National Study on Central Bank Digital Currency and Stablecoin in the Maldives

Prepared by Emir Hrnjic and Gordon Clarke
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## Glossary of Terms

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<tbody>
<tr>
<td>ACH</td>
<td>Automated Clearing House for cheques</td>
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<tr>
<td>AML/CFT or AMLT</td>
<td>Measures for Anti Money Laundering and Countering the Financing of Terrorism</td>
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<tr>
<td>ATM</td>
<td>Automated Teller Machine – a device for automated cash dispensing and other banking transaction</td>
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<td>B2B</td>
<td>Business to business</td>
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<tr>
<td>B2P</td>
<td>Business to person</td>
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<tr>
<td>BIS</td>
<td>Bank for International Settlements, located in Basel, Switzerland is the forum used by Central Banks for agreeing standards. The payment standards body in BIS is known as CPMI – Committee on Payments and Market Infrastructures</td>
</tr>
<tr>
<td>Blockchain</td>
<td>Term used to describe Distributed Ledger Technology (DLT), in which the transaction ledger for a system is created step by step as a series of “blocks” by a cryptographic process, so that the ledger is shared and validated by participants rather than one central authority</td>
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<tr>
<td>BML</td>
<td>Bank of the Maldives – the largest commercial bank in the Maldives</td>
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<td>CAGR</td>
<td>Cumulative Annual Growth Rate</td>
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<tr>
<td>CBDC</td>
<td>Central Bank Digital Currency</td>
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<tr>
<td>CMDA</td>
<td>Capital Markets Development Authority, which is the capital markets industry regulator in the Maldives</td>
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<tr>
<td>CSD</td>
<td>Central Securities Depository, a system to register the holdings of government securities and to settle transfers</td>
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<tr>
<td>cUSD</td>
<td>USD denominated Stablecoin minted by CELO</td>
</tr>
<tr>
<td>DeFi</td>
<td>Decentralized Finance – FinTech mechanisms to enable non-bank third parties to safely deliver financial services and products</td>
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<tr>
<td>DLT</td>
<td>Distributed Ledger Technology – see Blockchain</td>
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<tr>
<td>Dollarization</td>
<td>The extent of use of the USD for domestic transactions and savings</td>
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<tr>
<td>ECCB</td>
<td>Eastern Caribbean Central Bank</td>
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<td>eCNY</td>
<td>The “Digital Yuan” - the CBDC issued by the People’s Bank of China and in Pilot use in a number of large Chinese cities</td>
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<tr>
<td>EftPos / EFTPOS</td>
<td>Electronic Funds Transfer at Point of Sale - the technology behind secure card payment at Point of Sale via a card reading terminal</td>
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<tr>
<td>FinTech</td>
<td>Financial Technology company providing on-line products that compete wth the traditional banking sector</td>
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<tr>
<td>Financial Inclusion</td>
<td>The proportion of the population holding accounts with banks and other licensed financial institutions</td>
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<tr>
<td>FMI</td>
<td>Financial Market Infrastructure</td>
</tr>
<tr>
<td>GDP</td>
<td>Gross Domestic Product – a measure of the output of the economy</td>
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<tr>
<td>Grey Economy</td>
<td>Economic activity not recorded by the authorities because it is conducted in cash</td>
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<tr>
<td>IFC</td>
<td>International Finance Corporation, a member institution of the World Bank Group</td>
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<td>IPS</td>
<td>A payment system that enables inter-bank payments to be made in real-</td>
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<tr>
<td>Instant Payment System</td>
<td>time via mobile handsets or internet banking, regardless of which mobile network is used</td>
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<td>-----------------------------</td>
<td>------------------------------------------------------------------------------------------</td>
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<tr>
<td>Interoperability</td>
<td>The ability for any mobile payment system user to transact with any other user regardless of bank, Payment Service Provider or mobile network used</td>
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<tr>
<td>KYC</td>
<td>Know Your Customer – measures to check the identity of a customer applying for banking or payment services</td>
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<tr>
<td>MENA</td>
<td>Middle East North Africa region</td>
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<td>MMA</td>
<td>Maldives Monetary Authority</td>
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<tr>
<td>MNO</td>
<td>Mobile Network Operator</td>
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<td>Mobile money</td>
<td>Payment systems based on mobile network operator platforms</td>
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<tr>
<td>MPSD Project</td>
<td>Maldives Payment System Development project</td>
</tr>
<tr>
<td>National Roll-out</td>
<td>A stage after a Pilot CBDC Project, and subject to its success, in which the Digital Currency would be rolled out across the country step by step</td>
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<tr>
<td>NFC</td>
<td>Near Field Connectivity - a method for mediated contactless transactions</td>
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<td>NPCI</td>
<td>National Payments Corporation of India</td>
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<tr>
<td>P2B</td>
<td>Person to business</td>
</tr>
<tr>
<td>P2G</td>
<td>Person to government</td>
</tr>
<tr>
<td>P2P</td>
<td>Person to person</td>
</tr>
<tr>
<td>Pilot Project</td>
<td>An initial private launch of the CBDC to test assumptions, systems, acceptance and impact</td>
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<tr>
<td>PoC</td>
<td>Proof of Concept</td>
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<tr>
<td>PoS</td>
<td>Point of Sale</td>
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<tr>
<td>PRC</td>
<td>People’s Republic of China</td>
</tr>
<tr>
<td>PSP</td>
<td>Payment Service Provider – an organization that provides payment services to end-customers, which may be a bank or a non-bank such as a mobile network operator or FinTech</td>
</tr>
<tr>
<td>QR code</td>
<td>Quick Response code that allows information about a merchant (and transaction price in some cases) to be read by a payment App on a mobile handset in order to set up a payment</td>
</tr>
<tr>
<td>Remittances</td>
<td>Incoming fund transfers sent to recipients in The Maldives or vice versa</td>
</tr>
<tr>
<td>SAARC</td>
<td>South Asian Association for Regional Cooperation</td>
</tr>
<tr>
<td>UAE</td>
<td>United Arab Emirates</td>
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1 Introduction

Frontier technologies carry a promise to fast track the Sustainable Development Goals (SDGs) through supporting innovative, forwarding-looking policies and solutions. There are, however, numerous risks and complexities of digital technologies that come along with those opportunities, as well as policy and regulatory challenges.

In recent years, relatively new approaches of policy experimentation and regulatory sandboxes have emerged among countries and have proven to be effective in creating a more conducive and contained space where governments, in partnerships with relevant stakeholders, can experiment and trial with digital technologies and innovations at the edge or even outside of the existing policy space and regulatory framework.

The COVID-19 pandemic has not only brought about unprecedented challenges to sustainable development but have also accelerated the adoption of digital connectivity and transformation. At the same time, the pandemic has exposed harsh fragilities and digital divides especially for countries in special situations.

In response, the Division for Public Institutions and Digital Government (DPIDG) of United Nations Department of Economic and Social Affairs (DESA), and the Information and Communications Technology and Disaster Risk Reduction Division (IDD) of United Nations Economic and Social Commission for Asia and the Pacific (ESCAP), in partnership with the Ministry of Environment, Climate Change and Technology, and the Maldives Monetary Authority (MMA) are collaborating on enhancing institutional capacity to implement regulatory sandbox on frontier technologies in the Maldives. In this context, the Maldives has identified ‘Central Bank Digital Currency (CBDC)’ and ‘Stable Coin Digital Currency’ as its two priority areas of focus in the context of payment systems.

The objective of this report is to assess the opportunities, risks, and challenges for the implementation of CBDC and Stablecoin(s) in the Maldives. The paper explores the potential implications and risks of digital currencies, examines technical considerations and compares the socioeconomic conditions and likely objectives in the Maldives with other countries. It goes on to identify any current regulatory gaps and the monetary policy issues raised by digital currencies, the use of the sandbox concept to promote CBDC/Stablecoin products via experimentation and proof of concept projects, and how the various stakeholders, notably the government and the MMA as well as the private sector, might become involved.

The paper concludes with a set of recommendations on practical ways of mounting a live CBDC/Stablecoin experiment in the current environment for the consideration of the Maldivian Government.
2 Assessing the likely opportunities and challenges of digital currencies

2.1 Payment systems challenges in the Maldives

The Maldivian economy is divided between the relatively poor local communities and the well-to-do (often expat) owners of the resort islands. Much of the cash flow from the resorts is not seen in the Maldives. For example, card payments for all-inclusive package holidays in the resorts are not necessarily being acquired in the Maldives.

There is a significant degree of dollarization in savings and some economic dependence on remittances (a rate of around 11%). Dollarization in The Maldives has remained high since at least the mid 1990’s, with rates in the 50% to 60% range when measured as foreign currency deposits in the domestic banking system. Tourism growth naturally leads to greater foreign exchange flows and the dollarization of deposits. As the main inputs to tourism require dollars (imports and the wages of expatriates) as do taxes paid to the government, deposit dollarization is inevitable. Due to the high level of deposit dollarization in the Maldives, banks seek to match their foreign currency position by extending foreign currency loans for which there is a huge demand as most of the investments in the country are highly import intensive. There has often been a shortage of USD notes. because of an overall mismatch in demand and supply.

Over the past ten years, substantial progress has been made in the Maldivian electronic payment systems. Financial inclusion has improved considerably in the Maldives. with 37 bank branches (out of 60) being established outside the capital, Male. This is almost a 300% increase in the last 15 years. Nevertheless, the cost of setting up physical establishments across the islands has caused banks to focus also on providing electronic services. There are currently 8,221 POS terminals and 163 ATMs. Bank of the Maldives Ltd. (BML), by far the largest retail bank in the Maldives, claims a nationwide network of 35 branches across all 20 atolls, 75 Self Service Banking centres, 136 ATMs, 277 agents and a full suite of Digital Banking services. The other local bank, Maldives Islamic Bank, has six branches across five atolls. The level of domination of the market by BML creates competitive issues for other financial institutions.

Mobile phone penetration is high across the Maldivian population as a whole, at well over 90% of adults, so the idea of improving access to a broader range of mobile financial services has been a live issue for nearly 15 years from the time of studies by the IFC, and the programme to implement centralised electronic payment and settlement systems at MMA 2008-2012. The number of mobile connections in the Maldives in January 2021 was equivalent to 140.9% of the total population(as many users have contracts with more than one provider). This is a higher figure than most

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1 “Dollarization in the Maldives” MMA Research and Policy Note December 2015
2 Maldives Payment System Development Project. Dated 2022
http://www.payments.mv/about/currentpaymentslandscape.html
countries in the region. The number of social media users in the Maldives was equivalent to 70.1% of the total population in January 2021.\textsuperscript{3} Hence we can conclude that the Maldives is a digital-savvy nation.

Unfortunately, due to lack of retail bank co-operation at that time, the interoperable mobile payment system planned nearly 15 years ago was not implemented, but now, mobile payment services from mobile network operator Dhiraagu, Ooredoo Maldives PLC in 2016-17 and two others have been implemented more recently\textsuperscript{4}:

<table>
<thead>
<tr>
<th>No.</th>
<th>Licensees</th>
<th>Payment Service</th>
</tr>
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<tbody>
<tr>
<td>1</td>
<td>Ooredoo Maldives Plc</td>
<td>Electronic Money Issuance Service; Remittance Service</td>
</tr>
<tr>
<td>2</td>
<td>Dhivehi Raajjeyge Gulhun Plc</td>
<td>Electronic Money Issuance Service</td>
</tr>
<tr>
<td>3</td>
<td>Payer Pvt. Ltd.</td>
<td>Electronic Money Issuance Service</td>
</tr>
<tr>
<td>4</td>
<td>FahiPay Pvt. Ltd.</td>
<td>Electronic Money Issuance Service</td>
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</table>

Furthermore, a central bank based Instant Payment System (IPS) using the TietoEVRY software, is being implemented with launch planned for September 2022. This development is under the Maldives Payment System Development (MPSD) project, and connections for banks and non-bank PSPs are being made to the IPS, thus enabling full interoperability between bank and non-bank PSPs. The infrastructure is based on the open-banking concept, such that customers will be able to make transactions from their bank accounts via applications from the third-party service providers (licensed PSPs).

The take-up of the MNO-led mobile money services so far has been quite low, however, even though coverage is good, encompassing 151 islands - 80% of the population. Nevertheless, usage showed a significant increase during the Covid-19 period. The challenges include:

- Limited attractiveness to customers due to difficulties in topping up the mobile wallet. This is mainly due to lack of interoperability among the mobile payment service providers and the banks, which is expected to be resolved by IPS.
- Challenges in on-boarding customers due to KYC issues, which are expected to be resolved by a new e-KYC regulation (to be issued July/Aug 2022) and will be further aided by the planned integration of Maldivian government ID systems.

\textbf{2.2 Objectives for the introduction of CBDCs and stablecoins}

Central banks commonly state six sets of objectives in considering the implementation of CBDCs. These can be categorized as:

- **Social objectives**: Improvement in financial inclusion and reducing the use of cash, together with its cost, security risk and lack of transparency.

\textsuperscript{3} https://datareportal.com/reports/digital-2021-maldives

\textsuperscript{4} Source MMA
• **Payment system safety and efficiency**: Streamlining or improving the safety and efficiency of the payment systems; addressing fraud, AML/CFT risks or other criminal activity, while maintaining an effective balance with privacy and data protection.

• **Monetary Policy**: Improving monetary data and transmission of monetary policy to the market, including targeted stimulation of the economy in certain regions or sectors.

• **Understanding new technologies**: Learning about how the new payment technologies work and what risks they introduce, by conducting experiments, and thus identifying ways to enhance future architectures.

• **Collateral for credit**: Increasing the scope for credit institutions to offer secured credit by including digital assets among the collaterals that can be used to guarantee loans.

• **Currency sovereignty**: Safeguarding the sovereignty and stability of the national currency against potential disruption by private cryptocurrencies.

These objectives do not apply equally in the Maldives. Over the past ten years, as mentioned above, financial inclusion has improved markedly and now bank account ownership approaches 80%. This appears to be mainly due to the establishment of many more bank branches on the islands, outside Male, although the advent of MNO-led mobile payment systems has helped. Now, the interoperable instant payment system being implemented by MMA will further address the remaining financial inclusion issues.

These mobile payment systems, once they are interoperable, will also help to reduce the use of cash and hence the costs to MMA and the banks of issuing and handling cash – a major cost to most institutions in the banking system everywhere. The security risks of cash usage will also be reduced, along with the problems faced by retailers in remote parts of the country regarding banking cash and the problems of transporting physical cash between the islands.

Hence, common Central Bank social objectives for CBDCs will be at least partially met by the interoperable Instant Payment System. These include:

- Better financial inclusion
- Reduction of the grey economy
- Achieving cash-like convenience for users
- Reducing the physical security risks of carrying cash
- Generally displacing the use of cash and its costs
- Prevention of counterfeiting and reduced cash payment fraud
- Creating transparency to reduce money laundering.

