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Building Digital Public Infrastructure

Lessons Learned from Kazakhstan

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Introduction

Digital payments are a critical on-ramp for people around the world to access increasingly digitized public and private services. In many countries, digital payment use has expanded rapidly over the past decade—especially in the wake of Covid-19—as consumers and businesses have migrated online and grown used to the convenience, speed, security, and transparency of paying digitally. Mass adoption of digital payments has created powerful network effects that enable ubiquitous person-to-person transactions and dramatically expand the markets for small businesses. The digital payment revolution has also helped **create** the financial technology (fintech) and e-commerce revolutions that fuel consumption and promote income growth.

Countries around the world have promoted digital payments and financial inclusion through various means, including through digital public infrastructures (DPIs)—a relatively new term that usually refers to digital identity, payments, and data exchange systems on which other digital solutions and services can be built, typically to promote financial and digital inclusion. In 2023, the G20 **envisioned** DPIs as "interoperable, open, and inclusive systems supported by technology to provide essential, society-wide, public and private services" that can play "a critical role in accelerating digital transformation in an inclusive way."[1]

Estimates suggest that over 100 countries—possibly as many as 130—**have** at least one DPI element in place; many more are considering DPIs. However, as **discussed** in a recent paper published by the Center for Strategic and International Studies (CSIS), there remains little knowledge about DPIs' functioning and impact, for example on digital payment adoption and use, financial inclusion,

1 According to earlier work by the Nextrade Group and applying a stricter definition, there were 101 DPIs in place. On the 2024 DPI map created by the Institute for Innovation and Public Purpose, there were 132 identity systems and 156 payment systems across 132 countries; 134 data exchange systems were studied, but more than half of the systems were not active yet.

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consumer choice, and economic productivity. In addition, debate has only begun on the optimal DPI designs that would promote payments adoption and economic and inclusion gains. For example, while DPIs are often thought of as being led by the government, the degree of "public" in national digital identity and payment infrastructures varies widely across countries. Indeed, in many countries with broad-based adoption of digital payments, the private sector has led the way in enabling payments and even digital identity systems, with the government creating an enabling environment for digitization and ensuring competitive and open markets for all participants.

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The purpose of this paper is to help bridge the knowledge gaps about DPI designs and their impact by highlighting Kazakhstan's digital transformation journey. The Kazakh case merits attention for several reasons: the percentage of the population using online banking **has risen** from a quarter of the population in 2018 to nearly 100 percent in 2024; digital transactions **have increased** from 7 percent of all transactions in 2014 to 89 percent in 2024; and public services and government transfers and transactions are nearly fully digitized, in part thanks to the government's **partnerships** with banks. Over 90 percent of the economically active population uses the **eGov** platform. In addition, digital transactions soared from about $20 per capita in 2014 to $13,800 in 2023. As payments have digitized, the Kazakh fintech and e-commerce ecosystems have boomed and diversified rapidly.

Though Kazakhstan's swift digital transformation has not been widely discussed, it offers valuable lessons to the many developing and emerging markets that are considering DPIs and contemplating the design of their digital transformation journeys. In particular, the Kazakh model highlights the importance both of private sector leadership in digital transformation and of public policies that promote competition and level playing fields in digital payment offerings. This paper highlights several policies and design choices that have contributed to Kazakhstan's success, including the following:

- Focusing on the adoption of policies and regulations that have enabled an open, competitive, and innovative payment infrastructure conducive to consumer choice and convenience.
- Securing digital identity, enabling user access to multiple public and private services and diffused to the population by banks.
- Enabling public-private partnerships aimed at promoting digital transactions, access to e-government services, and transfers, and ensuring private sector leadership to build sustainable, market-led solutions.
- Creating consumer protection and cybersecurity frameworks and mechanisms to monitor and address fraud in the financial system.

- Promoting financial innovation, for example through regulatory sandboxes and public sector investments in fintech and e-commerce players.
- Investing in internet connectivity and duty-free access to devices to create network effects and ensure that remote and underserved populations are able to access digital payment systems and e-government services.
- Supporting large-scale educational campaigns to promote the adoption and use of digital payment and identity systems.

This paper discusses the features of Kazakh DPIs and the policies behind them, drawing comparisons with nine other economies with diverse digital transformation experiences and DPI journeys—Brazil, Estonia, India, Peru, Singapore, Sweden, Thailand, Turkey, and the United Kingdom. Each country has designed and sequenced their digital transformation initiatives differently, but collectively, their experiences offer generalizable policy lessons to countries building their own digital public infrastructures.

The following section explores the Kazakh digital transformation, focusing on the outcomes in digital ID and payment adoption and the use and expansion of financial innovation and e-commerce. The third section analyzes the policy playbook behind Kazakhstan's progress, and the final section offers a conclusion.

Kazakhstan's Digital Identity and Payments Ecosystem

If you spent a day as a Kazakh business owner traveling for meetings from Almaty to Astana, shopping and running errands on the way, you would not need more than your smartphone. A single day might run as follows. You head for a coffee shop in Almaty in the morning and pay for your cappuccino with your phone via a QR code. While enjoying your coffee, you book and pay for your train ticket via a superapp. Later, heading for lunch between meetings, you remember to transfer a micro payment to your friend for the evening's movie tickets. Then you decide to celebrate the morning's successful meetings by finally buying your dream motorbike on one of the many local e-commerce marketplaces, paying for it with a buy-now-pay-later app. Before heading out for your next meetings, you use your biometrics to authenticate yourself with an e-government or bank app and register the motorbike with the government. As you return home on the train at the end of the day, you decide to apply for a digital mortgage for your new house, which you do by authenticating yourself with your biometric digital ID. Finally, as you finish your train ride, you get back to work, using Kazakh fintech apps to prepare invoices and run the month's payroll.

This day in a Kazakh's life parallels others in advanced economies. Yet it remains a distant prospect in many emerging and developing nations: on average 1.4 billion people in the world do not have **access** to even the most basic digital payments, and hundreds of millions of others have only basic transactional accounts without access to other financial services such as lending, and only partial digital access to government services.

Yet the Kazakh-style "digital everything" economy is not out of reach. Only 15 years ago, fewer than a third of Kazakhs used the internet and fewer than a fifth used digital payments.[2] Much like in other rapidly digitizing emerging markets such as Turkey, Thailand, and Peru, Kazakhstan's rapid digital transformation journey is the product of intentional steps aimed at building a customer-centric,

2 For payments, see the World Bank's Global Findex Database 2014-2021. For internet connectivity, see the World Bank's World Development Indicators.

open, and competitive digital economy (See Case 1). The Kazakh government and the National Bank of Kazakhstan (NBK) have worked closely with the country's banks and private sector to make strategic investments in digital and payment infrastructures, to develop regulatory frameworks and policies conducive to open and competitive payments markets, and to promote financial innovation and fintech and e-commerce ecosystems. The following discussion examines the Kazakh DPIs and the policy playbook that helped birth them.

Case 1: Milestones in Kazakhstan's Digital Public Infrastructure Journey

Digital ID

- There are two methods for digital identification of individuals, one for the provision of public services (the Digital ID service) and another for remote identification in the financial services market (the Identification Data Exchange Center, or DSC), which provides financial institutions with biometric identification services for their customers.
- In 2020, the NBK launched a remote biometric identification service for financial services aimed at promoting digital payments.

