A Report By

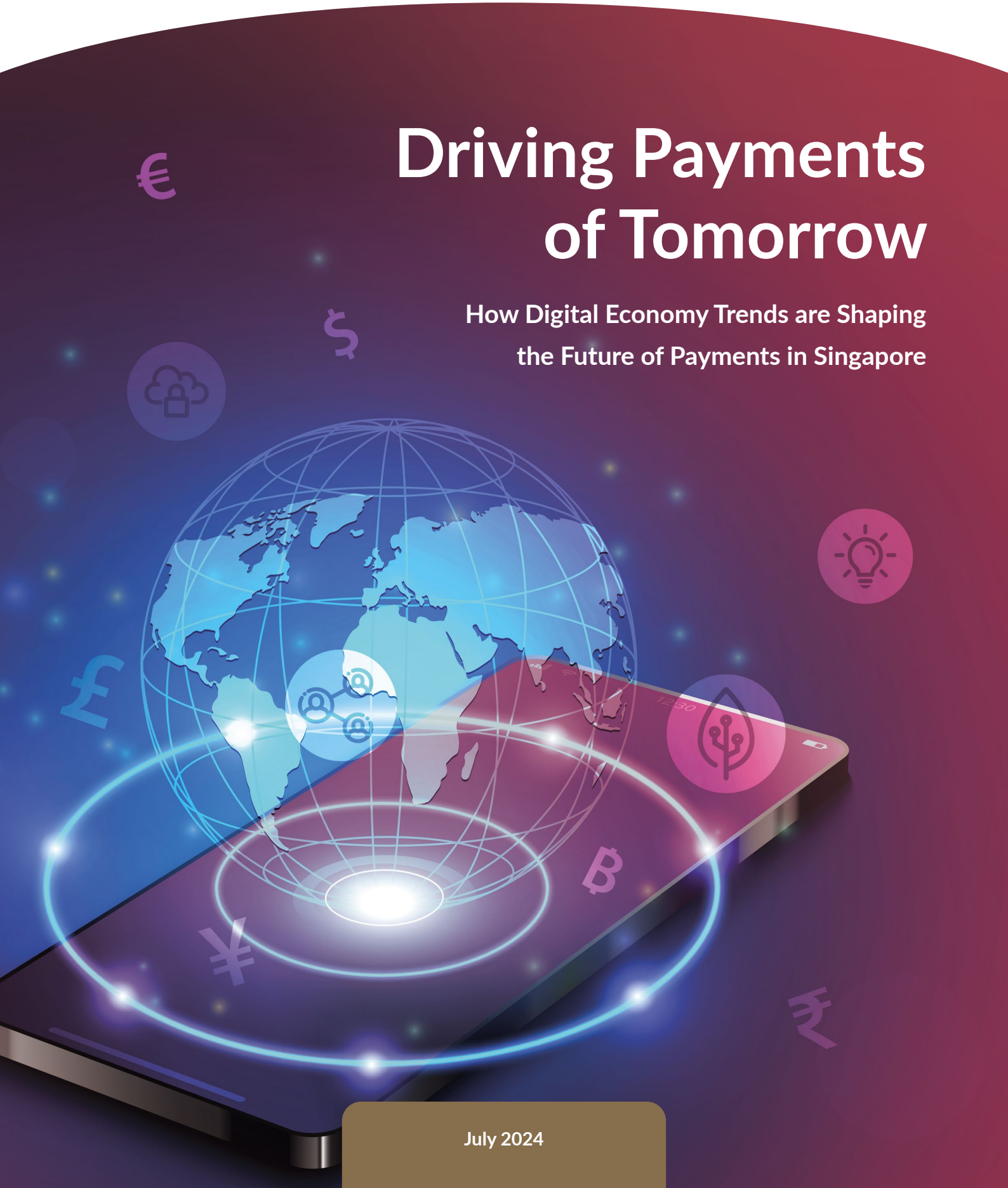
Singapore Institute of International Affairs

Knowledge Partner

VISA

Driving Payments of Tomorrow

How Digital Economy Trends are Shaping the Future of Payments in Singapore



July 2024

1. Executive Summary

Southeast Asia's digital economy has experienced exponential growth over the last decade and is on track to be valued at US$600 billion by 2030.[1] This rapid growth has fundamentally altered commerce, business operations and consumer behaviour, leading to significant transformations in the payments sector.