The challenges faced by the country which CBDCs and stablecoins could address are therefore not primarily those of cash use and financial inclusion per se, although those challenges might also be further mitigated by CBDC introduction.
We understand that the broad objectives of the Government for CBDCs and potentially certain types of stablecoin concern primarily:

1. Use of digital instruments to encourage tourism
   - The use of CBDC and/or stablecoins could provide an underlying mechanism to boost the industry, especially for mass tourism such as Chinese tour groups, via simplified currency conversion mechanisms and the use of overseas digital services or even (under strict conditions) overseas digital currencies (notably the digital Yuan). We note, however, that:
     - There are already ways in which Chinese tourism could be supported by having FinTech firms act as acquirers for the dominant Chinese digital payment brands AliPay and WeChat Pay (neither of which are central bank products). QR code acquiring for AliPay and WeChat Pay is already provided in the Maldives by Bank of the Maldives and others.
     - However, the potential exists for accepting the digital Yuan (eCNY) in a similar way to AliPay and WeChat Pay if the Chinese authorities allow the use of the digital currency cross-border.
   - There may also be ways to use new technology to stem the risk that much of the tourism income by-passes the Maldivian economy by introducing payment methods for inclusive packages at resorts that bring the income onshore. Special purpose stablecoins could be such a method, as described below.

2. Providing broader opportunities for FinTech companies, such as:
   - The potential to involve local FinTechs in the new technology markets, eg in developing open banking or “decentralised finance” (DeFi) products or cloud service products which could improve the local financial infrastructure and potentially become a source of (invisible or physical) export revenue.
   - Potential for a regulated ecosystem of tokenized assets enabling the Maldives to be seen as a friendly environment for digital innovation and entrepreneurs, while conserving financial and currency stability.

MMA has also highlighted specific objectives, which include:

3. Social policy issues (next steps): Further improvement in financial inclusion with cash-like convenience for users, which would need to include the potential to offer digital transactions off-line when telecoms are limited.

4. Continuous improvement to the payment systems: optimising their safety and efficiency, as defined by the BIS/IOSCO Principles for Financial Market Infrastructures (PFMIs), managing issues such as:

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5 These principles represent global best practice for managing risk in payment systems – see
a. Lowering currency issue and management cost, together with increased seigniorage; and

b. the potential for testing the use of alternative platforms for greater architectural flexibility in the future, which could support programmable payments, managing digital assets and smart contracts,

c. while ensuring that the commercial banks and other PSPs are not disintermediated by digital payment initiatives, and

d. building in protection against criminal behaviour: such as creating transparency to reduce money laundering and implementing more-intelligent ways to detect and prevent fraud.

5. Cross-border opportunities: Potential for cross-border use of CBDCs and certain types of stablecoin (as described below) where new technology may have a role, eg for remittances and wholesale cross-border transactions.

6. Monetary policy management: Improved monetary data, eg data based on financial and industrial sector uses of currency (not private individual data); leading to improved transmission of monetary policy to the market via eg specific, timed cash injections. The primary objective would be financial stability and specifically price stability rather than the idea of directed economic stimulation of the economy (“helicopter money”). The points raised include:

   a. Stemming the risks of dollarization;

   b. Potential impact on credit availability via use of digital assets as collateral;

and

7. Monetary sovereignty - avoiding proliferation of private cryptocurrencies used within the country and risk of loss of control over domestic currency.

A further consideration for an Islamic country like the Maldives could be:

8. The potential use of commodity-backed stablecoins in Islamic Finance and community support:

   a. One specifically Islamic Bank already exists in the country (Maldives Islamic Bank) and major institutions like BML also operate an Islamic banking window

   b. Subject to many conditions, the use of commodity-backed digital instruments opens up a wide range of opportunities, including simple methods of collateralising Sharia-compliant transactions, financing infrastructure projects and conducting Islamic repos to provide liquidity and guarantees.

https://www.bis.org/cpmi/publ/d101.htm
c. The use of stablecoins in community projects for the distribution of welfare benefits and in healthcare provision, in an Islamic context, may also be a valuable aim, subject to safeguards against dollarization.

These potential benefits and how they might be realised are discussed further in Section 3.

In broad terms, a CBDC may be a good method (although not the only one) to address many of these objectives, but the impact of existing mobile payment initiatives and the IPS on cash usage and financial inclusion are likely to reduce these problems in advance of any CBDC or stablecoin introduction.

Overall, the primary benefits of digital currencies often sought for less developed countries (such as financial inclusion, reduction of the grey economy, helicopter money etc.) may turn out to be CBDC benefits for the Maldives, but it is likely that boosting tourism, meeting monetary policy objectives, future technical architecture opportunities especially involving FinTechs, cross-border payment (and perhaps Islamic finance) will be the primary goals.

2.3 Risks of Central Bank Digital Currencies

2.3.1 Risks of launching a CBDC

There are clear benefits from CBDC implementation, as detailed above, but with benefits, come risks, which must be identified and addressed. Some more-developed countries, e.g. UK, see the risks of a CBDC outweighing the specific benefits. In that instance, a recent debate in the UK House of Lords found no compelling case for a CBDC based on a Bank of England plan.

Risks considered in the UK case, and some additional ones include:

(1) Impact on financial stability: we do not yet know how the broad use of a CBDC would affect market confidence, especially if there are technical issues, (such as those encountered by the Eastern Caribbean Central Bank with their CBDC6) and if the level of take-up of CBDC (backed by Central Bank money) against the IPS (using commercial bank money) is not high. It is unlikely that this subtle difference alone will ensure that take up will be sufficient.

(2) Protection of privacy (depending on the way the CBDC is implemented), which is a major concern for western countries where data protection is a big issue. It is important to prevent the Central Bank from being drawn into controversial debates on privacy and state surveillance.

(3) Safeguarding against telecoms and electricity outages, so there needs to be an offline mode of working, which is not usually provided in IPSs.

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6 Which we understand were largely to do with the expiration of security certificates rather than any failure of the technology itself
(4) Risk of runs on bank deposits in times of economic stress, conversion of large amounts of bank account deposits into digital currency (resulting in an excess of currency notes); or risk of consumers dumping Digital Currency if there is a differential in interest rates for the CBDC vs commercial bank money, leaving the CBDC illiquid. This would have to be managed using limits on digit currency balances and spending velocity limits.

(5) Risk of the banking industry seeing the Central Bank as a disintermediation threat (although a 2-tier system is likely for retail CBDC in most jurisdictions).

(6) The liabilities of MMA could increase with the launch of a CBDC. There will need to be a unit within MMA (possibly two or three people) to deal with customer complaints and disputes.

(7) The issuance of a CBDC will increase the size of the MMA balance sheet as an unknown proportion of customers’ account activity previously conducted in commercial bank money will now be conducted in Central Bank money. This will need careful consideration and monitoring.

(8) With the introduction of CBDC, demand for USD may decrease, (less Rufiyaa exchanged for USD), and if so, the consequences for foreign exchange rates may be negative.

(9) Security risks:
   a. attacks on individual accounts (possible account take-over or spoofing, normally caused by weaknesses in payment origination procedures);
   b. attacks on the centralized CBDC ledger (very unlikely in practice – FMIs are very rarely attacked);
   c. if a blockchain approach were used, attacks on blockchain integrity (eg “51% attacks”\(^7\)), which are impossible in a Central Bank managed “permissioned” blockchain).

These perceived risks must all be addressed for a CBDC issued by MMA, whether the intention is for a wholesale CBDC only (for inter-bank or cross-border payments), or for a retail CBDC to be used by the public nationwide.

2.3.2 Acceptance risks

Furthermore, the degree of public take-up of the digital currency is an extremely important issue. Objectives will not be achieved if people do not use the digital currency, and they will not do so if they do not enjoy a benefit from using it. People (and banks) are very conservative about the way they do financial transactions. There is a downside – people like cash; and they don’t want their transactions potentially under surveillance.

\(^7\) In which more than half of the participants in a blockchain conspire to defraud the rest – theoretically possible in the public blockchains used for privately issued cryptocurrencies
Hence, there is a major communication and education job to be done, often headed by the central bank, but it must involve all the bank and non-bank participants in the CBDC system. Even the best technical solutions may fail due to lack of effective education, messaging, communication and marketing campaigns.

Hence, well before CBDC issuance, and before or during any Pilot implementation, a public consultation would be required to pave the way for the smooth introduction of the CBDC and to try to ensure a high level of public acceptance. This can help to ensure that the CBDC instrument is easy to use and accessible to people of limited means, in any location and of any level of education. It is important to avoid any kind of digital exclusion, so understanding people’s views and concerns will help to encourage uniform acceptance.

One aspect that has been found to aid acceptance elsewhere, and in the roll-out of instant payment systems is to ensure that KYC processes for onboarding are proportionate and layered. Hence, for access to CBDC use with low limits only, a minimum level of KYC would be necessary, whereas for a broader and more flexible service, a greater degree of KYC check would be carried out. This is much how KYC is managed for Instant Payment Systems.

It has been noted elsewhere that growth of digital payment usage via small communities can be a good approach, using community gathering places, potentially including potentially the mosques both for zakat purposes, and for charitable works in the community. The small communities of usage gradually expand and cover larger and larger areas as people experience the benefits of digital payments. This is often led by retailers who no longer have to worry about banking cash and finding change.

### 2.3.3 Risks of creating a stablecoin

The risks of a stablecoin are different from those of a CBDC, however, mainly because they are generally privately issued.

The reasons for adopting the use of an existing stablecoin or issuing a new form of stablecoin in the Maldives are, we believe, largely around cross-border payments, especially the management of remittances, the opportunities they may offer for entrepreneurial FinTechs, their potential use as convenient private currencies on resort islands and the potential for use in Islamic Finance.

This may imply two different kinds of stablecoin – a USD-based coin (or potentially other hard currencies such as the Euro, or a multi-fiat currency backed stablecoin) and commodity backed stablecoins. Neither would necessarily have to be issued by MMA but would need to be regulated by MMA (as the authority responsible for the integrity of the payment systems) for use in the Maldives under specific conditions and backed by Maldivian currency or suitable real-world assets.

The Sharia authorities in the Maldives would have to take a view on whether a fiat-currency-backed stablecoin (used for cross-border transactions as described below),
would also be acceptable for Sharia-compliant transactions. Our expectation is that a commodity-backed stablecoin (probably a gold-backed stablecoin) would be more suitable for Islamic Finance use cases.

There has been a market explosion in USD-backed stablecoins in the past year or so. There were about 5000 times the value of USD stablecoins on the market in January 2022 than there were a year before. This implies that not all of the major stablecoins can be backed by actual holdings of USD, and many are dependent on “algorithmic” stabilisation mechanisms which have recently failed spectacularly in the case of the Terra USD stablecoin. The recent market losses may temper the enthusiasm of investors.

Furthermore, the business case even for the providers of “traditional” stablecoins actually backed by fiat currencies or tokenized physical assets is poor unless the deposits received from the buyers are loaned out in order to create a revenue stream in the form of interest. The issuers are effectively acting as unlicensed deposit takers. This creates a major risk if there is a “run” on any stablecoin, as it will not be possible to recover the funds quickly. Stablecoins, we believe, are inherently flawed unless backed by financial authorities or physical assets, but this would limit their commercial attractiveness.

Further details on the stablecoin market are provided in Annex 1.

2.4 Technology considerations for CBDCs

Stablecoins are, by their essence, based on distributed ledger technology (known as DLT or Blockchain). But for CBDCs used only domestically, a major question needs to be addressed - whether DLT is the best way to implement a CBDC, or whether a conventional centralised issuance, payment and settlement system with the Central Bank as trusted third party, is a lower risk approach. Both China (Digital Yuan) and India (not yet launched) seem to have taken the view that a large scale domestic CBDC is best run on a conventional infrastructure. However, all the other CBDCs that have been officially launched as more than just a Pilot are blockchain systems, ie:

- Bahamas
- Eastern Caribbean
- Cambodia (Debateable as to it being a true CBDC)
- Nigeria

To explore this question, we need first to establish the type of use case (eg domestic or cross-border / wholesale or retail) for which a blockchain solution delivers positive benefits. We must consider how the challenges associated with blockchain based CBDCs, such as performance, scalability and cross-chain interoperability\(^8\) can be minimised.

2.4.1 Distributed Ledger Technology (DLT) and payments

Distributed ledger systems are valuable in use cases where:

1. there is no trusted third party in the middle of a transaction;
2. the information exchanged is sensitive, private or valuable;
3. that information needs to be available at many locations; and/or
4. requires decentralized “smart contracts” to manage ownership.

Good examples include:

• Medical records – where a person’s complete medical history can be available in a secure way, to medical staff in a new place or in a different organisation; for example, a person has changed doctors, has moved home, has changed insurers, or is attending a distant hospital due to special treatment or being involved in an accident.

• Hotel records – where a person may visit the same hotel chain many times in different locations, but personal data is held which must be protected. This doesn't require a blockchain approach as there is a (relatively) trusted entity in the middle, but a blockchain is a convenient medium where there are a relatively small number of usage sites.

• Customs documentation – documents for import-export activities are notoriously complex. Although automation (e.g., “single window” systems) have enabled trading companies and shipping agents to speed up some of the processes, a DLT solution where all the commercially-sensitive documentation is accessible to the appropriate parties at all times, and where updates and the steps in a transaction can be easily tracked has been shown to be beneficial.

• Other prominent potential uses are in supply chain (e.g., food recalls would be much faster and easier) and ownership of land using distributed ledger registries.

In the banking sector, there are a number of use cases that fit the definition above, including:

• Cross-border payments
• Digital assets
• Digital ID check for banking and payment transactions
• Credit score
• Letter of credit (trade finance)
• Merchant onboarding for card payments.

Note, however that:

• domestic payment systems do not necessarily benefit per se from the use of blockchain methods because there is necessarily a trusted third party involved for settlement (i.e. the Central Bank);
• larger countries, notably China and India, are not planning blockchain-based domestic CBDCs but conventional ones, partly because of performance risks; and
other benefits of blockchain technology in payments like programmable payments, built-in governance principles, smart contracts and the concept of “metadata” can be realised in centralized systems but may not be so easy to set up, test and monitor.

2.4.2 Prerequisites for a successful CBDC

The first step is to be clear on objectives – what problem is the CBDC intended to solve? And what problems can a CBDC solve that could not be resolved by an IPS?

For the Maldives, we discussed above the top-level objectives for a locally-issued CBDC:
  o supporting the tourism industry in innovative ways;
  o encouraging the Maldives FinTech sector to take part in innovative payment-related projects where they can add value for customers, within regulatory guidelines;
  o continuous improvement to the payment systems, such as being ready to harness the new technologies for payments;
  o exploring new mechanisms for cross-border payments;
  o assuring positive benefits for monetary policy; and
  o guarding against the risks of private cryptocurrencies.