Digital payments

- In 2003, trade and service enterprises were required to accept card payments.
- The 2011 Regulation on Electronic Money and Digital Payments promoted secure electronic transactions and innovation in digital financial services.
- In 2013, Kazakhstan created the Kazakhstan Interbank Settlement Center (KISC) to conduct transactions between banks and improve the overall efficiency of the banking system. A decade later, KISC was reorganized into the National Payment Corporation of the NBK.
- In 2017, Kazakhstan started the "Digital Kazakhstan" program to transform various sectors through digital technologies and to transition to a digital government and roll out a biometrics-based identity system.
- In 2020–2022, the NBK rolled out various strategies to promote digital payments and the national financial infrastructure, including the Development of the Financial Sector of the Republic of Kazakhstan until 2030; the Strategic Roadmap for FinTech and Innovation for 2020–2025; and the National Payment System Development Strategy, which **outlines** the next stages of Kazakh digital financial infrastructure.
- In November 2023, the Central Bank Digital Currency—Digital Tenge—was **launched** on a pilot basis. From its inception, the Digital Tenge has been intended to increase the accessibility of digital payments and to promote innovation. By design, this currency allows interoperability with debit cards from international payment networks, thereby enabling usage for cross-border payments.

- Kazakhstan's Open Banking utilizes Open API (application programming interface) standards to enhance the interoperability and functionality of financial services. A 2023 pilot project involving several banks and real customers focused on testing APIs in a controlled environment. The pilot program enables clients to open accounts with different banks via a single application. There are plans to **scale up the initiative** and extend the use of Open API to business use by 2025.
- Kazakhstan's Anti-Fraud Center was established in early 2024 by the National Bank of Kazakhstan to protect citizens from fraudulent activities. It focuses on monitoring and analyzing payment transactions, identifying suspicious activities, and consolidating blacklists to prevent fraud across financial institutions. The center **incorporates** advanced technologies such as digital biometrics and open APIs to improve fraud detection and prevention.
- In 2024, the National Bank of Kazakhstan launched a single QR code for payments to ensure interoperability among card payments, instant account-to-account payments, and proprietary digital wallets from banks. Transactions started in early 2024 and are growing rapidly as most large banks in Kazakhstan provide a QR payment service. Prior to this launch, Kazakhstan's leading bank Kaspi had **developed** its own QR code which accelerated its superapp adoption and financial inclusion by offering loans, deposits, and money transfer services. To make QR payments at the interbank level, the National Bank plans to launch the Interbank Payment and Transfer System using the principles of open banking in 2025.

Data exchange and e-government

- In 2006, the Kazakhstan government launched an e-government portal that acts as an integrated mechanism for interaction between the state and its citizens, and state agencies with each other.
- The mobile e-Gov app was launched in 2014.
- Since 2021, government digital services can be accessed via commercial banks' mobile applications, with the Identification Data Exchange Center (IDC) facilitating the customer identification procedures.

PROMOTING UBIQUITOUS IDENTITY, ACCESS, AND PAYMENTS

Digital identity is one of the cornerstones of today's digitizing economies. According to the **World Bank**, 186 out of 198 countries and around 7.35 billion people have some type of digital ID. In Estonia, India, Sweden, and the United Kingdom, digital IDs are nearly universally adopted (see Figure 1). Digital IDs are not always created by governments. For example, in Nordic countries ID systems were started by banks. The Swedish Bank ID is particularly widely **used**, with 1.8 weekly uses per capita.

There are many benefits to using digital identities, including dramatically lowering the cost of verifying people's identities; promoting access to public services; facilitating payments across the financial

ecosystem; enabling users to gain access to financial services; and promoting economic efficiencies. One frequently cited example is Estonia's e-ID—specifically the use of digital signatures—which helps Estonians to **save** five full workdays each year. In Kazakhstan, there are two ways to identify and authenticate individuals based on a biometric digital ID, one for e-government services and another for financial services.[3] Almost all second-tier banks and a significant number of non-banking financial organizations (e.g., 75 payment, microfinance, and other financial organizations) are connected to the digital biometric identification system. Using these systems, Kazakhs can easily authenticate themselves and thereby access e-government services, make a payment, open a bank account, order a credit card, and even apply for a loan or digital mortgage. The use of the ID has grown rapidly, from 592,000 monthly uses in 2021 to 2.4 million in 2024.

Another DPI layer is digital payment, **with over 100 countries** having adopted some type of instant payment system. Instant payment systems—or a real time account-to-account money movement infrastructure—often are discussed as DPIs and as a prerequisite for financial inclusion. However, many countries have digitized payments through coexisting and competing payment platforms, and often before instant payment systems have been introduced. Indeed, survey data compiled by the Nextrade Group strongly indicates that instant payments typically gain traction among individuals and merchants that are already using digital payments and cards. Moreover, the use of instant payments has taken off in such economies as Brazil, Singapore, Sweden, and Thailand, **which had strong digital payment** adoption rates and network effects already in place before instant payment systems were introduced.[4] In contrast, in economies such as Mexico and India, where digital payment use has been more limited, the adoption of instant payments has been slower. This is also reflected in transactions per capita—by the end of the third quarter of 2023, Thailand's instant payment system PromptPay surpassed 30 transactions per capita per month, while Brazil's Pix had 25 transactions per capita per month, India's UPI had 10 monthly transactions per capita, and Mexico's CoDi even fewer than that.

Instant payment systems are built by both public and private entities. For example, while Brazil's Pix and India's UPI are government led, in many other countries instant payment systems are led by the private sector or through public-private partnerships. Sweden's popular Swish instant payment system—used by 82 percent of Swedes—was developed through a partnership between major Swedish banks and the Riksbank (the Swedish central bank) and is operated by four leading banks. The United Kingdom's instant payment system—the Faster Payment System—is operated by a consortium of major banks and fintech companies under the regulation of the Bank of England. Singapore's instant payment system FAST (with mobile alias PayNow) is owned by the Association of Banks of Singapore and overseen by the Monetary Authority of Singapore (MAS). Public-private partnerships created Thailand's PromptPay.

