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POLICY BRIEF

Building the Infrastructure for Digital Finance during COVID-19 and Beyond

The COVID-19 pandemic has disrupted cash flows, including payments, investments, and remittances. Photo credit: ADB.

Digital connectivity is a public good that can lead to new and sustainable growth areas and facilitate cross-border trade and remittances.

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Introduction

The coronavirus disease (COVID-19) pandemic has changed the world significantly. The Asian Development Bank (ADB) estimates global economic impact of the crisis to be between $5.8 trillion and $9.1 trillion. Border closures have disrupted traditional sources of cash flow, jeopardizing such industries as travel and hospitality, beauty, fashion, and retail. External cash flows have declined with the decrease in the number of tourists and business travelers and reduced foreign income from remittances, supply chains, e-commerce, and investments. This further leads to lower internal consumption and debt servicing abilities that may result in layoffs and disrupt operation and governance.

COVID-19 is also accelerating global digital transformation and exposing a lot of challenges. Since the outbreak, broadband service providers have seen up to 60% increase in internet traffic. Services are switching to online operation and communication in response to mobility and contact restrictions. This situation calls for an immediate allocation of resources to build the national and the regional digital

infrastructure, which should be classified as a "public good" expenditure to provide access to everyone. Contactless connection is key to addressing the telecommunication and inclusive fintech bottlenecks. Mesh networks with satellite and digital identification (ID) are feasible solutions to create business opportunities, enable a lower marginal cost of network expansion, and accelerate the building of the digital finance infrastructure.

This policy brief was written with the support of the Asian Development Bank's (ADB) Finance Sector Group (Junkyu Lee, Lisette Cipriano, and Jae Deuk Lee). It is based on a presentation and background paper for the Policy Actions for COVID-19 Economic Recovery (PACER) Dialogues organized by ADB.

Challenges

First, there is a lack of public infrastructure and regulations that enable contactless connection, which is aggravated by the gap in digital knowledge and infrastructure. Meanwhile, more opportunities lie in emerging markets and funding for infrastructure, startups, and education remains vital.

Second, the fundamental determinant of financial inclusion and e-inclusion is the telecommunication infrastructure. Many countries, such as the People's Republic of China (PRC) and the Republic of Korea, have been investing heavily in 5G, the next generation of wireless network technology. It has faster speed and greater bandwidth, enabling more connected devices and reducing latency to virtually zero. Edge computing is also rising along with 5G. It does computing closer to the source of data and allows more personalized services, and it will have lots of advantages when integrated with 5G.

Providing access to the digital infrastructure can improve social welfare, enhance resilience, increase national competitiveness, and facilitate international trade. However, the reality is that over three billion people, or 41% of the world population, do not have internet access, and the situation in Asia is even worse. The primary reasons behind this digital divide are cost and scalability, especially in rural areas. These issues should be addressed in pursuing cheaper, more inclusive alternatives.

Technology Solutions

1. 5G versus mesh network

A mesh network is a cheaper alternative to 5G and edge computing. It refers to a group of devices or nodes that act as a single Wi-Fi network, and it can provide multiple Wi-Fi sources in a faster, smoother, and more reliable way. A critical advantage of the mesh network is that it can expand with less technical or financial hindrance. This scalable solution is especially beneficial in places with poor connection and remote areas with limited internet infrastructure. It is the most crucial first step in e-inclusion for financial services.

2. Cellular network versus satellite

A cellular repeater amplifies signal and improves connectivity using a donor antenna that receives and

transmits the signal from nearby cell towers. Another option is to connect a node of the mesh network to a satellite, which provides a more affordable connection to the internet for an entire area network in remote areas. It is an alternative source of contactless connection that enhances the traceability of products or changes related to crop growth and farming conditions. Data and information on farmers and crops provide transparency and reduce the risk for micro insurers and lenders, improving branding and quality, which are essential for levelling the supply chain playing field for emerging and agriculture economies.

3. Digitizing fiat currency

Digitizing fiat currency can create sustainable and new fintech models. Central bank digital currencies (CBDCs) may propel a cheaper form of remittances and delivery versus payments, and their use means more than improved speed and efficiency in the payment system and exchange of value. In the second stage, regional cooperation of CBDCs could be a critical element of cross-border remittance capabilities. The next stage will be to foster the growth of the regional digital infrastructure to facilitate digital trades.

By connecting the unconnected and digitizing fiat currency, there will be more transparency for a more equitable and sustainable economy. Privacy can be maintained, but funding and education are the most challenging issues.