A CBDC built using a conventional centralized system approach does not provide the ability to address the monetary policy objectives and would not add to knowledge about new technologies and cryptocurrencies. Hence, blockchain solutions have been deemed attractive by central banks in many smaller countries.

But the use of blockchain in payments, even for a CBDC run by the Central Bank, has some prerequisites:

  • CBDC blockchains are “permissioned blockchains” where consensus mechanisms for approving the latest block on the chain are different from and more efficient than private cryptocurrencies. Consensus is managed via an “Endorsement Policy” e.g. a policy that the Central Bank node plus 3 (or more) additional nodes must endorse each transaction.
  • The Endorsement Policy has to be set to the approval of all stakeholders, as they will all be affected by it.
  • Requires a robust supervision and cybersecurity oversight framework for all the possible nodes, which is a Central Bank responsibility, so before a country implements a DLT CBDC, clear regulations and an inspection regime for cybersecurity at banks must be in place. The MMA has already implemented some key measures, which are described in Annex 2.
  • It will be wise to implement only with banks to begin with, since the security policies and mechanisms of FinTechs are likely to be less robust.
In its latest survey\(^9\), BIS takes the view that Central Banks are favouring blockchain methods, despite costs and risks (see summary in Annex 3). A recent Arab Monetary Fund (AMF) Guidance Note to Central Banks\(^10\) comes to similar conclusions, but stresses legal issues, clear objectives and experimentation.

### 2.5 Comparison of countries with similar socio-economic conditions

#### 2.5.1 Introduction

In this section we present a comparative analysis of key factors for the Maldives as compared to other countries with similar socio-economic conditions related to the use of digital currencies. These include two countries which have implemented a CBDC, one which is at similar stage to the Maldives in exploring the possibility and one which has studied other countries but not taken their own steps as yet.

We present a comparison table below and then comment on the comparison with respect to the potential for digital currencies in the Maldives. The basis for our choice of countries is discussed in Annex 4, with a specific note on India (of particular interest to MMA) in Annex 5.

---

\(^9\) A summary could be added as an Appendix

<table>
<thead>
<tr>
<th>Item</th>
<th>Country:</th>
<th>Maldives</th>
<th>Bahamas</th>
<th>Fiji</th>
<th>Brunei</th>
<th>Cambodia</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Size (population millions)</td>
<td>0.54</td>
<td>0.40</td>
<td>0.90</td>
<td>0.45</td>
<td>17.2</td>
</tr>
<tr>
<td>2</td>
<td>GDP per head PPP (USD pre-covid 2020)</td>
<td>13443</td>
<td>30764</td>
<td>12079</td>
<td>65612</td>
<td>1512</td>
</tr>
<tr>
<td>3</td>
<td>GDP CAGR (2014-2019)</td>
<td>5.43</td>
<td>2.84</td>
<td>5.14</td>
<td>-4.09(^{11})</td>
<td>7.1</td>
</tr>
<tr>
<td>4</td>
<td>Remittance as % GDP</td>
<td>0.1</td>
<td>-15.2%</td>
<td>8.8</td>
<td>N/A</td>
<td>4.9</td>
</tr>
<tr>
<td>5</td>
<td>Dollarization level (ratio)</td>
<td>40%+(^{12})</td>
<td>A(^{13})</td>
<td>N/A</td>
<td>none</td>
<td>Partially dollarized</td>
</tr>
<tr>
<td>6</td>
<td>Status of cryptocurrencies</td>
<td>Implicit ban(^{14})</td>
<td>Legal</td>
<td>Discouraged but trading exists</td>
<td>Legal, unregulated</td>
<td>Illegal</td>
</tr>
<tr>
<td>7</td>
<td>Mobile penetration total % of pop.</td>
<td>133</td>
<td>119</td>
<td>139</td>
<td>123</td>
<td>126</td>
</tr>
<tr>
<td>8</td>
<td>Smartphone penetration (Mobile Internet penetration % 2020)</td>
<td>71</td>
<td>85</td>
<td>80</td>
<td>116</td>
<td>53</td>
</tr>
<tr>
<td>9</td>
<td>Banking penetration (individuals with accounts)</td>
<td>80%(^{15})</td>
<td>c.80%(^{16})</td>
<td>84.4%(^{17})</td>
<td>80%+(^{18})</td>
<td>c.50%(^{19})</td>
</tr>
<tr>
<td>10</td>
<td>Banking industry (no of commercial banks)</td>
<td>8</td>
<td>8(^{20})</td>
<td>6</td>
<td>7</td>
<td>43</td>
</tr>
<tr>
<td>11</td>
<td>Level of Fintech industry (no of firms)</td>
<td>8</td>
<td>40+ (2018 estimate)(^{21})</td>
<td>5+ (inc. MNOs)</td>
<td>5</td>
<td>Early 2019 50. Recent estimate 300(^{22})</td>
</tr>
<tr>
<td>12</td>
<td>Existence of sandbox</td>
<td>No</td>
<td>No, but has “Fintech Hub”</td>
<td>Yes – PIRI regional initiative(^{23})</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>13</td>
<td>Got IPS ?</td>
<td>Yes (Q4 2022)</td>
<td>Yes</td>
<td>In process</td>
<td>In process</td>
<td>Yes</td>
</tr>
<tr>
<td>14</td>
<td>Importance of tourism and travel (% population employed 2019)(^{24})</td>
<td>60%(^{25})</td>
<td>53%</td>
<td>27%</td>
<td>8%</td>
<td>13.6%</td>
</tr>
</tbody>
</table>

---

\(^{11}\) Due to oil price collapse
\(^{12}\) Viya.mma.gov.mv
\(^{13}\) 17.5k USD per capita in 2016
\(^{14}\) Investopedia.com
\(^{15}\) World Bank - Financial Inclusion in the Maldives Findex 2018 Survey
\(^{16}\) Bahamas FSAP July 2019
\(^{17}\) 2020 figure from Fiji Financial Inclusion Annual Report May 2022 p19
\(^{18}\) Brunei Darussalam Central Bank – Digital Payment Roadmap 2018
\(^{19}\) https://www.uncdf.org/article/7595/cambodia-financial-inclusion-refresh
\(^{20}\) 8 according to CB, but many according to SWIFT data.
\(^{21}\) https://www.linkedin.com/pulse/fintech-landscape-bahamas-lamont-astwood/
\(^{22}\) fintechnews.sg
\(^{23}\) See https://www.rbf.gov.fj/publications/pacific-regional-regulatory-sandbox-guidelines/
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<th>Cambodia</th>
</tr>
</thead>
<tbody>
<tr>
<td>14</td>
<td>Importance of tourism and travel (% GDP 2019)</td>
<td>26.3</td>
<td>40.3</td>
<td>40</td>
<td>6.6</td>
<td>11.5</td>
</tr>
<tr>
<td>15</td>
<td>Importance of farming and fishing (%GDP 2020)</td>
<td>8%</td>
<td>1.6%</td>
<td>9.3%</td>
<td>1.2%</td>
<td>22.4%</td>
</tr>
<tr>
<td>16</td>
<td>Geographical challenges</td>
<td>200 inhabited islands (of 1192)</td>
<td>30 inhabited islands (of 700)</td>
<td>100 islands inhabited (of 300)</td>
<td>Isolated – embedded in Malaysia</td>
<td>Poor infrastructure, many isolated areas</td>
</tr>
<tr>
<td>17</td>
<td>Status of CBDC projects</td>
<td>Current – this project is the initial step</td>
<td>Live – supplier is NZIA (now called Movmint)</td>
<td>Joint study with Pacific Islands led by Japan</td>
<td>None</td>
<td>Bakong – implemented by Soramitsu (Japan)</td>
</tr>
</tbody>
</table>

Which benefits are sought (as far as is known)?

- **Financial Inclusion**
  - No
  - Yes
  - Yes
  - No
  - Yes

- **Cost of cash/reduction in grey economy / shipping costs**
  - Yes
  - Yes
  - Yes
  - Yes
  - Yes

- **Monetary policy improvement**
  - Yes
  - Yes
  - ??
  - ??
  - Yes

- **Improve domestic payment system including future architectures**
  - Yes
  - Yes
  - Yes
  - No
  - Yes

- **Currency sovereignty**
  - No
  - No
  - ??
  - Yes
  - Yes

- **Cross-border payment**
  - Yes
  - No
  - Yes
  - Yes
  - Yes

- **Economic growth – stimulating specific sectors**
  - Yes
  - Yes (access across the islands)
  - Yes (Tourism)
  - ?Yes
  - Yes

- **Strengthened economic surveillance**
  - No
  - Yes
  - ??
  - Yes
  - Not known

- **Improved government disbursement/receipt**
  - ??
  - Yes
  - ??
  - ??
  - Yes

---

24 [https://www.visualcapitalist.com/countries-reliant-tourism/](https://www.visualcapitalist.com/countries-reliant-tourism/)
25 Including indirect employment
26 Trading economics.com (unless otherwise stated)
27 IADB.org Inter-American Development Bank: IDB
28 CEIC data
2.5.2 Commentary

The objectives for the Maldives have been listed above, which included boosting tourism, monetary policy, cross-border payment and financial innovation issues. Enhancing Financial Inclusion and reduction in cash usage are still desirable aims, but are also being addressed by other means. It is useful to compare the objectives and rationale for CBDC experimentation with those of the other countries, and as explained in Annex 4, the countries chosen for comparison have similarities with the Maldives and offer certain lessons.

The Bahamas

The Bahamas has already introduced a CBDC. According to government sources, the Bahamas went ahead with the Sand Dollar to:

- Increase the efficiency of the Bahamian payment systems, through more secure transactions, and faster settlement speed
- Achieve greater financial inclusion, cost effectiveness and provide greater access to financial services across all of the Bahamas.

Mastercard and Island Pay have introduced a debit card linked to the Sand Dollar to improve ease of use. This is particularly aimed at reducing the costs of moving cash around the islands.

However, the Sand Dollar represents only 0.1% of currency in circulation. The IMF has said that the Sand Dollar needs much wider reach and better cybersecurity if it is to meet its aims. There are currently limited avenues to use the Sand Dollar.²⁹

Fiji

Fiji is in a similar situation to the Maldives. It is an island nation heavily dependent for its economy on tourism. Just as the Maldives, it is currently in the process of reviewing the potential for a CBDC and the objectives it may be able to achieve. The review is being conducted by the Japanese FinTech firm, Soramitsu, one of the first providers of CBDCs, with the sponsorship of the Japanese government.³⁰ Hence, there is no decision yet to launch a CBDC programme in Fiji or the other Pacific islands in which Soramitsu is conducting its study. Nevertheless, the outcomes of the Fiji study may well the valuable for the Maldives in deciding the directions, objectives and possible types of new technology to use.

Brunei Darussalam

²⁹ https://www.coindesk.com/policy/2022/05/09/the-bahamas-sand-dollar-needs-improved-cybersecurity-imf-says/
³⁰ Soramitsu provided the infrastructure for the Bakong CBDC in Cambodia, which is widely taken up across Cambodia (50% of the adult population registered) but not yet heavily used.
We include Brunei as a comparator, because it is a relatively wealthy country like the Bahamas but does not have major financial inclusion issues, in common with the Maldives. In fact financial inclusion in Brunei is at a similar level to that in the Maldives. However, Brunei has a currency that is linked to the Singapore Dollar via a Currency Interchangeability Agreement, which is satisfactory to both parties. Hence Brunei is unlikely to move on Digital Currencies until Singapore does. Effectively, Brunei is unable to conduct Monetary Policy actions other than minor interest rate interventions because it cannot control its exchange rate.

In keeping with many high GDP per head countries, Singapore has conducted a wide range of CBDC experiments and has generally concluded so far that the risks of launching a CBDC outweigh the benefits, but it continues to seek experience in the expectation that the development of the global payment market will make it more attractive to launch its own digital currency in the future. Brunei may then follow, but agrees with Singapore that there is no overall benefit in moving ahead at this time.

Cambodia

Cambodia has some similar problems to the Maldives, notably a high degree of dollarization and potential monetary policy risks arising from use of cryptocurrencies, but it has a much higher population, much lower financial inclusion, much lower GDP per head and its economy is not so strongly based on tourism.

Nevertheless, partly for political reasons, the Cambodian government and the National Bank of Cambodia decided to go ahead with one of the first national CBDC implementations in the world, known as Bakong and supplied by the Japanese firm, Soramitsu, with a degree of Japanese government sponsorship. For some technical reasons regarding the way the CBDC ledgers work at the Central Bank, the Bakong system is not always regarded as a “true” CBDC. To all intents and purposes, however, it is a blockchain based digital currency managed by the Central Bank.

A substantial proportion of the adult population of Cambodia has subscribed to the Bakong service, but the actual level of usage so far is low. This is similar to the experience in the Bahamas.

2.5.3 Conclusions

Discussion with the Ministry and MMA suggest that it is important to focus on known problems that need to be solved as well as the opportunities presented by new technology. The table above gives an indication of the priorities of some of the comparable countries.

For the Maldives, identifying genuine benefits and then meeting the agreed objectives can give the Maldives more leverage as a SAARC country keen to explore payment technologies. The main points from the country comparison, set out by objective, are as follows.

Financial inclusion
As mentioned above, the issue of financial inclusion itself in the Maldives seems to be less serious than it was a few years ago; significant improvements having been made in terms of branch development, mobile payment and, more recently, the implementation of the TietoEVRY instant payment system.

From the country comparisons, it can be seen that financial inclusion is an important factor for Fiji, The Bahamas and Cambodia. It is not a major issue in Brunei. This is partially related to the geographical dispersion of island countries.

Whilst financial inclusion may not be a major problem in The Maldives, there is currently great reliance on BML proprietary systems in The Maldives and the same can be said regarding BIBD (Bank Islam Brunei Darussalam) in Brunei. So, digital currency measures that could reduce dependence on a single institution would be of value.

We should note that other means, such as Instant Payment Systems, bank campaigns to build branches and establish agency arrangements, and specific government initiatives on financial literacy, for example, have also been used to tackle Financial Inclusion. CBDCs are not a magic solution. The difference with CBDCs is that they are specific Central Bank initiatives, with the Central Bank taking the liabilities and much of the cost. It therefore puts the government at the heart of the Financial Inclusion issue and raises its profile.

**Cash reduction**

Cash reduction and cost savings associated with management of cash are important for all five countries. The movement of cash in all the Island nations is logistically difficult and expensive. As a general observation, the cost of managing cash for a dominant institution like BML in a small country could easily be as much as USD1 million per year. Central Bank currency management costs could be similar.