In Kazakhstan, NBK launched its Instant Payment System (IPS) in June 2022. Critically, it was launched only after bank-led solutions, such as the Kaspi digital wallet, had already **gained** a dominant share of the domestic payments market and thus promoted financial inclusion. NBK is also working on a unified QR code to facilitate payments between banks, further stimulate the development of mobile and online

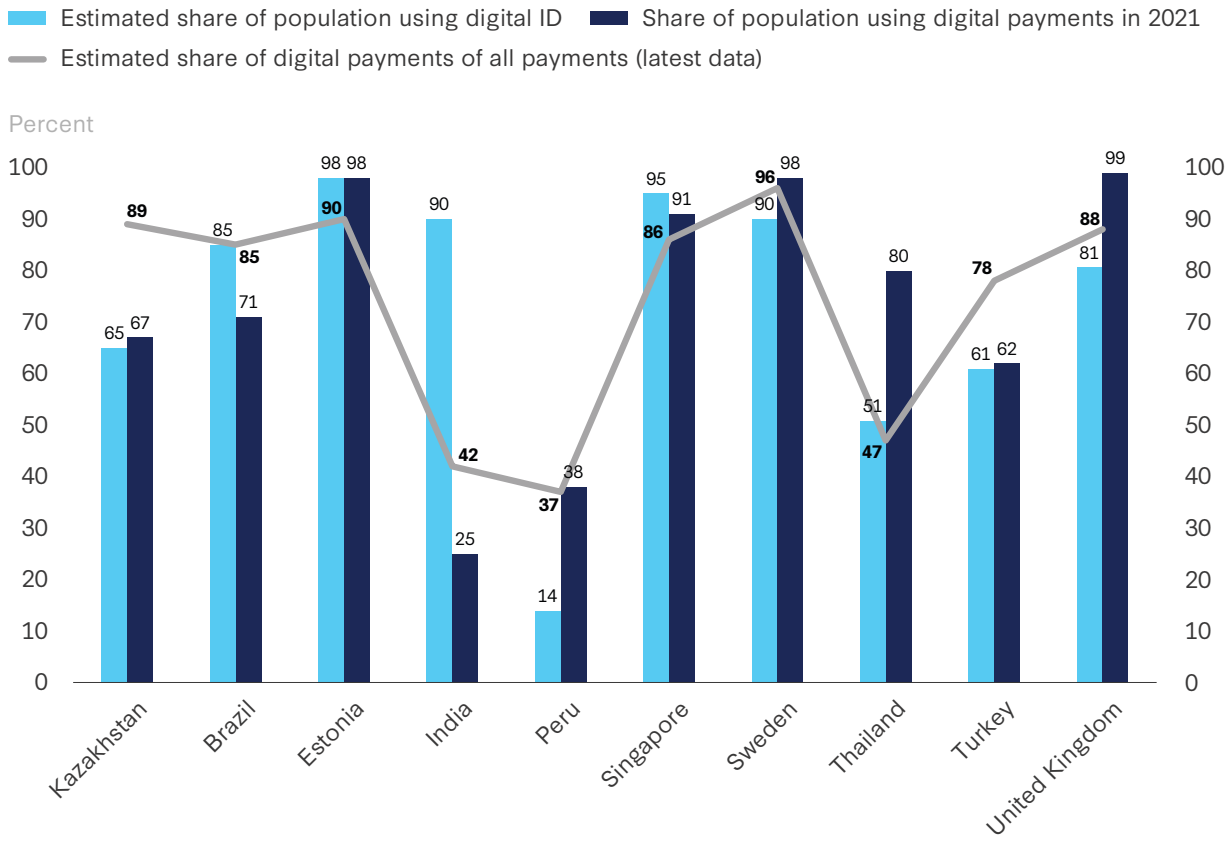
3 The former is Digital ID service and the latter the Identification Data Exchange Center, typically referred to as the DSC service, which enables remote identification. Today about 100 participants are connected to the DSC service and more than 70 million requests for customer identification have been processed. In 2024, on average, more than 2 million requests are processed per month.

4 Data compiled by Nextrade Group suggest that over 90 percent of Swedes and Thai, 74 percent of Brazilians, and 22 percent of Indians used fast payments in 2023, with Thailand, Sweden, and Brazil having had very rapid adoption and strong prior use of cards and other digital payments instruments.

payments, and promote financial inclusion through better access to data on underserved populations. As part of the "national digital financial infrastructure," the national QR code enabled 2.1 billion transactions in the first eight months of 2024. This is rather remarkable: the **QR code** was not even included in payment statistics as a separate line item the year prior.

As a result of its increasingly ubiquitous digital IDs and payment systems, Kazakhstan has quickly increased the share of digital payments to 89 percent in 2024, closing the gap with Sweden and Singapore, where 98 percent and 97 percent of payments are digital, respectively (see Figure 1). Retail commerce activities have rapidly digitized as well. In the first half of 2024, the **share** of payments for goods and services made through the internet and mobile banking applications was 62 percent, up from 47 percent in 2023. Compared to other emerging markets, Kazakhstan's journey has paralleled and, in some ways, surpassed Brazil's, where digital payments doubled from 35 percent to 70 percent of all payments in 2014-2023.

Figure 1: Use of Digital IDs, Digital Payments, and Overall Digital Transactions in Select Economies (2023)



Sources: "Global Financial Inclusion (Global Findex) Database 2021," World Bank, https://microdata.worldbank.org/index.php/catalog/4607; digital ID user data based on estimates from national sources.

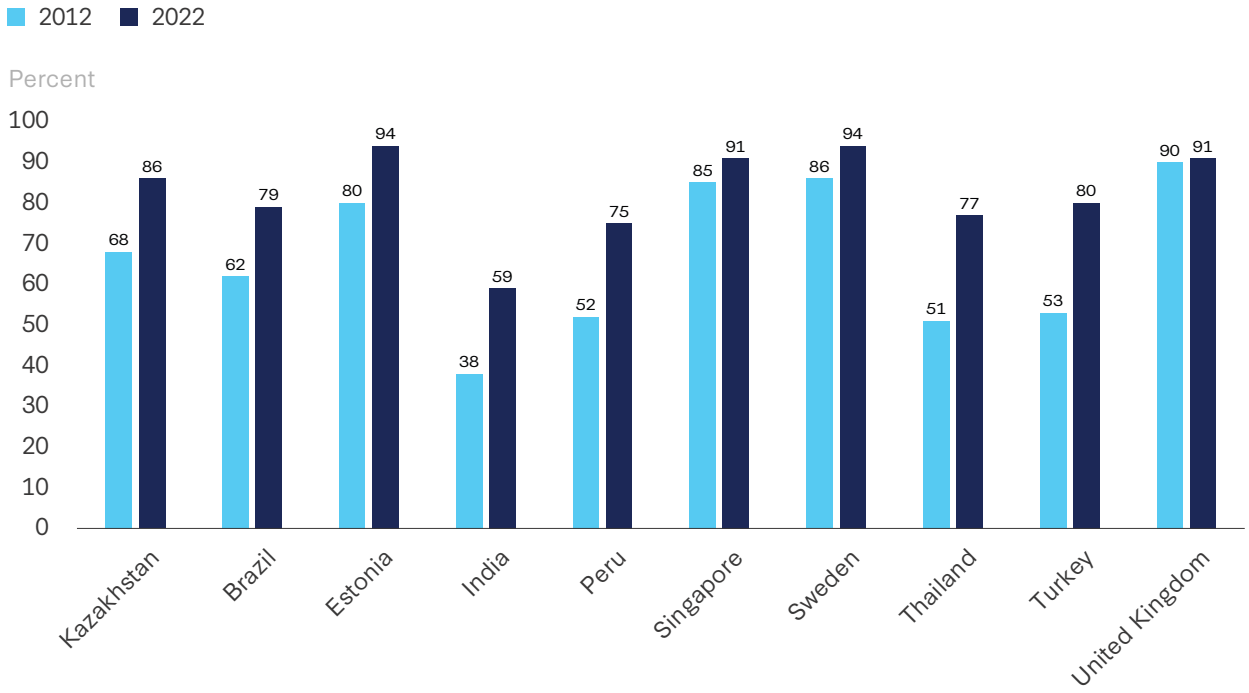
BUILDING ON DIGITAL ID AND PAYMENTS: E-GOVERNMENT, E-COMMERCE, AND FINTECH ECOSYSTEMS

Countries around the world have translated their DPI investments—digital ID, payments, and data exchange—into e-government services, e-commerce uses, and fintech ecosystems.