This special report provides a landscape view of the key digital economy themes in Singapore and considers how they are shaping the future of payments. Singapore serves as an interesting case study due to the country's rapid digitalisation and the high rate of cashless payments adoption in Southeast Asia. The five key themes that have emerged from our research are: Inclusive Digital Society and Economy; Secure Digital Ecosystem; Digital Sustainability; Singapore as a Hub for Innovation, Technology and Enterprise and Encouraging Regional Growth and Connectivity.

In considering the evolution of payments in the broader context of the digital economy, this report hopes to provide a more holistic view on the future of payments, highlighting key trends, opportunities and risks that stakeholders will need to contend with in the next few years. It also examines how these trends are interacting with one another, and in doing so, identifies opportunities for stakeholders to collaborate and achieve some of these goals.

Finally, considering the importance of secure and safe digital payments in enabling transactions across multiple sectors and industries in the digital economy, this report concludes with recommendations for key ecosystem stakeholders on how to capture opportunities in the changing payment landscape, aligning with Singapore's own goals in becoming a Smart Nation.

This is a shortened summary of key recommendations identified by the SIIA to promote a safe, secure, and inclusive financial ecosystem:

1. Digitalising the Wider Supply Chain Ecosystem
2. Developing Products and Frameworks that are Secure-by-Design
3. Nudging Secure and Safe Behaviour
4. Enhancing the Quality and Availability of Sustainability Data
5. Strengthening Public-Private Partnerships (PPPs)
6. Ensuring Regulation Keeps Pace with Innovation
7. Cultivating Talent Pool

An expanded version with more details can be found in the last chapter of this report.

About this Report

This special report by the SIIA provides a landscape view of the key digital economy trends and considers the payments sector in the broader context of the wider digital economy. The SIIA conducted a series of roundtables and interviews to garner insights from stakeholders in the payments ecosystem between April to July 2024. The report hopes to provide a more nuanced outlook on the future of payments, highlighting opportunities for businesses which are directly or indirectly involved in the payments space.

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Authorship and Acknowledgements

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All views expressed in the report are those of the authors, unless otherwise credited. We would like to thank our knowledge partner, Visa, for sponsoring the report. We appreciate the insights shared from the various stakeholders we engaged with for this report in the form of roundtable discussions and stakeholder interviews. A full list of the participating organisations for our research interviews and roundtables is listed in the appendix. The report's contents do not necessarily reflect the views or stated policies of the above contributors.

2. Introduction

The digital economy[2] has seen exponential growth since the onset of the COVID-19 pandemic. It is an area primed for further growth, as reflected by the increasing momentum amongst governments and businesses towards digital transformation, integration, and innovation. The Association of Southeast Asian Nations (ASEAN), for instance, is negotiating the ASEAN Digital Economy Framework Agreement (DEFA). This agreement is projected to unlock close to US$2 trillion in value by 2030.[3]

Singapore is no exception. As a hub for innovation and digitalisation, Singapore is leading in broader digital transformations of government, businesses, and society across various sectors. This has accelerated the growth of its digital economy, where its value has nearly doubled between 2017 and 2022, growing from 13% of the country's nominal GDP to 17.3% in 2022.[4] The development of Singapore's digital economy has brought about new opportunities for growth and innovation in sectors such as e-commerce, digital payments and financial technology (FinTech).

a. Role of Payments in the Digital Economy

Digital payments are integral to the continued expansion of the digital economy as it facilitates increased efficiency, connectivity and innovation.