**Monetary policy**

The ability to obtain better monetary data in Bahamas, Fiji, Cambodia and The Maldives is valuable and useful for the respective Central Banks to deliver monetary policy, manage cash and interest rates and to direct funds to particular territories in times of difficulty. This is not so important in Brunei as their Currency Interchangeability Agreement with Singapore limits their control of their own currency. Nevertheless, using a CBDC to focus cash support on particular regions or sectors as needed could be of value to all the countries compared. The Maldives faces the most difficult geographical conditions of the five.

**Cross border payments and remittances**

There are high levels of incoming remittances in all three island nations and Cambodia, but not so much in Brunei. The ability to achieve inexpensive and real time cross border transfers is an important issue for most of the comparator countries. The Bahamian Sand Dollar CBDC, however, has not been set up to be able to achieve this objective so far. The on-going Soramitsu study project with Fiji and three other Pacific Island groups certainly has cross border payments as an objective, but it is important to set up a CBDC
in the correct way to achieve this goal. A retail CBDC alone would not immediately address this problem.

**Dollarization and monetary sovereignty**

This is certainly of importance in The Maldives, The Bahamas and Fiji where tourism is of such importance, and for Cambodia with a high level of remittances. Tourism will bring in foreign currency, but an appropriately deployed CBDC could kerb dollarization and preserve monetary sovereignty, especially if seen as a better, less expensive (FX wise) and more convenient method of payment by tourists. With a CDBC in place, it would be easier for Central Banks to legislate to keep disruptive and volatile cryptocurrencies out and to limit any potential damage from unreliable stablecoins (see Annex 1).

**Technical experimentation and new architectures**

This is of importance certainly to The Maldives, Fiji, The Bahamas and Cambodia. In Brunei there is cooperation with Singapore on the results of CBDC experiments, but no intention as yet to issue. It is true to say that none of these countries want to be left behind as the CBDC landscape develops, and certainly The Maldives and The Bahamas actively want to pursue new technologies to promote FinTech developments. Maldives and Fiji are likely to see potential benefits to tourism also and will want to make the most of the opportunity.

**Overall**

The approach which the Maldives is considering, focussed on key economic sectors, addressing the problems of an island geography and taking the opportunity to learn about the new payment technologies in a timely manner are consistent with the initiatives and views taken in the comparator countries, each of which has its own specific challenges to address. Exploring the experiences of the comparator countries regarding Regulatory Sandboxes could be a useful next step.
3 Current gaps and conditions for implementing policy experimentation

3.1 Sandboxes

Regulatory sandboxes and various types of technology trialling regimes typically deliver significant benefits for encouraging FinTech industries, companies and products, but present some risks, which we can pinpoint for the Maldives.

There are particular benefits to be gained from the implementation of sandboxes, as specifically identified in the Kazakhstan project. Sandbox exercises can:

1) increase the contact of the Central Bank (ie MMA) with the FinTech industry;
2) help the regulators to gain insights from frontier innovators; and
3) reveal ways in which MMA can reduce problems and barriers for frontier innovators.

The Kazakhstan experience also identified a useful distinction between two types of sandbox.

- Firstly, a Regulatory Sandbox regime for regulators to analyze experimental systems and public trials happening at FinTech firms, with the aim of enabling the FinTech firms to gain a license for full public release of a new product. This type of sandbox would be located on a platform wholly within the FinTech companies’ premises but accessible to MMA.

- Secondly, a sandbox regime for any product that is owned by the Central Bank, for example, a CBDC, which would be hosted on a sandbox platform at MMA and would permit FinTech plug-ins or value-added components to be trialled in collaboration with MMA’s CBDC (or other) product as a public private partnership.

- As in the Kazakh experience, we also identified a third class of environment usually referred to as an Innovation Hub. This would be a unit within the MMA tasked to explore innovative technologies and their regulatory implications together with other relevant Regulators, market participants, FinTech vendors and collaborators. The Innovation Hub would be able to provide advice and support to frontier innovators, which for any particular study may or may not require the set-up of a hosted system environment.

In each case, when a new product is introduced to a sandbox, MMA would build a bespoke set of regulatory requirements and conditions specific to the company and their proposed product.

It is vital to balance the aims of the sandbox with the overall aims of the economy so that one set of companies or one sector is not given an advantage over others. A recent worldwide study, for example, suggests that:
“To make a sandbox worthwhile, it must provide some benefits to the firms operating within it. However, those benefits may confer a competitive advantage to the sandbox firms over their competitors, which could be detrimental to market competition in the sector and, ultimately, to consumers.”31

The same paper points out that the skill and resource requirements for a sandbox to be useful are considerable even in a small country. Further extracts from the paper are included herein as Annex 6.

In the Maldives, no sandbox regimes have yet been implemented, and doing so would require further resources, primarily at MMA. We note that CMDA, the Capital Markets regulator in the Maldives may also have an interest where products involving trading of digital assets is concerned. However, for the avoidance of doubt, we see the MMA as the institution primarily responsible for the Sandbox regimes.

The MMA Information and Communications Technology (ICT) department has grown significantly over recent years but is still relatively small (17 people) and relies on external expertise for handling complex problems such as the interconnection of the payment systems with the banks. It is always a challenge to keep up with the constantly shifting global payments landscape. Nevertheless, the MMA technical team is very familiar with the disciplines of system testing for real-time, mission-critical systems and has good experience of implementing the technical side of Financial Market Infrastructures.

In terms of ongoing support, four ICT staff are formally trained in managing the technical aspects of the FMIIs and there are six trained staff in the Payment and Settlement Section providing operational and customer support services. Furthermore, there are eight staff in all between the Payment and Oversight Division, although it is early days for the establishment of the oversight framework.

Other small Central Banks, such as that of Brunei Darussalam, for example, have successfully established Regulatory Sandbox regimes, with a relatively small staff contingent, involving a close connection with Payment Systems Oversight. It would thus be a significant task to build a Sandbox regime in The Maldives but should be feasible if adequately resourced. The Sandbox would need to be permanently manned but may require no more than two or three well trained and dedicated staff members.

A Regulatory Sandbox programme would need to be designed, suitable for DLT experimentation by FinTech companies and other non-bank entities such as MNOs who would not otherwise fall under the regulatory control of the MMA. There would have to be a fair competition arrangement such that FinTechs would not get an unreasonable advantage over the banks offering related products or vice versa. Models may be found

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31 The Sandbox paradox (knight-sandbox-mercatus-working-paper-v1_1)
in other smaller countries who have substantial experience in using sandbox programmes with FinTech companies and also among those who have implemented specialised financial centres.

Sandbox experience in other small countries – Brunei, Bahamas, for example – indicates that Sandboxes are usually little more than sophisticated testing and trialling environments for FinTech products, with the added characteristic of allowing such testing to move into Pilot stages with less regulatory strictures than those which would normally apply for, say, a bank’s novel payment system offering. Hence, the FinTech company would not be required to obtain a license or formal “no objection to operate” permission from the Central Bank before starting to use the product with real customers. In practice, though, the Sandbox rules would not allow a product which had not been proven financially safe to be trialled with the public. Identifying the regulations which can reasonably be relaxed is the main challenge concerning use of a “Regulatory Sandbox” for the purpose of testing a FinTech product in the real economy without causing actual regulatory problems. In general, it is administrative requirements that are relaxed, such as the requirement for Directors of the FinTech company to have a certain level of experience, or for the company to have a track record over a number of years or a certain amount of capital. There is almost never any reduction in security requirements or consumer protection requirements for obvious reasons. The precise rules governing the Sandbox and the types of controls that could be temporarily relaxed for experimental purposes would have to be explored.

Outsourcing requirements, notably those regarding overseas outsourcing, may be relaxed in jurisdictions for which there is no data residency legislation. At present, no such legislation is planned to be introduced in the Maldives, although data protection laws would apply. Some data protection controls are already in place within the Maldives Banking Act and there is an expectation that a Data Privacy Act will be introduced. A Sandbox regime would not normally allow any slack on data protection requirements.

Responsibility for a Sandbox for CBDC and digital payment generally should fall to the Central Bank as the authority responsible for the integrity of the payment system. In the Maldives, the MMA will need to fulfil this role, but to do so must have the necessary resources.

To understand how a sandbox regime may evolve, it is useful to note the ways in which Sandboxes in advanced digital countries such as Singapore have developed since their inception. The Sandbox programme of the Monetary Authority of Singapore (MAS) is a good example. MAS began its Sandbox programme in 2016 and MAS Governor, Ravi Menon announced significant enhancements at the Singapore FinTech Festival in November 2021, extolling the virtues of experimentation.

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32 For example Brunei Darussalam
33 For example, the Astana International Financial Centre in Kazakhstan
In 2019, MAS improved the processes around the Sandbox introducing “Sandbox Express”, to enable businesses to conduct market testing of low-risk activities more quickly. From January 2022, it was announced, MAS will enhance its regulatory sandbox with Sandbox Plus.\(^{34}\)

There will be three enhancements in Sandbox Plus:

a. Expansion of eligibility criteria to include early adopters of technology innovation.

b. Streamlined application with financial grant. - with funding of up to S$500,000 at a 50% funding level. A very big offer.

c. Participation in the “Deal Fridays” programme – a platform for deal-making opportunities.

It is not yet clear how well the enhanced programme is faring, but the MAS Sandbox is an interesting model as it is one of the earliest to come into effect and has assisted a large number of FinTechs to bring products to market.

Similarly the Central Bank of Saudi Arabia, SAMA, which is the leading country in the Middle East regarding payment systems, has been running a sandbox program for around 3 years, and has set out a useful framework for sandbox activities\(^{35}\) covering Scope and Objectives; types of applicant; the sandbox lifecycle; application process and criteria; evaluation process; testing; and exit stage, as well as considering customer safeguards. The process is based on a half-yearly set of innovation applicants working through the sandbox at the same time, and is focused on meeting national objectives.

### 3.2 Legal issues

MMA takes the view that introduction of either a token-based or account-based CBDC will require the creation of legal infrastructure that enables digital transfers between users to have the status of legal tender. For the time being, only physical banknotes and coins have legal tender legal status under the Maldives Monetary Authority Act.

In order to understand the legal gaps and changes required to the legal framework to manage a CBDC and to regulate and oversee activities of stablecoin issuers, we have conducted a brief review of MMA Laws related to the MMA and the payment systems with a view to potential implementation of CBDC in the Maldives.

Legislation reviewed:

- Maldives Monetary Authority (MMA) Act 1981
- Banking Law 2010

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- Payment System Regulation 2011
- Mobile Payment Services Regulation 2016
- National Payment System Act 2021

Our findings and conclusions are set out below.

3.2.1  **MMA Act 1981**
The MMA Act set up the MMA and established its main functions, which are to regulate banking businesses and to be the sole authorized issuer of currency. It also regulates availability and value of the currency. Currency is not defined, only notes and coins are mentioned, although the concept of Digital Currencies would not have been anticipated at the time of the Act.

3.2.2  **Banking Law 2010**
The Banking Law gives the MMA sole authority to license banks and also to issue regulations on banking activity. It provides for finality in the event of liquidation of banks, which is an important element protecting the integrity of the payment systems.

3.2.3  **Payment System Regulation 2011**
This regulation was issued to support the implementation of the RTGS and ACH systems and its main provision is to authorize cheque truncation. This amends articles in the 2010 Banking Law requiring banks to maintain written records. However, we have not been able to locate any reference to legal support for dematerialisation of paper instruments and giving legal status to the electronic record.

3.2.4  **Mobile Payment Services Regulation 2016**
This regulation covers the Licensing of Mobile Payment suppliers. We understand that the two local telecoms operators were licensed to provide mobile payment services under the regulations. However, since the enactment of the National Payment Systems Act, 2021, those old licenses have been revoked and today there are seven entities licensed to provide services related to mobile payment under the National Payment Systems Act, 2021:

- Ooredoo Maldives PLC
- Dhiraagu PLC
- VTT Finance Pvt. Ltd.
- Global Payments Asia-Pacific Maldives Pvt. Ltd.
- Payer Private Limited
- FahiPay Private Limited
- Faseyha Recharge
3.2.5  National Payment System Act 2021

This Act is based on the European model and explicitly empowers the MMA to regulate and oversee the Payment System. The MMA can license Payment Service Providers and System Operators.

Article 15 authorizes the MMA to establish, own and operate, and participate in Payment Systems, although the RTGS and ACH were implemented about 10 years ago. Until this point, the regulation of the central Financial Market Infrastructures has depended upon the powers in the MMA Act and the participants’ contractual commitment to the System Rules via Participant Agreements. This article also authorizes liquidity provision against collateral (Lender of last resort), and proposes the formation of a National Payments Council, which may be useful for establishing CBDC.

In terms of being able to issue CBDC there may be the start of authority to do so in the National Payment Systems Act Article 14, MMA can:

- 14 (c) 9. Perform such functions relating to systems operated by the authority, and issue payment instruments;

The definitions in the Act include the following:

- 11. “Payment Instrument” means any instrument or procedure used to initiate and/or process Payment Instructions. Payment Instrument includes but are not limited to cheques, funds transfer instruments and payment cards.
- 13. “Electronic Money” means a monetary value which represents a claim on its issuer, and which is - (a) a monetary value stored electronically, including magnetically, in any tangible or intangible device; (b) monetary value was issued on receipt of money of equivalent value; and (c) monetary value issued is accepted as a means of payment by persons other than the issuer.

This provides some indication that dematerialisation of payment instruments is acceptable although it does not mention legal force.

3.2.6  Cryptocurrencies regulation

MMA currently has no legal policy regarding private cryptocurrencies. It would be wise to implement a legal framework for such activities as cryptocurrency mining, which is detrimental to the environment, and use of cryptocurrencies, including stablecoins, in domestic and cross-border transactions.

3.2.7  Conclusion

It seems the NPS Act 2021 would enable the MMA to establish a CBDC system and issue digital currency but there may still need to be some legislation dealing with establishing the Digital Currency as dematerialised legal tender with a claim on the Central Bank and, a subsequent amendment of the MMA Act 1981. Strictly speaking, the NPS Act is not
the right place to deal with a legal tender matter that creates a liability against the MMA.

Similarly, any role of the MMA in underwriting stablecoins used for special purposes in the Maldives would also require legal support. We do not believe that the true stability of the global stablecoin market is adequate for them to be used in any officially sanctioned manner (see Annex 1), but local stablecoins could be viable under conditions in which they were genuinely supported by stable assets.

The legal framework needed to establish and operate a regulatory sandbox, to manage entry and exit, and to determine which types of regulations could be relaxed in the sandbox regime will also have to be explored in the follow up to this project.

Furthermore, MMA will need to understand the securities regulator’s role (CMDA), if stablecoins or digital assets become tradable through an exchange, and reach an agreement with them about regulatory boundaries. Ideally a Memorandum of Understanding should be agreed between MMA and CMDA.

