven distribution of financial services in these areas has always been the factor that restrain the promotion of non-cash payment. • Digital devices such as smartphones may be too costly for the poor in Vietnam, given the average income of poor households only range from 700,000 – 1,300,000 VND/month

Financial inclusion (2)

The level of the CBDC's impacts on financial inclusion is highly dependent on its demands, which would be determined by the correlation between benefits and limitations related to CBDC's design

Subject	Issues to be considered	Impact	How?
The level of CBDCs impacts on financial inclusion depend on the design of CBDC	Balance and limits	Unclear	- The impacts of CBDC's balance and limit on the feasibility or convenience of making high-value payments depend on how these restrictions are configured. - E.g. Setting limits for individuals' CBDC holding device, which mainly prefer low value transactions, as the same level as businesses' ones may impact the practicality of using CBDC for high-value payments of corporate activity
	Interest rate of CBDC		This factor may prevent or promote the incentive to use CBDC of customers. If CBDC is: - Interest-bearing: That paying interest on CBDC deposits would attract new entrants into the formal financial sector; Unbanked adults want to take advantage of the savings benefits of interest-bearing CBDCs. - Non-interest bearing: There would be no incentive to hold large quantities of CBDCs for payment
	On-boarding requirements		This factor may restrains or promotes the accessibility of CBDC - If CBDC has an "anonymity" feature and its on-boarding requirements depending on the strength of personal identity information, it may facilitate registration of people - If CBDC has complicated registration requirements to ensure AML/CFT compliance, proof of identification required will be another major impediment to on-boarding unbanked customers (E.g. alike the situation of Mobile Money in Vietnam) - Also, those who don't have digital devices, as well as living in remote areas, still make it hard for both e-KYC (if implemented) and KYC at the counter.

Financial stability

CBDC contributes to Vietnam’s financial stability by enhancing the SBV’s role in ensuring financial stability as well as improving the operation of financial system

Subject	Issued to be considered	Impact	How?
SBV engagement in the financial system	SBV’s role of ensuring financial stability	Positive	• As an actor that directly issues CBDC, CBDC promotes the state presence on the payment market • SBV can generate additional demand for CBDCs through regulations - E.g. by giving CBDC units the quality of legal tender; accepting CBDC for payment of public services, etc. • With access to real time data about the economy and monetary flow, CBDC enhances SBV’s financial oversights, thereby helping SBV to prevent financial crimes, as well as promptly issuing monetary policy
The operation of the current financial system	Cash management costs		CBDC can reduce cash management cost, in particular: • For bank branches: reducing distribution and safekeeping security; the cost of maintaining the supply of physical currency protecting it against counterfeiting. • For private payment providers: reducing the book-keeping, operational, payment reconciliation costs
	Emergency preparedness		CBDCs can also be a useful channel for governments to make economic stimulus payments to individuals and businesses, particularly during crises . • E.g. In the event of serious crises, when private payment systems may fail, CBDC could work as an alternative system and thereby increase stability in the payment system as a whole .
	Innovation and competition in the financial ecosystem and beyond		An interoperable CBDC platform will foster innovation and support competition in the financial ecosystem and beyond • If Vietnam implement an open and interoperable CBDC platform, it will promote the engagement of other players such as fintech to provide value-added smart contracts to extend the CBDC’s functionalities • When competition and innovation increase, charges may be lower.

Financial stability (2)

There are still some negative effects of CBDC on Vietnam’s financial stability, especially on the operation of banking sectors. However, the level of impacts is dependent on the design of CBDC

Subject	Issued to be considered	Impact	How?
Banking disintermediation depending on specific features of CBDC	CBDC is interest-bearing	Negative	As an attractive alternative store of value, it could cause banking disintermediation as customers might decide to substitute their bank deposits with CBDC, causing deposit outflows. In such a scenario: • Banks would be incentivized to increase deposit rates, leading to higher costs of bank funding and revenue depression • Banks can then pass on these costs to borrowers, or engage in riskier activities in search of higher returns by raising lending interest • Banks would need to maintain additional liquidity to support CBDC demand. This would consequently impact the size and risk profile of banks’ balance sheets and profitability
	CBDC is non interest-bearing		• The general public would have little incentive to switch from holding bank deposits to CBDC, and the effect of banking disintermediation would then be limited
	Systematic bank run		• Given the advantage of technology, a perceived “flight to quality” from bank deposits to CBDCs could take place digitally at an unprecedented speed during the time of economic or financial market turmoil. However, the degree of impact depends on the demands of CBDC as well as the attractiveness of CBDC in practice
Cyber security issues	Credential theft and loss		• Given the arsenal of modern attackers, techniques such as social engineering, side-channel attacks and malware could be used to extract credentials from a CBDC user’s device
	Privileged Actors		• Malicious insiders with privileged control such as freezing, transferring, withdrawing funds without the account holder’s consent are obvious causes for concern

Effect of CBDC – Interoperability

Overall, the extent to which interoperability is promoted depends on the design of the CBDC. CBDC effects on interoperability can be analysed from 02 aspects: (i) within the domestic system; and (ii) cross-border payment.

Subject	Issues to be considered	Impact	How?
The “interoperability” of the payment system	Domestic system	Positive	• The integration of retail CBDC with other types of retail payments can be achieved thanks to the potential programmability features of CBDCs enabled by smart contracts* and APIs**. • E.g. Integration between CBDC and banking system can be demonstrated when CBDC’s users obtain wallets or accounts through their bank or payment service provider (PSP) in exchange for bank deposits.
	Cross-border payment		• CBDCs that are “linked” can solve the problems of inefficiencies, risks and high costs of the current cross-border payment landscape • E.g. A single mCBDC multi-currency shared platform will enable international settlements on a common platform, streamlining the flow of cross-border payments and making payments faster, cheaper and safer.
Experiences (reference)			
eCNY - PBOC, China • A e-CNY wallet is needed for all transactions involving payments made with DC/EP. DC/EP wallets can be linked to accept payments from other private sector payment systems. • The m-CBDC Bridge Project is being conducted to evaluate the feasibility of cross-border exchange.	E-krona - Riksbank, Sweden • The e-krona pilot project is expected to be linked with the real-time gross settlement (RTGS) system in the future and this will enable it to integrate with other payment systems.		Project Dunbar - BIS Innovation Hub, central banks of Australia, Malaysia, Singapore and South Africa • Distributed ledger technologies' decentralisation capabilities and the programmable nature of smart contracts and CBDCs, tied together in a sophisticated platform design, have produced an elegant solution for central banks to share a common settlement infrastructure for cross-border payments

*Smart contracts and programmable payments, which are executed without any intermediaries, accurately, transparently, securely and efficiently, with no miscommunication or misinterpretations and paper-free; ** APIs: the central bank will own the CBDC core ledger and infrastructure; the central bank, banks and the PSPs will interact with the core ledger through APIs. APIs will also be used to manage interactions at the banks and PSPs with their back-end systems, payment gateways and banking platforms. The CBDC infrastructure will be integrated with RTGS and account-to-account payment systems to facilitate CBDC issuance and redemption