Network Cost and Effects

From the cost and benefit perspective, the initial infrastructure cost will have to be borne by individual countries. Network externalities from the local and the regional digital infrastructure may prevent individual domestic material consumptions from burdening the neighboring economies. If these burdens exceed the cost of funding regional digital infrastructure, it calls for government incentives and subsidies for infrastructure building and users’ participation, with the appropriate rules and regulations.

The local digital infrastructure builds the local network, which is dependent on the strength and size of the user base. An increase in usage and users leads to a direct network effect, which is an increase in new products and services for other users. The increase in value through the local and direct network incentivizes further growth of the ecosystem.

Collaborative efforts may result in a positive feedback network effect to the region by developing distributed ledger technology and industry standards in communication, trade, tourism, healthcare, supply chain, payments, and remittances. More regional and global participants may lead to a higher number of new entrants, giving a more extensive and diverse choice of products, services, and customers.

These three network effects (local, direct, and feedback) may stimulate investment in anticipation of higher returns. Higher investment may lead to access to cheap capital with more contactless connectivity and cross-border activities. These positive network externalities give rise to a positive loop. In the early stage of the development cycle, international agencies such as ADB may provide funding and financing before the network effects kick in.

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Policy Options

Governance

Digital infrastructure spans across different ministries involving telecommunication, monetary, economic and enterprise development, trade, education, and treasury. Some countries have a coordinating minister or a smart nation division under the Prime Minister Office. The longer-term solution is to have a ministry designated as the digital infrastructure and trade ministry.

There are many challenges in implementing a digital policy. It involves the granting of telecommunication licenses for the satellite and the mesh network and payments licenses. Taxation of digital assets and services needs clear guidelines from the treasury. Grants for education and the building up of skills and knowledge are needed. Trade and industry cooperation in the region requires negotiation with other countries. Private sector development needs to be driven by grants and subsidies.

Grants and education

Grants and education play an important role in facilitating the development of fintech and digitalization. COVID-19 provides opportunities for fintech companies and startups to scale up and provide solutions, but education and grants are needed to help businesses transform and collaborate with each other.

The purpose of grants is twofold: to ensure sustenance and growth in fintech and to foster acceleration and upskilling in digitalization. The first will help reduce layoffs in the short term and improve the growth of the right sectors in the long term. The second can help businesses create products to serve new customers and make digital services user-friendly, which is important for inclusion and scalability. Governments can also offer training allowances for approved and relevant courses. Universities will need to revamp their syllabus and include more digital materials.

Access for all

Digital inclusion provides the most appropriate option, and it is low-cost, sustainable, and scalable. Those who lack digital access represent the most significant demand and unexplored markets in this pandemic.

Second is to convert dead assets to live and tradable assets. Regulation should encourage the digitization of non-securities while bearing in mind appropriate risk-mitigating measures. Then digital assets for trading can be fractionalized and heterogenized (differentiated). The economy can leapfrog via these exchanges that deal with delivery versus payments to the region and beyond.

The ultimate goal of serving the underserved will be achieved eventually with linkages to international markets.

Digital infrastructure as a public good

A national digital infrastructure is vital in accelerating financial services for inclusion. Nations can focus on building technologies related to the mesh satellite or 3G/4G/5G network, virtual asset service providers' open platforms, CBDC, and open data. In the meantime, a regional digital infrastructure is key to facilitating a cheaper, secure, and sustainable source of remittances; e-trading of digital assets; and access to cheap capital.

There needs to be a focus on network externalities to foster alignment and collaboration domestically and beyond. This may be the only way to lift the economy from the COVID-19 crisis toward sustainable recovery with contactless connectivity. It is recommended that ADB assess the opportunities in filling the gap in investment needs to foster the national and the regional digital infrastructure.

Policy Implementation

Nearly all the policies above are in various stages of implementation by different countries. Their execution and effects are summarized below.

5G and edge computing

By 2023, 5G will make up around one-fifth of all mobile data traffic with 25% of the use cases depending on edge computing capabilities. The integration of 5G and edge computing will also bring several benefits to mobile video viewing.

Mesh network

Several entities across different jurisdictions have experimented on the mesh network, which is the cheaper and more inclusive alternative. The SmartMesh project team is implementing the mesh network in the Philippines, and the MeshBox Tesla model has passed all the necessary hurdles to get a license from the Federal Communications Commission last August. The Singapore University of Social Sciences is experimenting on a mesh network and meshbox on campus, and the program will be expanded to other higher learning institutions in the country.