Of the economies included in Figure 1, Brazil, Singapore, and Sweden have made strong gains in e-government services. **Sweden's BankID** offers users access to 6,150 businesses, agencies, and organizations, while **Singapore's Singpass** unlocks 2,700 services from 800 government agencies as well as numerous businesses. Brazil's Gov.br platform **enables** access to a wide range of public and private services, including at state and municipal levels.

In Kazakhstan, DPI investments have opened up access to government services and financial transfers. The Kazakh **e-government system** has digitized 90 percent of all public services, and over 90 percent of the economically active population **uses** the eGov.kz platform. Its omnichannel model means that Kazakhs can access the e-government services through the eGov.kz **portal** and an app, as well as through the banking apps of leading banks that enable their customers to transact with the government (see Case 2). As of 2021, more than 7 million Kazakhs—about half of the adult population—**accessed** the public services section via the superapp Kaspi.kz, including digitally registering a third of the vehicles in the country. The new eGov mobile app is expected to compound these gains by enabling users to access public services and digital documents through their biometric IDs on personal phones. The e-government system has lifted Kazakhstan into the top 30 in the UN e-government index, along with Estonia, Singapore, Sweden, and the United Kingdom (Figure 2). India, Brazil, Peru, Thailand, and Turkey lag further behind.

Figure 2: United Nations E-Government Development Index (EGDI), 2012 and 2022



Source: "E-Government Development Index (EGDI)," United Nations Department of Economic and Social Affairs, https://publicadministration.un.org/egovkb/en-us/About/Overview/-E-Government-Development-Index.

Case 2: Providing E-government Services through Banking Apps

Kazakhstan has seen significant growth in the adoption of digital banking services in recent years. The major banks in the country have developed sophisticated mobile applications to cater to the needs of their customers, including government services such as tax payments and car registration.

Each bank decides which government services should be included in its app depending on its own strategy and customer needs, while the government provides a single window for approvals through a "Digital Bridge."

Banks see the e-government service as another means of promoting their own customer service and building a competitive advantage. Popular banking apps that also offer e-government services include the following:

- **Halyk Kazakhstan**: One of the largest and most established banks in Kazakhstan, Halyk Bank offers a comprehensive mobile app that includes features such as money transfers, bill payments, and account management, as well as e-government services. The app is user-friendly and designed to provide a smooth banking experience.
- Kaspi.kz: Known for its innovation in the financial sector, Kaspi Bank's mobile app is extremely popular among users in Kazakhstan and has been among the front-runners in providing access to government services since 2020. A recently published **case study** from Harvard Business School highlights government services as one of the six pillars of the Kaspi ecosystem.
- ForteBank: **ForteBank**'s mobile **app** offers a wide range of banking services, from money transfers and currency exchange to government services.
- **Bank Freedom Finance Kazakhstan**: Known for its wealth management practice and mortgages, Freedom Bank has redeveloped its mobile application, and in 2024 it launched a new comprehensive mobile app that includes access to over 20 government services.

Digital IDs and payments have **promoted** e-commerce around the world. Especially during the Covid-19 shutdowns, consumers grew to **prefer** the convenience and security of remote digital payments over cash-on-delivery practices. As a result, e-commerce has grown to be a prominent part of national economies—as much as 44 percent of retail sales in **South Korea**, 35 percent in the **United Kingdom**, and 17 percent in **Singapore** are made online. In **Kazakhstan**, e-commerce has **grown** explosively from 1.4 percent of retail transactions in 2018 to 13.1 percent in 2023, similar levels as in Thailand and Brazil, two more established and dynamic e-commerce markets. Sales (or gross merchandise value) on the country's leading e-commerce **platform**—the **Kaspi.kz** marketplace—via a superapp that also brings together e-travel, e-grocery, and transportation services, and micro and merchant finance, has grown sixfold in 2019–2023, from $1.6 billion to $9.2 billion.

Furthermore, digital IDs and payments have fueled fintech ecosystems around the world. As of 2024, there are **over** 30,000 fintechs around the world, with the United States, the United Kingdom, and China leading the way. By promoting financial intermediation, fintechs such as digital lending start-ups

have **propelled** income growth in both advanced and emerging markets. As of 2024, in Kazakhstan there are around **200 fintechs**, one per 100,000 Kazakhs, just above the numbers in Brazil, India, and Turkey and up from just 50 fintechs in 2018. The fintech ecosystem is propelled by the country's leading financial institutions—for example, Kaspi Bank, Halyk Bank, ForteBank, Jusan Bank, Freedom Finance, and others—and is highly diversified, with e-wallets, mobile banking solutions, electronic know-your-customer verification (eKYC), anti-money laundering (AML) solutions, payment processing, invoice management, and many other services, many geared to supporting small and medium enterprises. By 2023, fintechs **accounted** for some 40 percent of Kazakhstan's venture-capital deals and raised the equivalent of $4 per capita, matching levels **raised** annually by fintechs in India in the previous several years.

> *Digital IDs and payments have fueled fintech ecosystems around the world.*

Policy Playbook for DPI: Open, Competitive, and Secure

What can countries interested in adopting DPIs and promoting digital payments learn from the 10 countries examined here, each with somewhat distinct DPI journeys, and from the Kazakh case in particular?

Overall, there are at least seven fundamentals, all of them in the Kazakh policy playbook and to varying degrees also present in the other countries' transformations (see Table 2).

1. **Competition and level playing fields in payment markets.** Throughout its digital transformation journey, Kazakhstan has emphasized public-private collaboration and partnerships, building a comprehensive digital infrastructure that promotes user choice. The NBK has taken steps to reduce bank concentration and promote competition and inclusion by implementing various components of the National Digital Financial Infrastructure: biometric identification, a QR code, instant payments, open banking policies, the National Digital Currency, and open APIs. The NBK has also created capabilities for market participants to test and bring to market collaborative and interoperable solutions through an API technology sandbox. The 2023 open-API infrastructure **pilot** consisted of three mobile banking apps and 130 customers from five of the country's leading banks and resulted in a product that ensures the security of transmitted data and transactions. In addition to cooperation with the private sector, Kazakhstan has created interministerial committees and working groups to ensure collaboration among different government agencies in digital transformation and DPI implementations.

   Kazakhstan's purposeful inclusion of open competition and level playing fields among all market participants is similar to that of four advanced economies with nearly universal use of digital payments—Estonia, Singapore, Sweden, and the United Kingdom. These countries promote competition and inclusion of all market players in their payment systems. These approaches provide users choice and flexibility at the point of purchase, positive fuel network effects, and easier cross-border transactions.