With the likely implementation of a regulatory sandbox to pilot a CBDC, MMA would need to issue a sandbox guideline, including the distinction between a retail and wholesale CBDC explaining which parties can use the instrument and for which purposes, and making clear the boundaries between MMA and CMDA responsibilities.

In parallel, MMA implement a legal framework for private cryptocurrencies.

3.3 Monetary policy issues
A Central Bank’s main lever of power stems from its ability to manipulate the domestic short-term interest rate. Moreover, it can influence long-term interest rates by buying or selling long-term government bonds via quantitative easing (buying bonds) and quantitative tightening (selling bonds). These processes directly influence the money supply.

The adoption of a CBDC (such as in the Bahamas) or a private cryptocurrency (such as in the case of Bitcoin’s adoption in El Salvador) could partially or fully replace physical fiat currencies and influence (positively or negatively) the ability of Central Banks to perform these tasks. The value volatility of private currencies is a major drawback in using cryptocurrencies officially as a national payment instrument, and although the concept of stablecoins can alleviate this to some extent, privately issued stablecoins are not always reliably stable and still prevent the Central Bank having proper control over the money supply if used extensively for domestic payment. For example, the G7 working group on stablecoins opined that “stablecoins that reach global scale could pose challenges and risks to monetary policy.”36

A dominant stablecoin could eventually fully or partially replace some sovereign currencies, especially in countries with high inflation and an unstable banking system. According to a BIS report, cryptocurrencies could “rapidly establish a dominant position in global finance and pose a potential threat to competition, stability and social welfare.” The result would be increased dollarization, fiat currency depreciation and inflation, which would affect adopters as well as non-adopters of the cryptocurrency.

On the other hand, a digital currency managed by the Central Bank could assist the conduct of monetary policy. A research study by the Bank of England concluded that a CBDC might “strengthen the monetary transmission mechanism” to the real economy. So a CBDC is much more desirable than any sort of private digital currency in domestic circulation. It could help target money supply and would enable access to real-time data regarding currency use. At the same time, interbank settlement systems for CBDC transactions would be fast and transparent, but this can also be said of the IPS currently under implementation.

Moreover, monetary policy typically affects the real economy via the Central Bank’s short-term interest rate, which has an impact on commercial banks’ funding costs and, thus, bank lending rates. This monetary policy pass-through is limited by the strong market power that banks have over depositors. So deposit rates are not very responsive to policy rate changes. However, a CBDC payment system under Central Bank control would enable the fine tuning of policy implementation via collection of sector or region-focussed currency usage data, likely increase competition, and competitive pressures would increase the sensitivity of deposit rates to Central Banks’ interest rates.

In summary, CBDCs are likely to strengthen the transmission of monetary policy and help to target money supply into particular sectors or regions, while combating the risk of dominant private cryptocurrencies which could severely undermine the effect of monetary policy and stimulate high inflation. Hence, the Central Bank needs to be fully in control of the issue and use of digital currencies in its territory to avoid these problems.

Nevertheless, as we explain below, there could be some important uses of privately issued stablecoins for cross-border payments and for managing the dollarization risks of remittances, among other roles. Their use would also have to be subject to effective control by the Central Bank.

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4 Developing CBDC and stablecoin digital currency in the Maldives

4.1 How to implement digital currency solutions

In this section we consider the best approaches to implementing a CBDC and accompanying stablecoin(s) to deliver the objectives discussed above.

The issue of a CBDC using a conventional IPS-like framework and supported by suitable laws and regulations, would not readily meet the monetary policy objectives set out above. The future architectures objective would require experimentation with distributed ledger systems and related tools, which a CBDC for domestic use would not necessarily need. As we have mentioned, though, many Central Banks have opted for permissioned blockchain implementations of CBDCs which reduce security and performance problems as well as permitting experimentation with new payment systems architecture.

However, issuing a stablecoin, or commissioning/adopting the issue of a stablecoin by a private company could address the need to experiment with the new technologies, as a stablecoin would be blockchain based and can address the problems of remittances and dollarization; a (probably separate) stablecoin could potentially support incoming remittances and innovative Islamic Finance tools if designed appropriately. Stablecoins linked to particular resorts could be a way to exploit the new technologies within the tourism sector and domesticate more of the tourism revenues.

The challenge of keeping such an instrument stable is one of the operational risks that would have to be addressed. Using commodity or full fiat currency backing is expensive, but one approach could be to tie the value of the coins to digital assets, especially real-estate titles. For example, a resort stablecoin could have its value based on the land value of the resort, set up as a digital asset.

4.2 Developing a CBDC in the Maldives for Domestic Payments

There is some experience now around the world of a suitable structure for CBDC projects, which is not greatly different from that of FMI projects. The main difference is that Central Banks tend to spend a long time thinking through the implications of launching a digital currency – far more than they would on an Instant Payment System, for example, which involves only commercial bank money and whose design principles are well understood. This is because of the risks we have highlighted above, especially the unknown risk to financial stability that a CBDC issue could have, and the technology risks that are involved, notably if a DLT solution is used. The IMF therefore recommends a Proof-of-Concept stage to explore in a very practical way how a particular CBDC implementation would work, before formal Pilot exercises, involving real customers, are launched.

In outline, however, the steps involved would be as in the following example, with Proof of Concept conducted within the Vendor evaluation for the leading Vendors:
Proof of Concept (PoC) exercises for the strongest candidates can be conducted as part of the RFP process. CBDC Pilot projects may last for a considerable time depending upon all the objectives to be tested, but sufficient information to guide roll-out, or to suggest a change of plan should be gatherable within 8-12 months. The planning of national roll-out needs to be conducted early to ensure that all risk management procedures are in place. Effective strategies for handling technical difficulties in the live system are vital, as experienced by the Eastern Caribbean Central Bank.

### 4.3 Wholesale CBDC for use in cross-border settlements

Project Aber involving the Saudi Arabian and UAE Central Banks, and Project Inthanon-LionRock and subsequently project mBridge, involving Thailand, Hong Kong, PRC and UAE are examples of pilot projects aiming to improve cross border payments using wholesale CBDCs. The BIS has also conducted exploratory projects around this issue, notably Project Dunbar.
The original Inthanon-LionRock project was first piloted in 2019 specifically for cross border payments between Thailand and Hong Kong. It was a wholesale CBDC PoC project.

The project was deemed a success and in Q4 2021 the mBridge trial platform was launched and included further participation from PRC and UAE as well as 22 private sector participants including many of the main banks in China - HSBC, UBS, Goldman Sachs, Dubai Islamic bank to name but a few.

As of now, pilot projects are in place with participating partners. For example, the Thai Banking Association is specifically involved with multi-jurisdictional trade, cross border eCommerce and supply chain financing, and HSBC with cross border real time payments and programmable trade finance.

Total value of transactions conducted so far on the mBridge platform are 10 billion THB, 2 billion RMB, 2 billion HKD and 1 billion AED. The next phase of the project is to launch what is called “minimum viable product” followed by “production ready.”

Thailand has also confirmed a partnership with the German company G+D to pilot a retail CBDC in the Kingdom. The pilot was originally set to commence early in 2022 but has been postponed towards the end of this year. The Retail CBDC would build on the success of the PromptPay instant mobile payment service which is widely used in Thailand.

The challenge for the Maldives would be to negotiate involvement, at a suitable stage, in projects of this kind. There are opportunities at a number of levels. In terms of conventional IPS cross-border connections, Maldives could seek involvement in the Nexus project, sponsored by BIS through the Singapore BIS Innovation Hub and involving NPCI in India. Nexus is at proof-of-concept stage and aims to connect Instant payment Systems between different countries. As an Islamic country, the Maldives could seek a connection with Buna, the Arab Monetary Fund’s cross border payment system that potentially links 22 countries across the Middle East - North Africa region (MENA) with ongoing connections into Africa and Europe.

At the CBDC level. Maldives could seek involvement in project like mBridge, discussed above, or bilateral cross-border CBDC pilot projects with countries like Saudi Arabia whose citizens view the Maldives as an attractive tourism destination.

We also note that there are already cross-border interoperability initiatives in which The Maldives could participate via the TietoEVRY instant payment system, as well as potential CBDC-related mechanisms. For example five ASEAN countries are scheduled to agree a QR interoperability accord later this year39

39 Indonesia, Singapore, Malaysia, Thailand and the Philippines
https://www.nfcw.com/2022/07/19/378054/central-banks-in-five-se-asian-countries-to-create-common-contactless-qr-payments-zone/s
4.4 Stablecoins and related digital initiatives

4.4.1 Opportunities and risks

While the idea of exploiting the new digital payment technologies (and related infrastructure) for boosting the Maldivian economy and encouraging the FinTech market is undoubtedly attractive, it is not a simple matter to contain the risks. As we have seen in recent weeks, stablecoins can be anything but stable and those that are supported algorithmically without solid backing of assets with stable value are prone to sudden collapse when the market turns against them – as it will if there is money to be made by speculators.

In the Maldives, especially, adherence to Sharia principles regarding managing risk and assuring fairness for the consumer must be borne in mind. Furthermore, the monetary policy considerations we discussed earlier would require that any stablecoin must be ring-fenced from the mainstream economy to avoid risk of undermining the national currency, which could result in an inflationary collapse and ensuing dollarization. This would mean loss of sovereignty over the payment landscape and economic decline.

However, this does not mean that no such initiatives can be entertained. There are a number of areas in which both the minting and use of stablecoins, under safe conditions, and the concept of digitalizing of assets (often referred to as “Tokenization”) could be very valuable tools in economic development, especially for the tourism and FinTech sectors. This requires much more discussion, but some examples are set out below.

Each project would have to be designed on its own merits, with its own timescale and resource needs.

4.4.2 Stablecoin use in cross-border remittance

More details on the stablecoin market are provided in Annex 1, but we anticipate that the most immediate potential use case for stablecoins is in cross-border transactions.

As we have suggested, cross-border payments can be managed via the use of stablecoins, backed either by a major fiat currency (hard currency) or by commodities, like gold, other precious metals and other commodities used as collateral in international transactions. The characteristics that make cross-border payment a suitable target include:

- There is no trusted third party as exists for domestic payments, but the system relies on agreements between commercial entities as to how the payments will work (eg the SWIFT rules), overseen by banking supervisors at the Central Banks.
- Private DLT operators have started to work in this market, notably Ripple, which uses a special “inter-ledger protocol” to enable secure digital currency (XRP) interchanges cross-border between 300 or more major banks, with a great deal less risk than paying in Bitcoin or other private cryptocurrencies; nor requiring the per transaction correspondent banking steps necessary for SWIFT settlement.
• Although the XRP token is actively traded, the problem of currency value volatility is not a major risk, as the transactions are completed in minutes.

This case is particularly interesting from the point of view of addressing dollarization that arises due to large amounts of USD or EUR remittances. We have already seen one or two examples of a suitable approach, as illustrated below:

This approach helps to avoid “stablecoinization” of a local currency. The need to convert the hard digital currency in Wallet 1 to local digital currency in Wallet 2 for use ensures that there is not extensive circulation of eg USD stablecoins domestically. The conversion can be carried out largely automatically as needed.

A commodity-backed stablecoin could be less threatening to the local currency but could raise the same problems associated with the now abandoned gold standard for national currencies.

4.4.3 Stablecoins for community projects

Stablecoins with the appropriate design can be used for domestic transactions, too, normally with a focus on aid to communities. One example is a project in Haiti, led by the “Celo Alliance for Prosperity”, together with “Emerging Impact” who have teamed up in the “Hope for Haiti” project⁴⁰ - a humanitarian organization working to improve the quality of life for local people in Haiti - particularly women and children. The project will leverage the benefits of blockchain technology in its community healthcare program – a small scale programme in a specific region of the country. Hope for Haiti is using Celo’s cUSD stablecoin and its associated blockchain to provide cash-based assistance for 150 mothers in its community nutrition program.

The beneficiaries have an e-wallet which allows the project to register, disburse, and monitor the pilot all in one place. Both participating mothers and local merchants in the target community can use the wallet to accept aid and purchase goods — all using cUSD. Merchants can use the wallet to cash out earnings (in local currency only) to their

⁴⁰ https://hopeforhaiti.com/
MonCash account, a domestic mobile money provider. All transactions take place on the blockchain, providing an adequate level of efficiency and transparency.

A refinement of this scheme would be to keep remittances in cUSD in the wallet as they come in, preserving their value when there is a danger of local currency depreciation, but transferring the money to a local currency wallet for actual use, as described above. This avoids the risk of increased dollarization. Celo and Emerging Impact have run a similar scheme in Vanuatu involving around 25000 people. There is a similar scheme in the Brazilian Favellas involving 50000 current participants. The providers of the technology are confident that it can be scaled up to a national level.

4.4.4 Stablecoins for Islamic Finance
A commodity-backed stablecoin could be an innovative tool to support Sharia compliant transactions of various kinds. For example, Sharia-compliant repos, which are otherwise rather cumbersome to implement using the Murabaha approach.

Some Islamic scholars have proposed the creation of currencies backed by gold and silver, arguing that such system would alleviate several problems of modern economies such as inflation and recurring financial crises. In fact, a stablecoin backed by gold or silver provides an opportunity for an emergence of a “digital Islamic gold dinar” or “digital Islamic silver dirham.”

4.4.5 Stablecoins for use in tourism
As we have discussed there is potential for stablecoins to be used in the resort industry so as to assist tourists in exchanging their currencies in the Maldives. One such structure was discussed above. A further possibility is to have stablecoins for use in specific resorts or groups of resorts which are linked more directly to the Maldivian economy than the current common use of offshore card payments. The objective would be to ensure that more of the tourism income benefits the Maldivian economy directly rather than being siphoned offshore.
5 Role of stakeholders in developing digital currency in the Maldives

5.1 Purpose
The section is intended to map the domestic/regional stakeholders and their capacity for developing CBDC and stablecoin digital currency

5.2 Stakeholders
The stakeholders in CBDC projects usually include the following:

- The Central Bank (the MMA) – typically the sponsor of the programme is the Central Bank, which has responsibility for the integrity of the payment system and for monetary policy
- The commercial banks – who will normally act as distributors of the currency to the public
- Government Agencies, which will have an input to the potential uses of the CBDC or other digital instruments for the benefit of the country and its people; in the Maldives, these include the Ministry of Climate, Tourism and Technology, the Ministry of Finance and other relevant agencies
- Businesses, especially merchants, who will be major acceptors and users of the CBDC
- The public, and community and consumer groups, will be concerned about matters such as safeguarding of customer funds, privacy and data protection
- Technology providers, which may include more than one firm – the provider of the central CBDC Issuance system, the providers of conventional or blockchain infrastructure and the telecoms providers, and the providers of front-end technology such as mobile Apps, QR code registry, directory services, PoS technology
- Regional groupings, in the case of the Maldives, SAARC, who will have an interest in potential cross-border payment and collateral arrangements and will wish to share learning about the uses of new technologies.