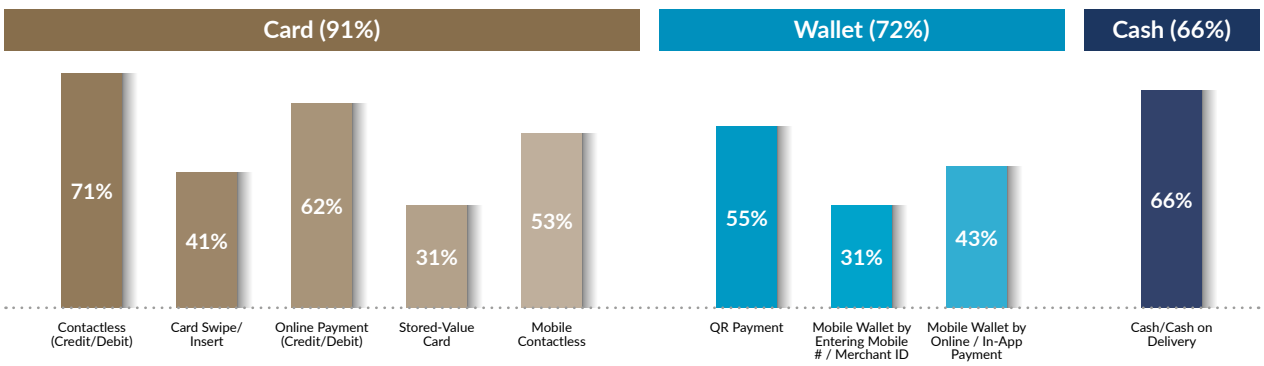
By streamlining and simplifying transactions, digital payments enable both consumers and businesses to conduct and process transactions with less effort and costs, accelerating economic activities and supporting faster growth.

Digital payments systems also transcend geographical boundaries, enabling businesses to expand and conduct cross-border transactions conveniently and efficiently. The interoperability, security, speed and integrated nature of digital payments support greater cost-savings, convenience and growth. It, therefore, has the potential to greatly enhance livelihoods across a wide variety of sectors.

i. Evolution of Payments and the Broader Financial Sector in Singapore

In Singapore, the payments industry is anticipated to have a compound annual growth rate (CAGR) of 7.5% between 2022 and 2027.[5] This growth is reflective of the broader evolution of the payments industry, where the move to prepare Singapore's transition to a cashless society began in the 1970s. As a result, Singapore has emerged at the forefront of cashless payments adoption in Southeast Asia, with card and wallet payment methods being more preferred than cash.

Breakdown of Payment Methods Usage in Singapore in 2024[6]



Source: Visa Consumer Payment Attitudes Study 2024 - Singapore report

Evolution of Payments in Singapore

1970 -2000s

Reducing Reliance on Cash and Cheques[7] and Increasing Cost-Efficiency of Everyday Payments[8]

1971: Formation of the Monetary Authority of Singapore (MAS) – adopts dual role of central bank and financial regulator of the financial services sector
1973: Establishment of the Association of Banks in Singapore (ABS) – non-profit organisation (NPO) which represents the interests of commercial and investment banking community
1984: Introduction of General Interbank Recurring Order (GIRO) – aims to help billing organisations reduce the social cost of customers paying for utilities and other bills in cash. Residents were encouraged to open bank accounts for their pay to be credited via GIRO
1986: Launch of Network for Electronic Transfers (NETS) – a debit network that facilitated the adoption of Electronic Funds Transfer (EFT) at Point-of-Sale (POS) or EFTPOS networks. This enabled consumers to make payments across a range of use cases through ATM cards linked to bank accounts
1996: Introduction of EMV chip specifications - enabled global interoperability of chip card transactions
1997: Organisational restructuring of MAS – formation of Financial Sector Promotion Department, where MAS took on the additional role of a market developer

The role of MAS as a central bank, financial regulator and subsequently market developer was pivotal in establishing a central authority that could regulate and promote the financial services sector in Singapore. With the ABS, the MAS sought to establish the foundation for a cashless society by reducing reliance on cash and cheques. This led to solutions which increased the cost-efficiency of everyday payments, including the introduction of GIRO and NETS for interbank merchant payments.