As the production scales, the unit cost of a meshbox will drop from the current $1,000. Mesh is still a nascent technology, but there is good potential.

Satellite

Satellites have been used in analyzing financial data from remotely located farmers. Rabobank and Wageningen University, for example, finished a pilot in Ethiopia using the Climate Smart Digital Farm Finance (CSDFF) Solution tool to provide banks with data on smallholders' crop production, which reduced the need to visit farms in remote areas. Other projects pioneer in offering lower-cost financial products to previously unreachable farmers. These examples show how satellites can provide affordable and secured solutions for money transfer in remote areas.

Central bank digital currency (CBDC)

The Monetary Authority of Singapore has engaged various stakeholders to issue CBDC using distributed ledge technology. Project Ubin involved the tokenization of the Singapore dollar and cooperation with commercial banks, central banks, and technology companies in settlement. The project highlights not just the ability to realize cross-border remittance and tokenize assets transfer but also the role of government policies in spearheading tokenization and regional cooperation in the exchange of value.

The Monetary Authority of Singapore, JPMorgan, and Temasek have developed a blockchain payments system that handles different currencies on the same network. Other projects seeded by the Singapore government for digital identity include AID:Tech, which is working with Women's World Banking to provide microinsurance to underinsured women. Affinity, provider of portable digital identity technology, and GeTs with TradeTrust are working on cross-border trade documentation and agreements on the blockchain. The idea of identity systems as a building block to development is gaining traction and ADB is at the forefront of this initiative. Self-sovereign identity is an extension of that idea with portability.

The PRC has already completed the backend infrastructure of its CBDC, which is called Digital Currency Electronic Payment (DCEP). The DCEP wallet will support major functions, including digital asset exchange, wallet management, ability to look up past transactions, and offline payment via QR code. There are several initiatives to digitize assets using distributed ledger technology or blockchain.

The use of distributed ledger technology allows Cambodia to leapfrog the traditional means of connecting all players and address real-time gross settlement. Project Bakong links all payment service providers into one system via an open API, enabling users to transact peer-to-peer securely without transaction fees in real-time.

Project Inthanon is into the third phase as a collaboration between the Bank of Thailand and eight financial institutions. Project Inthanon-LionRock was a project initiated by the monetary authority of Hong Kong, China and the Bank of Thailand to explore real-time cross-border funds transfers and foreign exchange transactions via a corridor network to achieve payment versus payment more efficiently.

The experience from these countries is that unless there is a need for financial inclusion and to prevent fraud, the financial institutions are unlikely to collaborate as willingly. There is an opportunity for

emerging economies to leapfrog as the number of underserved determines the value of a digital infrastructure project.

Recommendations

In line with the policies discussed, the following action plans are recommended in addition to 10 enablers of digital inclusion to be implemented during the pandemic.

Stay connected

In lieu of the increase in telecommunication and network usage, network operators ought to prepare for the high demand, manage the communication facilities, keep track of the key network infrastructure service performance, and prevent congestion.

Connect the unconnected

One affordable way to ensure connection is through the deployment of satellite and mesh network. Create a favorable regulatory environment, such as a blanket license policy, cost-based license fee, and reduced import duties on satellite equipment to encourage uptake and deployment of satellite services.

This policy brief has not discussed portable identity and decentralized technology in depth despite the initiatives of Temasek Holdings in portable identities (also known as Self-Sovereign Identities) and the Chinese government in the Blockchain-based Service Network (BSN) for small and medium-sized enterprises. Such democratized efforts in identities and distributed ledger are crucial. ADB should take the lead in the discussions to ensure interoperability and collaboration for the region.

10 Enablers of digital inclusion

Policymakers should look into these critical enablers for digital inclusion and provide support for businesses to transform, cope with the challenges and pain points, and utilize the opportunities associated with COVID-19 to enable the economy to leapfrog and serve the underserved.

1. Fast, stable internet/mobile/mesh network connectivity

Use 3/4/5G, satellite, and mesh network for connectivity. Democratized connectivity goes beyond affordability.

2. Interoperable value transfer gateway

Enable low-cost, real-time transfer and settlement through interoperable systems.

3. Privacy protection for users

Combine processes that govern hygienic behavior with the latest technologies, such as secret sharing, secured multi-party computing, zero-knowledge proof, trusted executable environment, and other

cryptography and encryption standards.