The table in Annex 7 provides details of the expected roles and responsibilities of the stakeholders.

5.3 Role of FinTechs
It is an aim of this project to ensure that Maldivian FinTech companies are involved in the development of the CBDC and stablecoin / asset tokenization initiatives. A list of current FinTechs is provided as Annex 8.

The main opportunity for FinTechs is in the provision of end-customer products such as mobile Apps and products that exploit the opportunities for Open Banking or DeFi. A centralised mobile App for CBDC use which includes the ability to have multiple wallets
for cross-border remittance and the features necessary for off-line working – e.g. NFC mechanisms or the ability to work in conjunction with a smart card could be envisaged. It is up to the creative skills of the FinTechs to identify and design worthwhile products, remembering they can only be profitable if they have real benefits for end-customers, and those benefits must have some advantages over those provided by the banks – for example using the IPS settlement infrastructure to enable choice of account for different banks for a payment.

There may be broader opportunities in the world of Decentralized Finance (DeFi) which, with certain exceptions such as electronic securities brokers, have yet to materialise as profitable enterprises in other parts of the world. Hence sophisticated DeFi products would not be the first priority in the Maldives. Nevertheless, certain niche products such as smart lending Apps based on the CBDC service could be envisaged. These have certain advantages for lenders over conventional Direct Debit loan payments in assuring cash flow, although we understand that interbank direct debits are not yet available in the Maldives.

5.4 Drivers of the development process

The main protagonist of a CBDC implementation should be the Central Bank as part of its role as overseer and guardian of the payment system. Since the CBDC will be a form of Central Bank money, it is vital that the MMA is fully in control of the development and operation of the system, even if some aspects are outsourced.

The proposals regarding stablecoins (above) however, could be managed by the private sector under the MMA’s oversight. Sandbox arrangements could be used to allow non-bank companies to take part without increasing the risks to the financial services industry and the public.
6 Forecasting the demand for and use of CBDC and stablecoin in the Maldives

6.1 Measuring take-up

To determine reliably the likely take-up of the Digital Currency and the factors that affect it, the best approach is to conduct a study of consumer perspectives, and compare this with results for other countries. We are aware of countries who have done studies of this kind regarding take-up of instant payment systems, which have similar characteristics at the consumer level to CBDCs. The key findings were:

- When they are available, consumers are increasingly turning to digital payments, with a high priority placed on the convenience these payments can provide
- Lack of merchant adoption is the main factor deterring consumers from frequently using digital payments (as in the Bahamas)
- Interbank transfers (RTGS and ACH) are largely used for large ticket, infrequent payments, while retail payment methods are used for purchases of day-to-day products
- Keeping fees transparent and low, as well as providing a seamless payment experience would be of the highest priority for the take up of digital payments.

Such figures which we have been able to obtain so far allow us to calculate potential take-up rates based on digital Instant Payment take-up, but none of the “live” CBDCs can provide enough information over a long enough period as yet to help in the calculation. Most are still operating at very low rates of usage, where digital instant payments in a number of countries have taken off well – see table below

Penetration (% of adults over 15) rates for national instant payment systems – retail users:

<table>
<thead>
<tr>
<th>Country/System</th>
<th>Year 1</th>
<th>Year 2</th>
<th>Year 3</th>
<th>Year 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bahrain IPS</td>
<td>4</td>
<td>23</td>
<td>43</td>
<td></td>
</tr>
<tr>
<td>Singapore IPS PayNow</td>
<td>32</td>
<td>56</td>
<td>89</td>
<td></td>
</tr>
<tr>
<td>Malaysia IPS e-wallet</td>
<td>10</td>
<td>29</td>
<td>61</td>
<td></td>
</tr>
</tbody>
</table>

6.2 Levels of retail usage

The usage rates have been characterised elsewhere as:

- Light 12.00 transactions per year - used once a year or more
- Average 83.50 transactions per year – several times per month
- Heavy 239.50 transactions per year – several times per week
- Very Heavy 336.00 transactions per year – daily use
The types of usage in these systems include:

P2P
- Personal payments to family and friends- bill splitting
- Payments for informal sale of goods

P2B
- Payments to retail businesses, such as food and beverage and recreation
- Bill and fees payments to private institutions, such as insurance companies and schools

P2G
- Payment to government, such as Bill and fees payments to government agencies and entities, such as schools and public utilities companies
- Low-value payments such as parking fees, toll fees, and public transportation

### 6.3 Levels of business usage

At business level we can consider the Singapore PayNow business transaction volume over a five-year period:

<table>
<thead>
<tr>
<th>Year 1</th>
<th>Year 2</th>
<th>Year 3</th>
<th>Year 4</th>
<th>Year 5</th>
</tr>
</thead>
<tbody>
<tr>
<td>6,231</td>
<td>19,560</td>
<td>103,089</td>
<td>503,192</td>
<td>2,266,242</td>
</tr>
</tbody>
</table>

PayNow in Singapore has been exceptionally successful and not easy to emulate, so we should regard this as an optimistic scenario.

### 6.4 Conclusion

In practice, most of the CBDCs issued so far (except perhaps the eCNY in China) have not yet achieved substantial levels of usage. Nevertheless, instant payment systems, after a slow start in many countries, have begun to take off in both retail and business contexts, with some indications of scale being illustrated above. All the countries with strong uptake have had intensive education and marketing campaigns, which are essential for explaining the benefits of digital currencies and developing a public sense of digital trust.
7 Practical policy recommendations

In the course of the study and through the discussions with the Ministry and the MMA, we have noted a range of potential opportunities, objectives and concerns regarding Digital Currencies. The Maldives does not want to be left behind in this area and is keen to experiment with mechanisms that could boost the vital tourism industry and encourage the FinTech industry. Other Central Banks of smaller countries are exploring the potential impact on their economies of the use of cryptocurrencies, the potential of CBDCs and the ways in which their economies could advance by exploiting new technologies such as Distributed Ledger systems embodying the concept of smart contracts and digitization of assets. We have noted the views of large and more developed countries in Annex 9.

In our view, the steps that the Ministry and the MMA could take at this point to progress the concept of Digital Currencies and related innovative instruments, while containing the risks, are as follows:

1) Implement a Sandbox regime and an Innovation Hub under the auspices of MMA, as the banking and payment regulator. Exploring the experiences of the comparator countries regarding Sandboxes and Innovation Hubs would assist this process. The Innovation Hub would operate within the regulatory framework of the Sandbox regime. In effect, we propose one sandbox environment, but with a broader range including policy development and general experimentation as well as product launch preparation (whether MMA-owned products or privately-owned products and whether the systems are hosted on MMA premises or not).

2) The Innovation Hub can be presented as the new technology frontier for The Maldives and be promoted as a very progressive initiative. Not every explored idea would lead to a practical product, but The Innovation Hub would be an experimental facility enabling educational as well as technical initiatives and involving schools and educational establishments etc. as well as the MMA and FinTech firms. It would also function as a source of advice and support for FinTech innovators regarding, for example, regulatory policy.

3) The CBDC project would be entirely within the main sandbox, aiming for a launch in the longer term via a Proof-of-Concept and Pilot process (as recommended by the IMF), and enabling the trialling of add-on FinTech products. A Project Charter for PoCs, Pilot and Live Launch could be developed as the experimental phase proceeds. The Regulatory Sandbox would also support FinTech payment products undergoing pre-launch trialling. Other experimental FinTech products or projects including those focussed on digital assets would be within the Innovation Hub programme.

4) The CBDC sandbox project should be focussed on three key issues:
1. Cross border payments of all types using wholesale or retail CBDCs, with experiments conducted together with other nations where possible, such as the initiatives described above.

2. Domestic payments, especially exploring benefits for government payments and collections, enabling a safe and efficient eco-system for payment of suppliers, investment funds, international aid and collection of revenues.

3. Reduction in costs (cash supply, cash handling, transaction costs etc) by identifying functions that would create public benefits from reduction in the use of cash.

5) Any research or experimentation with stablecoins within the Innovation Hub must be based on assets that the MMA (potentially in cooperation with other Central Banks/governments) can properly back, or that are transparently and reliably backed by fiat currencies, commodities or other stable assets. This could include projects concerned with cross-border remittances, resort-based stablecoins using stable digital assets and with commodity-backed Islamic Finance instruments.

6) Regulatory policy with regard to conventional cryptocurrencies, stablecoins, digital assets and other innovative financial instruments must be explored, and the Innovation Hub experiments could make an effective contribution to this. In particular, the regulatory framework for protecting deposits taken by digital asset issuers needs investigation.

7) Educational and awareness initiatives should be established, aimed at merchants and business people as well as consumers, as part of a broad financial literacy program, to promulgate the benefits of digital payments and encourage reduction in the use of cash. This would benefit the growth of the TietoEVRY program as well as a future CBDC initiative.

8) MMA with the participation of the relevant government ministries, should take an active role on the SAARC Payments Council and related bodies regarding, for example, financial inclusion, cross-border payment matters and also to study the benefits and risks of Central Bank Digital Currencies and Distributed Ledgers in domestic payment systems. MMA should also continue its program of engagement with other Central Banks regarding CBDCs and other innovative instruments.

9) The Maldivian government currently has three digital ID systems in place and is in the process of integrating them into one system. It is very important for the MMA to integrate any new digital payment systems with the government digital ID system(s).
Annex 1 – A Note about Stablecoins

The 5 biggest stablecoins by market capitalisation (in USD) as at January 2022 were:

- Tether $82 billion
- USD Coin $51 billion
- Binance USD $27 billion
- Terra USD $16 billion (Until May 2022 when the product failed)
- Dai $15 billion.

However, stablecoins are not automatically stable. Each implementation must have a set of mechanisms that allow the value to be maintained. The mechanism will usually involve issuing more stablecoins if the price becomes too high and withdrawing stablecoins if the price becomes too low. This is not a foolproof mechanism as a sudden crash in value, as is apt to happen in the cryptocurrency markets, could not readily or rapidly be mopped up by withdrawing unissued coins.

The recent example of the Terra USD stablecoin crash illustrates the point. The value of the underlying cryptocurrency, Luna, started to decline because, it is thought, large investors effectively flooded the market with Terra, this resulted in more Luna (the underlying cryptocurrency backing Terra) being minted in an attempt to maintain the USD peg for Terra. Investors saw the sharp decline in the value of Terra and Luna which resulted in a bank run and the complete collapse of the price of both Luna and Terra USD.

Terra USD/Luna looks increasingly like a failed scheme resulting in significant customer losses. It suggests that all “algorithmic” stablecoins, backed mainly by volatile crypto-assets may well turn out to be inherently unstable because they rely on consistent demand in the crypto markets, which is not realistic.

“A computer algorithm that relies on arbitrage between two tokens doesn’t magically provide stability, because both tokens still depend on liquidity”\(^{41}\)

No Central Bank, therefore, is interested in supporting algorithmic stablecoins. Like all private cryptocurrencies, there are no legal protections for the user. Even asset-backed (i.e. not “algorithmic”) stablecoins supposedly supported by holdings of fiat currencies and other liquid assets are not all subject to transparent audits, which is a further cause for concern.

Our analysis also shows that gold-backed stablecoins vary considerably in the degree to which they accurately track the gold price, although USD denominated stablecoins have, until recently been somewhat more stable where they are backed by real assets.

Given that genuinely collateralised USD-pegged stablecoins can’t increase in price, their market cap rises as their circulating supply is expanded, hence the value of physical assets backing them. As of late January 2022, the total market capitalization of only the 5 top stablecoins equals $150 billion, which is almost 1/10 of the total $1.6 trillion crypto market. A year ago, the circulating supply of the 5 biggest stablecoins was worth $30 million.

In countries with hyperinflated local currencies, stablecoins may help people preserve their money. Bitcoin and other digital assets may also serve as a hedge against local inflation, but they bear huge volatility risk from which stablecoins are free. And, importantly, the USD to which most stablecoins are pegged, demonstrates, at least until recently, a much lower inflation rate than that of many local fiat currencies.

Like other cryptocurrencies, stablecoins run on blockchain and hence are available globally, meaning that payment will get from point A to point B in (more or less) the same time irrespective of the distance, be it the next door or 10,000 miles away. Traditional remittances involve a set of intermediaries who may take days to exchange information and may charge large fees to process the payment. By eliminating third parties, stablecoins allow money to be sent worldwide much faster, more cheaply and without currency risk.

As demand for secure and efficient payment infrastructure is rising, the largest stablecoins remain less easy to use than instant payment systems for ordinary non-tech-savvy users and require some degree of computer skills to operate.
Annex 2 – Cybersecurity measures undertaken by MMA

Many Central Banks are implementing active measures to monitor the cybersecurity status of their constituency of banks. This is an important prerequisite for allowing commercial banks (and in due course FinTech companies) to act as validation nodes in a distributed ledger technology (DLT) network supporting a CBDC or stablecoin. While it is by no means certain that a DLT would be the best way to implement a domestic CBDC for the Maldives, cybersecurity is still a key issue for a Central Bank.

MMA is already active in this area:42:

• Banks are required to implement a robust cyber-security policy approved by the Board of Directors. The policy must address at least the following:
  o Identify risks from cyber security threats facing the bank and measures to mitigate such risks.
  o Access rights management and secure system configuration.
  o Cybersecurity awareness program for staff and customers.
  o Measures to prevent data loss.
  o System life cycle management.
  o Continuous security monitoring and mechanisms for continuous vulnerability assessment and penetration testing.
  o Maintain up-to-date inventory of authorized software, hardware (workstation, servers, network devices etc.), other network devices, and internal and external network connections and ensuring all system components and software are updated.
  o Develop and maintain a robust cyber-crisis management plan.

• All banks are required to submit reports on Cyber Security Events (CSE) as follows:
  o CSE-I (report on cyber-security events) within one working day from the detection of any CSE.
  o CSE-II (quarterly report on cyber-security events) within 10 calendar days from the end of each quarter.
  o The reports must detail:
    - Type of incident
    - Summary of Incident
    - Date of detection
    - Physical location/ branch (if applicable)
    - Estimated/actual impact of the incident (Financial and Operational)
    - Internal Reporting authority
    - Law enforcement authorities involved (if applicable)

42 Source MMA
• There must be Supervisory follow-up to ensure that any incident has been adequately resolved, including special onsite inspection if necessary.
Annex 3 - Summary of BIS Report on CBDCs (6 May 2022)

https://www.bis.org/publ/bppdf/bispap125.pdf

Background

81 Central Banks were surveyed. All results from the survey were completed by year end 2021.

Of the 81 Central Banks, 25 are in advanced economies (AEs) and 56 in emerging market and developing economies (EMDEs)

90% of the banks surveyed are working on CBDCs.