Thailand and Peru have pursued similar models. In Thailand, the PromptPay **System** is the result of public-private partnership and enables users to connect to any payment app or card. In Peru, the Central Reserve Bank of Peru (BCRP) is currently **working** on an instant payment system in close coordination with all market participants. The BCRP has also **mandated** interoperability between all digital wallets and mobile payments, such as the widely used PLIN and Yape. As a result, Peruvians are able to transfer funds digitally to any other Peruvian. Even Peru's unbanked are **connected** to the digital payment systems through virtual cards that are issued instantly for sending and receiving funds.

These models contrast with Brazil's Pix and India's UPI, which are government sponsored and limit consumer choice of digital payments. Both India and Brazil have promoted the use of a specific payment system—UPI and Pix, respectively—and made banks prioritize these systems in lieu of expanding competition and partnerships across various payment rails. The Brazilian Central Bank Governor has even **discussed** Pix as potentially negating the need for credit cards entirely. In India, the government **subsidizes** banks to utilize UPI payments, raising questions about the system's sustainability. The G20 has **raised** concerns about the sustainability of DPIs, noting that the ecosystem at large would be undermined if entities that manage DPIs were to become financially unsustainable.

2. **Secure digital identity, opening access to multiple public and private services.** Biometrics-based IDs have **become** increasingly popular: as of 2024, some 54 countries use fingerprints and 31 use facial images for identification. Kazakhstan has built biometrics-based digital IDs for users to utilize e-government services and safely make payments across the ecosystem. The regulatory framework for the use of digital identification methods in the provision of electronic banking services—for example, electronic digital signature, one-time password (OTP) passwords, and biometric identification—was created in 2016. The Digital Kazakhstan program of 2018–2022 positioned the digital ID as the key to public and private service delivery and for accessing e-government services, thereby also reducing bureaucracy and increasing transparency. To be sure, biometric ID systems are not watertight and need robust cybersecurity and data privacy protections. India's Aadhar, for example, **suffered** a major data breach in 2023, leaving 815 million Indians' data exposed. Peru too has **faced** challenges with digital identity verification.
3. **Public-private partnerships to promote digital transactions and e-government services and transfers.** Kazakhstan's DPI journey exemplifies the potential for private sector leadership and public-private partnerships in developing DPIs. The government collaborates with private banks to allow government services to be integrated into banking superapps. In addition, recent legislation that legally equates digital documents to physical ones has enabled citizens to use their digital IDs to **access** services on banking apps instead of physically traveling to a bank branch. Other governments that have been particularly successful at promoting digital payments have cooperated closely with the private sector to meet their digital transformation targets, often even following the private sector's lead to develop market-led solutions. For example, Sweden's popular Swish mobile payment system was developed through a partnership between major Swedish banks and the Riksbank; the United Kingdom's Faster Payments Service was created by a consortium of banks. In its meteoric rise to one of the world's most digitized economies,

Estonia has worked closely with technology companies and financial institutions to develop and implement digital solutions as well.

4. **Consumer protection and cybersecurity frameworks and mechanisms to monitor and address fraud in the financial system.** As payments have become digitized and as e-commerce has been mainstreamed into citizens' daily lives, incidences of online fraud have increased. Kazakhstan has had challenges with fraud and, like other Central Asian economies, struggles with cybersecurity challenges and data protection. However, while Kazakhstan is only **78th** in the world on the 2016–2023 National Cybersecurity Index, it has attained one of the world's best ratings on the protection of e-identity and trust services, which has likely facilitated the uptake of the digital ID and payments. In addition, Kazakhstan has sought to prevent fraud through a 2022 Central Bank mandate that requires financial institutions to adopt cybersecurity protocols to protect sensitive financial data. Moreover, in 2024, the Central Bank **launched** a new Anti-Fraud Center to promptly respond to fraudulent activities, block suspicious money transfers, and maintain a blacklist of suspicious mobile numbers.

   India and Brazil have faced significant challenges with fraud as well. A total of 57 percent of consumers in India **believe** that their friends or family members have been victims of a fast-payment system scam on UPI, while in Brazil, 65 percent **believe** that their friends or family members have been victims of a Pix scam. Fraud has also **increased** in advanced markets like Singapore, where the government reported a 70 percent increase in fraud incidence in 2022–2023, though this only impacted 1 percent of Singaporeans.

   Other advanced and emerging market central banks have **employed** diverse technology and various regulatory and monitoring solutions to mitigate fraud in digital payments and banking. Central banks in India, Singapore, and the United Kingdom have established a comprehensive set of indicators for banks to monitor and report incidences of fraud. In Thailand, the Electronic Transactions Development Agency (ETDA) enforces strict regulations, including regular security audits and incident reporting protocols. Data is limited on the success of these initiatives.

5. **Promotion of innovation in financial services.** The fifth key policy in Kazakhstan's digital transformation is promoting innovation in payments and financial services, a policy adopted by practically all countries studied here. The NBK's regulatory sandbox is aimed at increasing the flexibility of financial market regulation and introducing new financial products. The term for the special regulatory regime can run up to five years, a long period of testing from a global perspective—most sandboxes cap the period to two years. The government-sponsored incubator Astana Hub features more than 1,500 tech companies, including 400 foreign ones, and research and development partnerships with global companies like Nokia. The government has also **promoted** venture capital into start-ups and scale-ups through a 2018 law that paved the way for the establishment of public angel investment entities.

6. **Digital inclusion as pathway to financial inclusion.** Comprehensive digital inclusion policies underpin Kazakhstan's broad-based digital payments adoption and financial inclusion efforts. Access to the internet and smartphones has promoted remote payments around the world, especially during the Covid-19 pandemic. Kazakhstan is no exception. Around 92 percent of the population has been connected to the internet, over a landmass of more than a million square

miles. Over 90 percent of people over 15 years of age in Kazakhstan **have** a mobile phone, and mobile broadband has expanded to cover 89 percent of the population. The Digital Kazakhstan program targets investments to fiber optic cables and the expansion of the 4G LTE network. As of 2024, mobile operators are working to expand 5G coverage in Astana, Almaty, Shymkent, and regional centers to finalize a 5G mobile communications rollout by the end of 2025.

Other large emerging markets have sought to drive financial inclusion through digital inclusion as well. Brazil has connected **87 percent** of its population through systematic investments and programs like Internet Para Todos, which aims to expand internet access in underserved and remote areas. Almost **90 percent** of Peruvian households and 74 percent of Peruvians have mobile internet, thanks to systematic **investments**, public-private partnerships, and **satellite internet** in remote regions of the Amazon. Turkey has been **investing** in fiber optic networks and improving internet connectivity to ensure that people in urban and rural areas can use digital services. India has been working to **catch up** with other markets in recent years, **connecting** 52 percent of Indians as of 2024, up from 14 percent in 2014.

India, Peru, and Turkey have also **committed** to lowering the costs of smartphones and devices by participating in the World Trade Organization's (WTO) Information Technology Agreement (ITA), which commits parties to liberalize imports of devices and IT products. In Brazil, the government has **created** incentives for businesses and individuals to adopt digital tools, such as tax benefits for digital transactions and subsidies for low-income households to access digital devices and services.