4. Strong security framework

Put in place a trust distribution process in software and hardware to ensure that there is no single point of failure or attack. There is a strong case for legislation and regulation to require the setting up of a technology risk management committee in licensed and listed institutions with specific skills and understanding of the risk and complexity of nascent and scalable technology.

5. Open source and trust distribution governance

Regulation and processes for distribution of trust should be encouraged. There is also a need to promote open source and open environment for apps, data, and systems to crowdsource wisdom, defense, and resources to guide against malicious attacks and maintain an equitable environment for digital assets.

6. Digital literacy and user experience

Education remains a priority. Software and hardware companies can improve user experience to ensure that the learning curve is shortened by functional interfaces and guidance from the devices.

7. Portable digital identity

Identity of individuals and organizations now extends beyond foundational components like national identity and includes credentials and history relating to employment and finance. However, the data is typically constrained either by lack of digitization or portability across platforms and borders. User-centric solutions like portable digital identity (or self-sovereign identity) can ensure portability and fair exchange of value. There is also a need to establish new data sharing guidelines.

8. Easy compliance

Revise, update, and enhance existing regulation, rules, and guidelines in line with new developments. It is crucial for the ministries or departments involved to coordinate on changes. A sandbox environment may provide temporary relief and limit the systematic risk.

9. Comprehensive data and oracle ecosystem

Digital assets are a digital representation of physical or virtual goods and services. Storage and processing capabilities determine the competitiveness of an economy and sector. When a smart contract is used, an external source of data or blockchain to record transactions is crucial for the proper functioning of decentralized apps. Such an oracle ecosystem is needed to provide data, and a national digital infrastructure will be useful for this purpose.

10. Talent, knowledge, and skills

Education in urban and rural areas are substantially different. As the digital economy develops, the need

for talents, knowledge, and skills at all levels will be enormous. The democratization of communication services will enhance the ability of talents to learn via the internet. Rural areas will benefit the most from making knowledge acquisition, on-the-job training, and internships accessible online to anyone anywhere.

Resources

Altencalsoft. 2020. How Edge Computing Is Revolutionising the Telecom Industry.

Android Central. 2016. How Wi-Fi Mesh Networks Work.

Boxmining. 2020. [People's Republic of] China's National Digital Currency DCEP/CBDC Overview.

C. Duffy. 2020. 5G Explained: What It Is, Who Has 5G, and How Much Faster Is It Really? *CNN.* 6 April.

CNN. 2020. [People's Republic of] China Is Fighting the Coronavirus with a Digital QR Code. Here's How It Works.

C. Setboonsarng. 2020. Tourism-Reliant Thailand Shelves' travel Bubble' Plan as Asia Virus Cases Rise. *Reuters*. 6 August.

Deloitte and Monetary Authority of Singapore. 2017. *The Future Is Here. Project Ubin: SGD on Distributed Ledger.* Monetary Authority of Singapore.

EMEA Satellite Operators' Association. *Enabling Digital Financial Inclusion Through Satellite Communication.*

Ericsson. 2020. What Is Edge Computing and Why It Matters.

Financial Times. 2020. Loss of Working Hours to Equal 195M Full-Time Jobs, UN Agency Warns. 7 April.

Global Times. 2020. [People's Republic of] China Ramping up Research into 6G.

H. Baharudin. 2020. Parliament: More Jobs in Digital Sector; Businesses to Receive Bonus for Adopting Digital Solutions, Says Iswaran. *The Straits Times.* 4 June.

J. Greevink. 2019. 3 Ways Satellite Tech Is Helping to Transform Finance. *GEO Awesomeness.* 6 June.

Monetary Authority of Singapore. 2020. Project Ubin: Central Bank Digital Money Using Distributed Ledger Technology.

National Geographic. 2020. How Hard Will the Coronavirus Hit the Travel Industry? Article. 2 April.

National University of Singapore. 2020. *FAQs on COVID-19 Outbreak.*

N. Glazebrook. 2020. How 5G and Edge Computing Will Change the Telecom Industry in 2020. *The Fast Mode.*

OECD. 2020. *Keeping the Internet up and Running in Times of Crisis*. 4 May.

PCWorld. 2020. Wireless Mesh Networks: Everything You Need to Know.

Qualcomm. 2017. What Is 5G?

Statista. Global Digital Users Worldwide as of July 2020.

Wikipedia. 2020. Wireless Mesh Network.

World Bank. 2020. The Global Economic Outlook During the COVID-19 Pandemic: A Changed World. Article. 8 June.

???. 2020.??“??”??????????????.

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