Strong growth in the crypto-asset and stablecoin market in 2021 has accelerated the work being done on CBDCs. The growth in the stablecoin market has attracted particular attention from Central Bank regulators and standards setters.

Results reported

The survey reported that most of the Central Banks are particularly interested in retail CBDCs. Some are looking at both retail and wholesale CBDCs, but none are just looking into wholesale CBDCs.

AEs and EMDEs have different motivations. AE motivations are particularly strong in the areas of payment efficiencies, payment safety and financial stability.

EMDEs are motivated by the above but give greater weight to financial inclusion and monetary policy implementation.

65% of the banks surveyed said they would launch a retail CBDC in the short to medium term.

With regard to stablecoins being used as an alternative payment method, single currency backed stablecoins are seen by Central Banks as the most favourable solution, followed by multi-currency backed stablecoins and then commodity backed. Central Banks are not supportive of stablecoins backed by other cryptoassets or those that are un-backed and algorithmically controlled.
Annex 4 – Potential Country Comparators with the Maldives

To find good comparators with the Maldives, we looked for:
  o Countries with small populations – ideally under 1 million
  o Island nations, with scattered populations and/or difficult geography
  o GDP per head (PPP basis) in the medium range – ie higher than USD10k, lower than USD 60k
  o Countries already showing a degree of interest in digital currencies.
  o MMA’s views. MMA is additionally interested in:
    o Initiatives in India (where a project has been announced but little progress has yet been reported – see Annex 5)
    o Cambodia – one of the countries that has already launched a nationwide CBDC, which is particularly focussed on Financial Inclusion and stemming dollarization

Our long list for the comparative analysis included the following countries:
  o Bahamas. Have implemented CBDC, island nation, similar population. Similar per capita GDP.
  o Bhutan. SAARC country, less GDP per capita, similar population. Involvement with Ripple for CBDC.
  o Brunei whose currency is tied to Singapore via an interchangeability agreement, and who follow closely the development in Singapore, which they may have to follow. Similar population. Wealthy country because of oil and gas, so much higher GDOP per head but an absolute monarchy, so some of the wealth is concentrated in the extended royal family. GDP per head across the common population is more comparable.
  o Cambodia, which has implemented a CBDC known as Bakong, using the Soramitsu system. Cambodia has similar issues to the Maldives regarding dollarization although significantly worse level of financial inclusion. Cambodia has a much larger population than the Maldives, however, has a very low GDP per capita and is not heavily dependent on tourism.
  o Eastern Caribbean Currency Union (8 countries with a shared Central Bank - Anguilla, Antigua and Barbuda, Dominica, Grenada, Montserrat, St. Kitts and Nevis, St. Lucia, and St. Vincent and the Grenadines.) The Eastern Caribbean Central Bank (ECCB) has implemented a CBDC but had to interrupt use for a time because of technical problems; island nation(s); similar GDP per capita.
  o Fiji. Island nation, similar population, lower GDP but currently involved in a major FMI renewal project; and also a multi-country CBDC study under Japanese government sponsorship.
  o Guyana, Caribbean nation, similar population, potential oil boom around the corner – currently taking little action regarding CBDCs.
  o Mauritius, some experimentation, similar GDP, larger population, but active in innovative financial services.
o South Sudan. Known to be conducting CBDC studies, very unstable and underdeveloped but part of the East African Community. Much large population and low GDP per head

o Trinidad and Tobago. Limited experimentation with CBDCs, Island nation, similar GDP, larger population. Very active in financial services.

o Uruguay, similar GDP per capita, did a trial using a token-based CBDC but did not implement, larger population.

o Vanuatu. Island nation, much lower GDP, similar population. Innovative in financial services. Working with CELO as provider of stablecoin and looking at a dual wallet solution with a CBDC and stablecoin.

We have provided information about the CBDC initiatives of developed countries, other notable countries and countries in the SAARC region as Annex 9.
Annex 5 – India’s Imminent CBDC

In June 2022, the Reserve Bank of India (RBI) made a major announcement regarding Central Bank Digital Currency.

Rabi Sankar, the Deputy Governor of the RBI, revealed in a Press Report that RBI proposes to introduce a digital rupee later this year.

The Highlights of the announcement are as follows:

- The RBI is engaged in the introduction of a digital rupee in India.
- The design of the central bank digital currency (CBDC) needs to be in conformity with the stated objectives of monetary policy, financial stability and efficient operations of currency and payment systems.
- The process to introduce the country’s central bank digital currency will be gradual to avoid disruption to the country’s financial system.
- In its recent Annual Report, RBI proposes a three-stage “graded approach” to introducing digital currency. The stages include proof-of-concept, pilot, and launch.
- The specific department tasked with seeing the agenda is the Reserve Bank Innovation Hub. This unit also has the task of overseeing other goals the RBI has in the Fintech area, all within its 2022-23 agenda.

According to Deputy Governor Sankar, India’s state-run payment platforms, including Unified Payments Interface (UPI) and Aadhar (the national ID database), are already experiencing massive adoption despite challenges. The DG highlighted the UPI system, noting that its simplicity has been at the centre of its success. The platform, a fiat-currency-based peer-to-peer payments system, has seen an average transaction growth of 160% per annum over the last five years and was especially accelerated by the 2020 lockdown.

In contrast, he noted that blockchain technology and digital assets have failed to see the same level of adoption and growth. The DG’s view on Blockchain Technology was reported as follows:

- “Blockchain, which was introduced six-eight years before UPI started, even today is being referred to as a potentially revolutionary technology. [Blockchain] use cases haven’t really been established that much at the speed it initially was hoped for”
- “This slow adoption has been due to several shortcomings of digital currencies, the deputy said. Some of these are the lack of an issuer and intrinsic value.” Based on these, Sankar thinks CBDCs will replace even the little use case that digital assets have.
- “We believe that central bank digital currencies (CBDCs) could actually be able to kill whatever little case there could be for private cryptocurrencies.”

The DG may have been misreported, but these statements are somewhat incomplete and controversial. In particular, there are many cases in the financial services industry in
which genuinely beneficial Blockchain use cases have been demonstrated, especially related to international trade. However, domestic payment infrastructure is not one of them, as has been explained in this paper. Cross-border use of blockchain systems, however, where no single trusted third party is involved, has been shown to be effective (eg by Ripple, Project Dunbar and the mBridge initiative).

Nevertheless, it seems clear that the RBI (like China’s Central Bank, the People’s Bank of China), has chosen to use a conventional centralized infrastructure run by the Central Bank to support its issue and management of the Indian CBDC. It seems that both the larger countries and the richer countries and currency blocks (such as USA, EU and UK) are not convinced about the value of blockchain CBDCs. Introducing a non-DLT CBDC reduces risk, especially in a large economy where performance could turn out to be a constraint when take-up and activity grow rapidly (as happened previously in India when demonetization led to a spurt in the growth of instant payment systems on mobiles, such as Paytm).

The statement by the DG regarding “killing” private cryptocurrencies, is also significant and shows a key concern relevant to all Central Banks. There is a risk that private cryptocurrencies and especially reliable global stablecoins, could undermine the sovereignty of national currencies if widely adopted by the public and mainstream business. The recent disastrous experience of El Salvador, which adopted Bitcoin as legal tender, only to see their holdings collapse in value, shows how dangerous this can be.

The case of the Indian CBDC development should rightly be watched closely in the other SAARC countries.
Annex 6 - Building Blocks and Stages of a Sandbox

Introduction - the nature of regulatory sandboxes

If implemented effectively, a sandbox can bring down the cost of innovation and reduce entry barriers, and allow policymakers and regulators to gain important insights before any decision-making. When considering a sandbox, Governments should clearly define the objectives and the challenges that need to be addressed. (See UN DESA, 2021. 13th tranche Development Account Project “Frontier Technology Policy Experimentation and Regulatory Sandboxes in Asia and the Pacific”.)

The success of a sandbox relies on the capacities of institutions and the existence of relevant legislation within jurisdictions, allowing for the proper establishment of the sandbox environment. Sufficient resources should be made available to support its implementation and evaluation. Sandboxes and experiments are resource intensive, and policymakers and regulators should be aware of this prior to initiating one. Moreover, institutions may find that sandboxes and experiments demand more of their time and skill than they have anticipated. Lack of technical staff and capacity thus may lead to serious consumer protection risks as well as reputational risks for the institutions, who may be held responsible for undue consequences (See World Bank, 2020. Key Data from Regulatory Sandboxes across the Globe)

Requirements for regulatory sandboxes can vary, but they generally share these features:

- They are temporary
- They are for a limited number of consumers
- They contain provisions for consumer protection and compensation
- Sandbox participants are required to share information with regulators regarding their operations.

![Image](https://www.mercatus.org/system/files/knight-sandbox-mercatus-working-paper-v1_1.pdf)
Regulatory Sandboxes Risk Tampering with the Marketplace

While sandboxes can provide a valuable service, they also come with three primary potential drawbacks:

1. The government may be empowering certain companies at the expense of others
2. Sandboxes could potentially muddy the market, making it unclear for consumers and investors which products are reliable—and which are unduly propped up by government
3. Sandboxes could open the door to favouritism in the regulatory process, potentially creating a quid pro quo relationship between companies and regulators

Regulators Can Take Steps to Make Sandboxes as Fair and Productive as Possible

Despite these concerns, regulatory sandboxes can still make a valuable contribution to the financial sector. To enhance their productivity, here are several ways regulators can minimize the negative effects of FinTech sandboxes:

- Establish liberal procedural qualifications for entry. This would allow as many qualified firms as possible to participate.
- Permit third parties (such as industry groups) to manage sandbox entry for their members. This would help many firms to benefit from the sandbox and minimize government favouritism.
- Institute well-defined sandbox terms and guidelines at the outset so that firms are all regulated by the same standards. This would help eliminate regulator bias.
- Ensure the duration of the sandbox is no longer than necessary to achieve its goals.
- Publish detailed reports of all sandbox findings. This would both help the public learn more about sandboxes and add an extra layer of transparency.
- Clarify that nonparticipation in a sandbox is not cause for suspicion or for different treatment on the part of regulators.
## Annex 7 – Roles and Responsibilities of Stakeholders in a CBDC eco-system

<table>
<thead>
<tr>
<th>Stakeholder</th>
<th>Roles</th>
</tr>
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</table>
| MMA             | ● Issuer and destructor of currency, responsible for putting currency into circulation and guarantor of the Maldives Digital Currency in accordance with the MMA Law;  
● Supervisory/Oversight authority for the compliance of the system and payment transactions made with the Digital Currency.  
● Clearing house for transactions and settlement agent for settlements between participant institutions;  
● Custodian of funds received in return for issued digital currencies;  
● Head of centralized KYC/identity infrastructure;  
● Owner and administrator of the digital platform;  
● Owner of certification authority for digital certificates associated with the Digital Currency  
● Responsible for the communication policy around the Digital Currency. |
| Government      | **Legislator / regulator**  
● Creation of a legal framework conducive to the promotion and use of the Digital Currency (with MMA).  
● Guarantor of the legal provisions relating to the Digital Currency.  
● Guarantor of privacy of data on users and on digital payment transactions used for tax purposes, anti-money laundering and combating terrorist financing, etc.  
● Guarantor of the balance between legitimate government collection of information and citizens’ rights to privacy.  
● Note that the Capital Market Development Authority may need to become involved at some point, especially regarding trading in Digital Assets. |
| Promoter        | ● Promoter of the adoption of digital payments by prioritizing this means of payment for government payments, and social benefits operations.  
● Promoter of national digital infrastructures, including responsibility for incentives for cash displacement |
| Technology firm(s) | **Technology Solutions Provider:**  
● Provide the technological solution(s) in order to operationalize the vision of the Maldivian Government and the MMA for the Digital Currency;  
● Provide technical assistance to other Stakeholders (MMA, payment merchants, Commercial Banks and non-bank PSPs, Cooperatives, end users.)  
● Provide the necessary technological infrastructure for:  
  o The issuance, destruction, circulation and transfers of the Digital Currency in The Maldives; |
<table>
<thead>
<tr>
<th>Stakeholders</th>
<th>Responsibilities</th>
</tr>
</thead>
</table>
| **Commercial Banks and other Payment Service Providers** | ● Enhance their technological infrastructure and their network of points of service to enable the distribution of the Digital Currency;  
● Participate in the CBDC network have the necessary straight-through processing infrastructures or API compatible systems to interact with the Digital Currency platform;  
● Build and maintain a secure network and business continuity facilities;  
● Maintain a settlement account at the MMA or at a banking financial institution, according to MMA regulations;  
● Have an ergonomic platform allowing users to create accounts, store their digital currency, make transactions securely;  
● Provide facilities for users to receive cash in return for the Digital Currency;  
● Set up a system for monitoring and dealing with customer complaints;  
● Submit regularly the reports required by the oversight and supervisory authorities at MMA;  
● Provide payment orders at the request of any user of the Digital Currency;  
● Apply and ensure compliance with AML/CFT requirements, privacy and consumer protection principles;  
● Provide the interface to receive payment requests from merchants, process them securely based on the information received from the payer about the beneficiary and provide proof of transactions to stakeholders;  
● Proceed to any type of payment (e.g. B2B, P2P, P2B) by applying and ensuring compliance with security rules in the context of the initiation and processing of electronic payments and for the protection of consumers' financial data;  
● Promote a provider network that is robust enough to ensure the continuity of payment transactions. |
| **Merchants (interface between distributor and consumer)** | ● Receive product and service payments through POS or mobile apps deploying QR codes and NFC facilities as well as card acceptance facilities;  
● Make transfers and conversions from Digital Currency to fiat currency followed by payment transactions;  
● Generate statistics of completed transactions. |
| **End Consumers** | ● Recharge digital device with a financial institution and/ or Agents in exchange for cash or PSP account deposits;  
● Transfer an amount from a digital account to a digital account and/or... |
| trust account;  
| ---  
| ● Pay for everyday purchases of goods and services at point of sale and/or on-line;  
| ● Payment of bills;  
| ● Perform P2P (between two people) transactions offline;  
| ● Store digital currency in an e-wallet according to the limits established by the MMA;  
| ● Follow up on individual account and file complaints within any time limit set;  
| ● Assure the timely reconciliation of transactions that have taken place offline;  
| ● Protect their personal information;  
| Consumer Groups  
| ● Address Consumer issues such as privacy - in particular the potential loss of anonymity through traceability of digital transactions under certain circumstances or above threshold values.  
| Regional Groupings  
| ● The Maldives belongs to the SAARC regional grouping - the South Asian Association for Regional Cooperation.  
| ● SAARC will in due course be seeking interoperability around its member countries in respect of digital currency and instant payments. SAARC secretariat will need to be keep informed of the developments  
| ● The Government of the Maldives and MMA may be expected to make presentations about the progress of studies, PoCs and Pilot plans
Annex 8 – FinTech Companies and start-ups in Maldives

From https://www.f6s.com/companies/maldives/co

A sample of companies in Maldives on F6S.