7. **Large-scale educational campaigns to promote the adoption and use of digital payments and identity systems.** Kazakhstan has pursued several financial and digital literacy campaigns to promote digital payments. In 2020, the government approved a plan for improving financial literacy for 2020–2024, aligned with the recommendations of the Organisation for Economic Co-operation and Development (OECD). The initiative aims to improve consumers' understanding about financial services and to protect their rights and interests. There have also been multiple digital literacy campaigns. For example, in light of persistent challenges for teachers to acquire adequate digital competencies, in August 2023, the Kazakh Ministry of Education **launched** a pilot project in six Kazakh regions to upgrade teachers' qualifications to use and teach modern digital technologies in small rural schools. Practically all countries surveyed here have run similar educational campaigns to promote the adoption and use of digital payments, identity systems, as well as e-commerce and financial technologies for different types of beneficiaries, such as small businesses and rural populations. For example, Brazil has several digital literacy programs aimed at teaching populations around the country to use digital tools effectively. Turkey's Ministry of Trade has introduced the E-Export Consortium model, which helps companies in cross-border e-commerce access end consumers through various e-commerce channels.

These success drivers related to the deployment, maintenance, and governance of DPIs were **echoed** in the G20's 2023 position paper on DPIs, which emphasized three elements for DPI development: enabling financial and digital infrastructures, such as mobile penetration and broadband connectivity;

providing ancillary government support systems, such as government-to-person (G2P) digital payments; and creating conducive legal and regulatory frameworks, such as data protection and privacy laws.

In the Nextrade Group's 2023 **analysis** of 15 policies within these three dimensions across 190 economies, there are significant variations in DPI readiness—Kazakhstan ranks 51st out of 190 countries, while many economies aspiring for DPIs, for example in sub-Saharan Africa, still fare quite poorly, indicating the need for much more fundamental work prior to the introduction of DPIs.

Granted, all economies—even the most advanced, with solid enabling environments for DPIs—face challenges in their digital transformation journey. One major challenge is cybersecurity, where the threat environment evolves quickly with technological advancements. Another is ensuring DPIs contribute to cross-border payments in a world where companies and consumers around the world habitually use e-commerce to transact across borders. In addition, DPIs' business models and sustainability remain question marks in markets such as India where governments subsidize DPIs. This paper has shown that many other countries have opted for market-led digital transformations and succeeded, through private sector solutions, at creating ubiquitous and inclusive digital payments ecosystems, governments policies promoting level playing fields, competition, and solid policy-enabling environments. For the international community analyzing and promoting DPIs in developing nations, there is a great need for clear common definitions of DPIs, and for rigorous measurement of DPIs' usage, functioning, and development results.

Conclusion

Payments have digitized around the world, yet considerable gaps remain—some 1.4 billion people have yet to use any digital payments. Typically, technology is not the challenge; rather, the challenge lies in the adoption and implementation of policies and practices conducive to digital payments' adoption and use.

This paper has reviewed Kazakhstan's journey digitizing transactions across the population and building robust e-commerce and financial services ecosystems that are increasingly universally used by Kazakhs in their daily lives. At a time when many governments look to instant payments, Kazakhstan's example shows that an impactful and inclusive digital payment infrastructure can be developed by enabling multiple and competing payment solutions.

Several policies and design choices have contributed to Kazakhstan's success, such as their focus on the adoption of policies and regulations that have enabled an open, competitive, and innovative payment infrastructure conducive to consumer choice, and public-private partnerships to promote digital transactions and e-government services and financial transfers.

These policy moves in Kazakhstan have created an economy where nine out of ten payments are digitized, where businesses have shifted to selling online, and where consumers use their phones almost daily to shop online, pay for goods and services, secure loans, access public services, and transact with the government.

While Kazakhstan's specific digital infrastructure design features and diffusion strategies may not always travel across markets, these policy principles do. They provide useful guidance for the many emerging and developing nations that are seeking to build their own tech stacks to promote digital transactions,

financial inclusion, and an ecosystem of fintechs and services that in turn increase their economies' productivity and incomes. ■

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Table 1: Digital Public Infrastructure Elements

Component	Kazakhstan	Brazil	Estonia	India	Peru
Digital identity	There are two technologies to authenticate users, one for e-government services and another for digital payments, including e-government payments.	There is a single ID and taxpayer number CPF (Cadastro de Pessoas Físicas) for individuals and a Cadastro Nacional de Pessoas Jurídicas (CNPJ) for companies.	The E-ID system allows secure access to e-services, enhancing user convenience and security.	Aadhaar provides biometric authentication, reducing fraud but raising privacy concerns.	Peru's national digital identity (Documento Nacional de Identidad or DNI), issued by Registro Nacional de Identificación y Estado Civil (RENIEC), has been seen as a bulwark against cybercrime. Peruvians are required to submit fingerprint biometrics and a facial photo to obtain the ID. In February 2021, Act 31120 established the regulatory framework for the National Identity Document Bank Account (Account-DNI), in response to the priority objectives and guidelines of the National Financial Inclusion Policy. The Account-DNI is a savings account that is opened at the National Bank (BN). It is opened automatically and mandatorily, is linked to the DNI, and operates in a digital environment.

Component	Kazakhstan	Brazil	Estonia	India	Peru
Payments	The possible payment methods include e-wallets, intra-bank payments, and transfer systems (e.g., Kaspi.kz, Halyk Bank), cards, mobile banking, CBDC, Digital Tenge, and national QR codes (2025).	The possible payment methods include Pix fast payment system (2020), e-wallets (PicPay, Mercado Pago), and cards.	The possible payment methods include E-residency-linked payments (TransferWise/Wise, PayPal).	The possible payment methods include UPI instant payment system (2016), e-wallets (Paytm, PhonePe), mobile banking (SBI YONO), and cards.	In June 2024, the central bank announced a partnership with International Payments Limited (NPCI) to introduce an instant payment system. The central bank's goal is to enable instant payments between individuals and businesses, reduce reliance on cash, and increase the use of digital alternatives among Peru's substantial unbanked population.
Data exchange	The Open API platform of the national bank provides standardized data exchange between participants of financial markets with the consent of the client.	Open banking APIs promote data sharing with security. The central bank is promoting an Open Finance structure.	X-Road facilitates secure data sharing, considered a model system.	DigiLocker, under the Ministry of Electronics and Information Technology/ Unique Identification Authority of India, aims to provide a secure cloud-based platform for storing and accessing documents and certificates.	Peru has Digital ID registries. The Registro Nacional de Identificación y Estado Civil (RENIEC) keeps physical backups in its centralized archives.