(1) MSG.mv
“Everyone wants their privacy to be protected, while most of telecommunication and SMS providers records clients sent/received data’s unknowingly to the client. MSG.mv provides end-to-end secure text messages where you require 2-Factor Authentication pass-code to login to web-based application and provides text messages which will be sent via encrypted SMS-gateways.”
Located in Male, Maldives

(2) Trip Beaver
“TRIPI Beaver.com is not one more head in the competition of price comparison. The Brand was introduced by hospitality professionals who had hands on quality service in the leading hotel chains. In addition to the price comparison now the visitors will be able to grab Discounted Coupons or Pre-Travel Vouchers for Exclusive Destinations like Maldives, Thailand, Dubai and Seychelles. We do not sell Coupons; the clients can choose the coupons we will introduce the coupon provider contact details to the customers.”
Located in Hithadhoo, Maldives

(3) Payer
“We’re on a mission to build a simple and hassle-free payment solution for the tiny islands of Maldives. Customers face slow and inefficient services powered by outdated technology and legacy systems. As traditional channels and service providers are unable to respond to evolving needs of customers interested in managing everyday finances, Payer is here to make payments simple allowing customers to manage, pay and keep track of all their monthly finances and more.”
Located in Male, Maldives

(4) Finwice
“Finwice (Winner of 1st AngelHack Global Series event in Maldives) helps you reach your financial goals by analysing your spending habits and suggesting personalized tips and suggestions on how to save smartly. Finwice lets users import, processes transaction data and provide users seamless and fast expense tracking and analysis saving you hours otherwise spent going through your statements trying to manage your finances. Moreover we also help users set saving goals, and get personalized tips & advisories, and investment opportunities to maximize your wealth. Finwice is currently going through AngelHack's HACKcelerator program.”
Located in Male, Maldives

(5) Hologo World
“Hologo World is a company that provides affordable education solutions using cutting edge technologies that aim to foster innovation, propel societies and transform industries. We built a demo platform on IOS that replaces images and videos with life-like 3D images curated with AR technology and made it compatible to everyday devices such as the iPhone. Now we have taken the same concept and developed the solution for Android opening up an entire new base of potential customers and mixed the new update with a high level of agility to: 1. Allow teachers to customize the AR experiences by voicing over 2. Allow teachers to create private networks with students 3. Gamified the AR experiences with interactive tools 4. Allowed the ability to integrate new languages seamlessly to the application. 5. Built a framework for multiplayer AR interactivity and machine learning. 6. Built a library of over 300 AR experiences for STEM subjects. All for below USD 10 per year per user.”

Located in Male, Maldives

(6) Agile Technologies
“Fina is the first of its kind lending and collections solutions crafted for everyday use. Fina simplifies the lending solutions practiced traditionally taking a move on digitalizing the lending sectors. An easy-to-use light-weight application developed using the latest high-scale technologies to serve you better. Agile Technologies is headquartered in Male, Maldives but the application has a regional focus. We believe that the time is ripe for disruption in Asia – a region with huge internet penetration rates and high smartphone adoption rates but underserved by local mobile applications and cloud applications.”

Located in Male, Maldives

(7) Qolvs
“Qolvs is a multi-disciplinary firm established in the Maldives with a presence in Malaysia providing Cloud and FinTech solutions with an innovative platform at its avenues since 2020.”

Located in Male, Maldives

(8) Kunbu Pvt Ltd
“Kunbu is a complete sea transfer management system, with booking, payment and review for users. Business management for fleet operators and state of the art tracking and monitoring solution for fleet owners. Our company is based in the Maldives.

Located in Male, Maldives
Annex 9 - CBDC insights from Singapore and other nations

The following information was provided at the Maldives Workshop for Regulatory Sandbox on Digital Currency 10-11 August 2022 in Male and is now added to the National Study Report. Topics included are:

- CBDC experimentation in Singapore
- Dunbar - cross-border experiments
- The Singapore Regulatory Sandbox
- Current situation for CBDC in Singapore
- Insights from other economies
- Conclusions

CBDC experimentation in Singapore

The Monetary Authority of Singapore (MAS) has been experimenting with CBDCs for several years:

- Project Ubin 2016-20 focussed on developing a domestic RTGS using Blockchain technology on three different types of platform, and was regarded as a successful Proof of Concept, but did not lead to any expectation of implementation
- The MAS Regulatory Sandbox was set up in 2016, and has successfully enabled the launch of a number of products
- Project Dunbar 2019-2022 explored the use of a cross-border multi-CBDC platform (discussed below)
- In 2020-21, MAS hosted the Global CBDC Challenge and announced the results at the Singapore FinTech Festival in November 2021; over 300 firms from around the globe participated.
- Project Orchid was planned as a next step in preparing for issue of a digital Singapore Dollar, but there is no strong case for issue at this time, so the project provides a contingency plan in case MAS decides to move forward

Project Dunbar – cross-border multi-CBDCs

Project Dunbar explores how multiple CBDCs linked via a common platform could enable cheaper, faster and safer cross-border payments and involves the Bank for International Settlements (BIS) Innovation Hub Singapore Centre, the Reserve Bank of Australia, Bank Negara Malaysia, the Monetary Authority of Singapore and the South African Reserve Bank.

The project focussed on technical viability and demonstrated a working prototype, intended to resolve three challenges relating to access, jurisdictional boundaries and governance. The Project Dunbar Report addresses three issues:

1. Key benefits and challenges, and the approach to achieving the objectives, specifically, how cross-border payments can be made faster, cheaper and safer through less reliance on intermediaries (and especially avoiding the need for
intermediary currencies such as the USD), simplified settlement, process improvement and process automation using smart contracts

(2) The design of a multi-CBDC platform exploring the base capabilities required for governance, processes and technology. The report describes the technical design of the prototypes

(3) Areas for further exploration. As one of the first experiments with multiple CBDCs, Project Dunbar raised as many questions as it answered. Open questions are categorized under policy, business and technology headings

Since Project Dunbar began, we have seen other multi-CBDC projects such as Project LionRock between Thailand and Hong Kong, with China and UAE joining in a later version (mBridge, discussed in this report), and Project Aber – between Saudi Arabia and UAE - all significant players in global payments

Note that Cross-border mechanisms to connect conventional Instant Payment Systems around the world are also being developed, so CBDC is not the only answer to fast and cheap cross-border transfers. Indeed BISIH is exploring both CBDC-based cross-border mechanisms and those based on connecting Instant Payment Systems (the Nexus scheme).

The Singapore Regulatory Sandbox

Sandboxes in advanced digital countries such as Singapore have developed since their inception, giving a useful indication of how a sandbox regime may evolve.

- The MAS Sandbox began in 2016, but MAS Governor, Ravi Menon announced significant enhancements at the Singapore FinTech Festival (November 2021), focusing on experimentation
- In 2019, MAS had already improved the processes around the Sandbox introducing “Sandbox Express”, to enable businesses to conduct market testing of low-risk activities more quickly. From January 2022, Menon announced, MAS will enhance its regulatory sandbox in three ways, with Sandbox Plus:
  - Expansion of eligibility criteria to include early adopters of technology innovation
  - Streamlined application with financial grant - with funding of up to S$500,000 at a 50% funding level; a very generous offer
  - Participation in the “Deal Fridays” programme – a platform for deal-making opportunities – progress on which will be showcased at the next Singapore FinTech Festival in late 2022
- It is not yet clear how well the enhanced programme is faring, but the MAS Sandbox has already assisted a number of FinTechs to bring products to market (including insurance and custodial products), and the changes show the important elements that were believed to be needed for future success.
Current situation for CBDC in Singapore

In a Parliamentary answer in May 2022, Lawrence Wong, then Deputy Chairman of MAS and Minister for Finance, stated that MAS believes there is no pressing need for issuance of a CBDC at this time.

In summary, as for other developed country Central Banks, (eg US Federal Reserve, Bank of Canada, and Reserve Bank of Australia) MAS does not see the case for a retail CBDC in Singapore as compelling, since the commonly-offered benefits of CBDCs such as financial inclusion or cheaper and faster payments do not apply:

- Financial inclusion is not a significant problem in Singapore.
- Electronic payments in Singapore are already pervasive, seamless, fast and cheap via the rollout of FAST, PayNow, and SGQR (Singapore standard QR code)
- Cross-border IPS links are becoming available (eg Singapore -Thailand already operates; Malaysia, India, Japan under development)
- Government transfers are disbursed efficiently through digital means, even through the Covid period
- The Singapore payments system is already becoming even more innovative and competitive, as more payment service providers and digital banks are being admitted through the Payment Services Act, 2019

MAS current thinking is therefore that issuing a retail CBDC would be a major decision, which it is not ready to take at this time. Important risks and uncertainties come with creating a new form of money, so:

- careful practical experimentation alongside industry players will be necessary if MAS decides to proceed with a retail CBDC at some stage
- for example, the case for a CBDC could strengthen if foreign digital currencies become more widely used locally.

Hence, MAS continues to build up its technological and institutional capabilities to prepare for the possible issue of a digital SGD but does not see an immediate case for doing so. Project Orchid provides a contingency plan in case MAS decides to move forward towards CBDC issuance.

Insights from other major economies

G7 countries

- USA – The Fed has conducted research projects, and recently issued a further Consultation Paper; the current US Administration has issued an Executive Order to progress further study notably regarding regulation of digital assets including stablecoins and considering whether CBDC issue is desirable in the longer term. It seems probable that the Fed is keeping an eye on the development of the digital Yuan and will wish to ensure that it does not fall behind.
• **ECB** (covering France, Germany and Italy as well as smaller members) conducting a 24-month project on retail CBDC, which has issued various working papers looking at privacy as a significant issue. The overall view is that citizens are not enthusiastic, and risks seem to outweigh benefits so a potential launch would not happen in the short term.

• **France** - Banque de France has its own experimental project on wholesale CBDC for domestic and cross-border, focussed on interbank transactions and has experimented with MAS and with the Swiss National Bank in 2021; ready to launch by 2023 but no plan to do so.

• **Germany and Italy** do not have current major projects separate from ECB initiatives

• **UK** – Bank of England conducted major studies and distributed consultation documents but there is little enthusiasm among politicians or the public; there are concerns about financial stability and the risk of BoE getting involved in controversies regarding anonymity and privacy; risks seem currently to outweigh benefits, so any potential launch would not happen in the short term.

• **Japan** – cancelled its CBDC project citing lack of interest from the public – digital payment is already widely used in Japan and a new method did not elicit enthusiasm in consultations.

• **Canada** - Project Jasper – conclusion is that privacy, security and universal access are significant issues and the possibility of launching a CBDC would require significant political will and public enthusiasm, which is currently lacking.

• The flavour is that the major developed economies are looking at CBDCs only as a contingency measure, should the public and the world economy demand it in due course. Bank of Canada sums it up: “**We are building the capability so we can be ready should the need arise**” – much like MAS.

**China and India – the giants**

• **China** has been running a Pilot program for the digital Yuan or eCNY for several years in selected cities and claims that more than 140 million people (around 10% of the population) have opened digital wallets

• Experimental use at the winter Olympics in Beijing was deemed a great success.

• The wallets seem to work much like AliPay or WeChat Pay wallets and are thus readily useable by the public who are used to those systems - hence the retail eCNY is not a blockchain system.

• The Chinese government is further ahead in digital currency research than any other major economy, but sees economic and political challenges to conducting a national roll-out - hence, after nearly a decade of development
and several years of localized testing there is still no clear date for a full-scale launch of the eCNY.

- **In India**, a Pilot Digital Rupee program was announced in June 2022 by the Deputy Governor of the Reserve Bank of India, with some interesting comments included
  - The announcement (paraphrased in the National Study Report) stressed the need to safeguard financial stability; hence the process of roll-out would be in three stages - proof-of-concept, pilot, and launch - to avoid disruption
  - India’s state-run payment platforms, including Unified Payments Interface (UPI) and Aadhar (the national ID database), are already experiencing massive adoption despite challenges, with an average transaction growth of 160% per annum over the last five years
  - The announcement was negative about the use of a blockchain system for the CBDC, and suggested that the establishment of national CBDCs would “kill whatever little case there could be for private cryptocurrencies”
  - Prior to this announcement, RBI had set up an Innovation Hub in March 2022 as a wholly owned subsidiary of the RBI, headquartered in Bangalore, with the following objective:
    - “To foster innovation in a sustainable manner and through an institutional set-up.”
    - The Press Release stated that the RBI hub will collaborate with financial sector institutions, technology, industry and academic institutions and will coordinate efforts for exchange of ideas and development of prototypes related to financial innovations for creating an ecosystem that would focus on promoting access to financial services and products and would further financial inclusion.”

**Other notable countries**

- **SAARC** – India is a major force as discussed above; some investigations in Pakistan, Bangladesh, little in Nepal, Sri Lanka, but experiment in Bhutan - the “Digital Ngultrum” for retail, cross border and wholesale use cases
- **Brazil** (largest country in S America) – “Digital Real” Pilot in preparation
- **Nigeria** (largest country by population in Africa) – “Digital Naira” Live, but poor take-up so far
- **Indonesia** (largest country in ASEAN) – planning a White Paper on retail and cross-border CBDC – financial inclusion, risk management, efficiency and directed economic stimulus are key
- **Philippines** (second largest country in ASEAN, and first country to have mobile payment - 2001) – doubt about whether CBDC experiment will continue, but plans to launch a Pilot within the year
• Saudi Arabia (the major force in payments in Middle East) - Project Aber (cross-border transfers pilot with UAE); now exploring digital assets

• South Africa experimenting with wholesale CBDC and taking part in cross-border pilots

• Much experimentation is being done in smaller and less-developed countries, notably in the Caribbean, where the benefits such as financial inclusion, payment system efficiency and monetary stability are stronger, and risks are on a smaller scale

Conclusions - Key learning points

• Large, highly developed countries have been experimenting, but in general do not see a good case to launch in the foreseeable future.

• The largest countries - China and India - have launched or are planning, respectively, systems based on conventional technology, not blockchain – this may be to do with concerns about performance in very high-volume systems.

• Some other large developing nations – Brazil and Nigeria - have reached pilot or live stage.

• Effect on existing businesses, especially domestic transfers and FX, is a big concern – Central Banks do not want to be perceived to disadvantage their constituency of banks.

• All Central Banks are concerned about the unknown financial stability consequences of large-scale CBDC launch, but also see the need to learn about the new technologies in order to prepare for issue, should global cryptocurrencies become widely used, for example, or a dominant CBDC emerge in global trade finance.