Component	Kazakhstan	Brazil	Estonia	India	Peru
E-government	E-government services provide a wide range of services in a remote format, and at the same time are available to citizens both through their own applications and through bank interfaces with the provision of biometric identification and authentication via SMS.	The PagTesouro government app allows payments to and from the government. The government launched a platform called "gov.br" with all government services. There are different apps for driver's licenses and IDs; however, all of those apps are part of the Gov.br platform.	E-government services include Mobile ID for mobile phones and DigiDoc4 for all e-ID authentications and signings. The mobile app called mRiik (Mobile Government) allows citizens to make payments to government entities and is connected to Mobile ID and Smart ID. In addition, through the DigiDoc app, citizens can access digital certificates and documents, sign documents digitally, share documents with others securely, and validate the authenticity of signatures on received documents. In Estonia, 99 percent of public services are available 24 hours a day.	The National E-Governance Plan (NeGP) of 2006 aimed to make government services accessible, efficient, transparent, and affordable for all citizens. Several initiatives, including Digital India, Digi-Locker, Mobile Seva, myGov.in, and more, have been launched under NeGP to promote e-governance. Bharat BillPay allows for all bill payments, including electricity, telecom, gas, and local taxes. DigiLocker, under the Ministry of Electronics and Information Technology, enables access to certificates and documents.	The digital platform Pagalo was developed by the central bank to simplify the payment of interest rates, fines, and services for procedures in different public entities, as well as the payment of taxes, without the need to go to a bank branch. There is a comprehensive list of transfers that can be performed through the government's digital platform. These procedures relate to various sectors including but not limited to the judiciary, migration, national ID (DNI/RENIEC), electoral processes, driver's licenses, tax authority (SUNAT), health and pension systems, and competition authority.

Component	Singapore	Sweden	Thailand	Turkey	United Kingdom
Digital identity	SingPass enables secure access to a wide range of services, enhancing convenience and security. The Government Technology Agency of Singapore (GovTech) owns SingPass.	BankID is not formally designated as Sweden's official digital ID, but it is the most used e-identification in the country. BankID is used to prove identity in digital services, such as banking and authority contacts. There are alternatives. Freja eID is a state-approved e-identification that can be used both digitally and physically. It offers identification for e-services and physical identification in stores. Another ID system is AB Svenska Pass issued by the Swedish Tax Agency and used for digital identification.	The Thai National ID Card has each holder's details embedded in a chip. Rather than building a national digital ID system, the Thai government created a way to link service providers and identity providers (IDPs) to allow the digital sector to flourish and innovate. Thailand has created a blockchain based biometric digital identity infrastructure operated by the National Digital ID Company Limited (NDID). The majority of NDID's 60-plus shareholders are in the financial sector, such as the Thai Banking Association, along with the stock exchange and post office.	An identification number (comparable to the U.S. social security number) has been assigned to every Turkish citizen since 2000 and forms the backbone of all digital services that the Turkish government offers. The government built and owns the database, with funding from the World Bank.	There is no government-issued digital ID in the United Kingdom. The government offers GOV.UK One Login, which enables people to prove their identity when they sign into some government services. There are some privately issued digital IDs available—for example, EasyID, Lloyds Bank Smart ID, and Yoti ID.

Component	Singapore	Sweden	Thailand	Turkey	United Kingdom
Payments	Singapore FAST, the instant payment system, is owned by the Association of Banks Singapore and regulated by the Monetary Authority of Singapore (MAS). The mobile alias of FAST, PayNow, also supports e-government payments.	Instant payment system Swish is operated by four banks with oversight by Riksbank, the central bank.	The instant payment system PromptPay (2017) was built by Vocalink, a private vendor, and is overseen by the Bank of Thailand, e-wallets (TrueMoney, Rabbit LINE Pay), and cards. In addition to facilitating basic money transfers and payments, PromptPay is an important tool utilized by the government for social welfare disbursements.	The instant payment system FAST (2021) is used. The central bank also owns the domestic card scheme (TROY). It also owns and partly operates instant payments.	There is the fast payment system Faster Payments Service (FPS), and there are a wide variety of payment instruments like cards, digital wallets, and e-money providers.
Data exchange	SGFinDex is the first public digital infrastructure to use a national digital identity and centrally managed online consent system. It enables individuals access to their financial information held across different government agencies and financial institutions.	Widely adopted open banking APIs and secure data-sharing frameworks foster innovation and competition.	Secure data-sharing frameworks ensure security and privacy, but cross-border data-sharing compliance is challenging.	Open banking APIs are adopted to promote secure data sharing, but interoperability with global systems is a challenge.	Open banking requirements enable consumers and small- and medium-sized enterprises to share their bank and credit card transaction data securely with trusted third parties and initiate payments directly from their payment accounts.

Component	Singapore	Sweden	Thailand	Turkey	United Kingdom
E-government	Singapore's e-government journey started in the early 2000s with the establishment of the Infocomm Development Authority (now known as the Government Technology Agency of Singapore, or GovTech). Practically all public services are digital and accessible with the SingPass. The Myinfo function empowers users to allow the service they are interacting with to use their data for a range of public and private services.	Kivra is a private company and app that is the main digital mailbox in Sweden and is also used by the government. There is a government alternative to Kivra in Sweden called Min myndighetspost that allows you to receive secure digital mail from Swedish authorities and municipalities.	Thailand's Digital Government Development Agency's e-government portal www.egov.go.th serves as a central hub for public services. The CITIZENinfo application offers information for those searching for state agencies. As of 2023, the DGA had linked over 112 government services to an e-government application. Most mobile banking applications allow people to make payments for some government services such as utility payments (water, electricity bills, etc.).	Turkish e-Devlet kapısı (the e-government gateway) or turkiye.gov.tr provides access to government services, from government agencies, municipality services, universities, as well as some businesses.	The United Kingdom's GOV.UK One Login aims to enable everyone to access government services. Users can sign in with their email address, password, and two-factor authentication.

Source: CSIS analysis.

Table 2: Digital Public Infrastructure Policies across Countries

Policy	Kazakhstan	Brazil	Estonia	India	Peru
Ownership and operation of fast payment system	The National Bank of Kazakhstan supervises and regulates payment systems and has a separate subsidiary (National Payment Corporation of Kazakhstan) that manages the Open API, the national card switch, and the instant payment system.	Payment systems are public sector–led by the Central Bank of Brazil, with collaboration from private fintech companies.	Payment systems are public sector–led by Eesti Pank, which has active participation in digital payment innovations.	India has a mixed ownership system; NPCI operates RTP under the regulatory oversight of RBI, encouraging private sector innovation.	Peru has a mixed ownership and collaboration system between the main operator CCE, the BCRP, and major banks, institutions, and technology.
Fintech regulatory sandbox	The payment system is available for fintech testing, managed by the National Bank of Kazakhstan.	Brazil has established a regulatory sandbox, supporting fintech innovations.	Estonia has established an advanced sandbox for innovation, supporting digital initiatives.	India has established an extensive sandbox for fintech innovation, managed by RBI.	Peru has established a regulatory sandbox, as provided in the SBS regulation, though it is not yet operative.
Cybersecurity in payments	In 2022, the National Bank of Kazakhstan (NBK) enhanced cybersecurity measures for digital payments.	There are specific cybersecurity regulations that the financial and payment institutions must follow, including advanced security frameworks and the Resilience Policy for the Financial System.	Robust cybersecurity policies leverage X-Road infrastructure. X-Road provides a robust and secure solution to exchange data.	Stringent regulations on digital transactions emphasize cybersecurity such as the RBI Guidelines for Cybersecurity Framework.	La Superintendencia de Banca, Seguros y AFP (SBS), is the Peruvian financial regulatory body and mandates stringent cybersecurity standards for financial institutions.

Policy	Kazakhstan	Brazil	Estonia	India	Peru
Fraud incidences in RTPs	Incidences are monitored and mitigated through enhanced security measures and regulations.	There are notable incidences. A 2022 survey by Brazil's banking association found that almost one in three Brazilians have been victims of financial scams and frauds.	There are relatively low incidences due to strong cybersecurity measures and proactive monitoring.	There are significant incidences despite stringent measures and technologies in place to mitigate fraud.	There are some fraud incidents, including phishing and social engineering scams and unauthorized transactions.

Policy	Kazakhstan	Brazil	Estonia	India	Peru
Data privacy and consumer protection	Data protection laws secure consumer payment data, with a focus on privacy and security.	Comprehensive data protection laws, including the General Data Protection Law (LGPD), focus on consumer rights and privacy.	Data protection laws under the Data Protection Act focus on consumer privacy and security.	The Digital Personal Data Protection Act (DPDPA) was enacted in August 2023 and is India's first comprehensive data protection law. The DPDPA is "umbrella" legislation that sets out a high-level framework for India's new data protection regime, with supplementary rules and guidance expected to follow. The DPDPA is not yet in force and timelines for its implementation remain unclear. An independent agency responsible for enforcing the DPDPA—the Data Protection Board of India—still needs to be established, and the implementation of rules and regulations is forthcoming.	The Personal Data Protection under the 29733-2011 Act is meant to guarantee the fundamental right to personal data protection by regulating appropriate handling by both public entities and institutions belonging to the private sector. Its provisions constitute public order norms and are mandatory.

Policy	Kazakhstan	Brazil	Estonia	India	Peru
Payments interoperability initiatives	There is domestic interoperability between IBAN and card networks and ongoing exploration of cross-border solutions. There is also ongoing implementation of the ISO 20022 financial messaging standard.	There is no interoperability between different instant payments solutions.	There is domestic interoperability between RTP and card networks and ongoing exploration of SEPA integration for cross-border payments.	UPI is not interoperable with global card networks.	In October 2022, the central bank issued the interoperability framework (Circular Nº 0024-2022-BCRP), which is aimed at promoting interoperability and the efficiency of the digital payments market in Peru. There is extensive work by the central bank to promote competition and include all market players in the payment ecosystem.

Policy element	Singapore	Sweden	Thailand	Turkey	United Kingdom
Ownership and operation of real-time payment system	RTP is owned and operated by the Association of Banks Singapore (ABS). MAS regulates and oversees the functioning of RTP rails.	A mixed ownership organization, Swish is operated by a consortium of major banks, regulated by the Riksbank.	The system is public sector–led by the Bank of Thailand (BOT), with active collaboration from private fintech companies to drive innovation.	The system is public sector–led by the Central Bank of Turkey, with involvement and innovation support from private fintech companies.	The United Kingdom's RTP system is operated by a consortium of major banks and fintech companies under the regulation of the Bank of England.

Policy element	Singapore	Sweden	Thailand	Turkey	United Kingdom
Fintech regulatory sandbox	There is an active regulatory sandbox, promoting fintech innovations.	Sweden has not implemented a regulatory sandbox that allows fintech companies live testing of innovations or business models in a sandbox environment.	The BOT has instituted a regulatory sandbox program in which new technologies such as QR code, biometrics, blockchain, and AI were introduced.	The International Finance Corporation (IFC) aims to establish a regulatory sandbox in order to monitor the impacts of the area and provide potential benefits for fintech innovations.	There is an active regulatory sandbox, promoting fintech innovations and collaborations with start-ups and established firms through the Financial Conduct Authority.
Cybersecurity in payments	There are comprehensive cybersecurity measures under the guidance of the MAS—Technology Risk Management Guidelines Notice & Cyber Hygiene Notice.	There are robust cybersecurity measures focusing on protecting digital payment infrastructure, including new legislation on clearing and launching the RIX-INST settlement system.	The Bank of Thailand announced new measures to increase security for digital banking transactions. High-value mobile banking transactions will be required to use biometric scans.	The Banking Regulation and Supervision Agency and Central Bank of Turkey have established regulations to ensure that financial institutions adhere to high standards of cybersecurity.	National cybersecurity monitoring is coordinated through the Bank of England and enables cyber teams from all UK networks (Pay.UK, Visa, Mastercard, Swift for CHAPS) to exchange information and threat alerts. Government agencies (e.g., GCHQ, the police) also participate.

Policy element	Singapore	Sweden	Thailand	Turkey	United Kingdom
Fraud incidences in RTPs	There has been a moderate number of incidences, and MAS and banks have implemented various anti-scam measures such as transaction limits and improving transaction verification processes.	There have been frequent incidences, including phishing scams, false payment confirmations, and social engineering, where fraudsters often impersonate bank officials.	There has been a moderate number of incidences, typically involving phishing scams, social engineering, and technical glitches.	There have been notable incidences; common types include phishing and social engineering scams, business email compromise, and technical glitches.	The United Kingdom has seen notable Authorized Push Payment Fraud, where fraudsters trick individuals into authorizing payments to accounts controlled by the fraudsters.
Data privacy and consumer protection	There is robust data protection under the DPDPA focusing on consumer privacy and security.	There are strong data protection regulations under the General Data Protection Regulation (GDPR) focusing on consumer rights and data privacy.	There are comprehensive data protection laws under the National Digital ID framework ensuring consumer privacy.	There are robust data protection laws focusing on consumer privacy and data security; these laws are aligned with international standards.	There are strong data protection frameworks, complying with the GDPR, focusing on consumer rights and data security.

Policy element	Singapore	Sweden	Thailand	Turkey	United Kingdom
Payments interoperability initiatives	There is interoperability between instant payments and wallets and between wallets and open-loop payment cards. There is also a level playing field—there are no regulations or policies in favor of specific payments schemes. Paynow is exploring cross-border interoperability with regional payment systems. Myinfo, a personal data management platform for citizens and residents, has been integrated into the Singpass app.	The government is promoting a level playing field between the instant payment platform (Swish) and others; one example is Visa's partnership with the bank Froda and its infrastructure, which is largely owned by the four major banks in Sweden. Swish supports integration with major card networks and is exploring cross-border payment solutions within the European Union. Swish recently transferred its settlement infrastructure to the Riksbank's new instant settlement system, RIX-INST. This should enhance resiliency and interoperability. The Riksbank encourages banks to offer various instant payment solutions, including those via online banking.	PromptPay interoperates with major card networks and e-wallets. It is exploring regional interoperability solutions. The government is implicitly favoring instant payments, as evidenced by the fact that it is making QR payment close to being virtually zero cost for retailers and consumers. The Bank of Thailand, the Thai Bankers Association, and the National Interbank Transaction Management and Exchange (ITMX) created Promptbiz in 2023, creating a payment infrastructure that will allow e-tax invoicing, e-receipts, and the digitalization of supply chains.	FAST supports integration with major card networks and digital wallets. Any merchant that accepts cards has been mandated to accept instant payments at the POS level via a domestically developed QR standard. Many value-added services to FAST are developed by the Interbank Card Center (BKM), the domestic switch that is owned by the Central Bank and that owns the domestic card scheme.	There is no connectivity between FPS and card networks. The United Kingdom is actively exploring cross-border payment interoperability solutions.

Source: CSIS analysis.