Early 2000s -2010s

Significant Innovation in Payment Technologies and Solutions[9]

2002: Contactless stored value in EZ-link cards for public transit – applicable for MRT, Bus and Electronic Road Payment (ERP) charges
2004: The Infocomm Development Authority (IDA) commits S$12 million to develop Radio Frequency Identification (RFID) technology
2007 to early 2010s: Introduction of Mobile Banking features in Singapore's three largest banks
2012: Launch of mobile payment services using Near Field Communication (NFC) technology
2014: Launch of Fast and Secure Transfers (FAST) and the Smart Nation Initiative

The early 2000s saw significant innovation in payment technologies and solutions driven by the Singapore government and local banks. With the intention to support e-payment adoption across different sectors, the government introduced contactless stored value in EZ-link cards and invested in RFID technology. This was complemented by the introduction of mobile banking features and mobile services enabled by NFC technology which spurred mobile payment adoption. The launch of FAST by the ABS in 2014 was a significant milestone in Singapore's e-payments journey as it facilitated the near-immediate transfer of funds from participating banks and non-bank financial institutions (NFIs) in Singapore. The launch of the Smart Nation Initiative in the same year further reiterated the government's commitment to creating a digital-first nation.

Late 2010s

Integrating Domestic Systems: Stepping Up Efforts to Establish E-Payments Roadmap[10]

2015: Introduction of Financial Sector Technology and Innovation (FSTI) scheme - MAS commits S$225 million to FinTech over the next 5 years
2016: Mobile phones compatible with NFC can be used for public transportation
2017: Launch of PayNow, Unified POS and Industry Transformation Maps (ITMs)
2018: Launch of PayNow Corporate, development of Singapore Quick Response Code (SGQR) standard, and NETS begins offering interoperable e-payment solution
2019: Development of the Payment Services Act (PSA) - streamlines regulatory requirements for various payment services and InvoiceNow - nationwide e-invoicing network

The late 2010s was marked by increased efforts to integrate domestic systems into cohesive platforms. PayNow was introduced by ABS in 2017 as an overlay service to FAST, requiring only the recipient's mobile number, Singapore National Registration Identity Card (NRIC) / Foreign Identification Number (FIN), or Virtual Payment Address (VPA) to facilitate a transfer. A year later, the Singapore Quick Response Code (SGQR) was launched, making QR payments seamless and convenient for both consumers and businesses. In 2019, the government further streamlined regulatory requirements for various payments services with the passing of the new Payment Services Act, and launched InvoiceNow, a nationwide e-invoicing network that enables companies to process invoices in a more efficient manner.

2020

Sustained Demand for Digital Payments Driven by COVID-19[11]

2020: Accelerated growth of FAST payments and MAS commits another S$250 million over three years under FSTI 2.0 to 'speed up technology adoption and innovation-driven growth in the financial sector'

While the shift towards digital payments was already gaining traction, its growth and uptake accelerated tremendously during the COVID-19 pandemic. Adopting digital tools out of necessity during periods of lockdown resulted in a change of consumption habits, including the move to shop online.[12] As a result, FAST payments in 2020 grew by approximately 80%, with transaction volumes increasing by 60%.

2021 -Present Day

Connecting Domestic Payments Systems[13]

2021: Opening FAST to non-bank financial institutions (NFI); Exploring cross-border payment linkages
- Bilateral: Singapore-Thailand Pilot, Singapore-Philippines
- Multilateral: Project Nexus

2023-2024: Expanding on cross-border bilateral payments with Malaysia, Indonesia and India; Project Nexus to commence live implementation after successful proof-of-concept

In recent years, a large focus for Singapore has been facilitating greater convenience and access in retail cross-border payments. After a successful pilot which connected domestic real time payment (RTP) systems with Thailand, Singapore has since established multiple bilateral linkages with different countries. This has been followed by efforts to explore the potential of a multilateral solution which is more efficient and scalable.

b. Looking Ahead: Shaping the Payments Landscape

Enabled by new technologies, processes and solutions, the digital payments landscape has evolved tremendously. From our research, we have identified **three key trends** in Singapore's payments landscape.

Rise of New Solutions and Players

With the advancement of technology comes the rise of new solutions and players in Singapore's digital payments space. Startups and fintech companies are introducing various innovative payment technologies such as blockchain-based transactions and biometric authentication. This momentum towards more innovative methods of conducting and processing payments not only improves efficiency, but also addresses issues related to high transaction costs and slow processing times that are characteristic of previous, more traditional, payment methods. By generating novel solutions and introducing new players into this space, the development of digital payment systems is accelerated through the expansion of choice, improvement of service quality and lowered barriers to entry for users.

Disaggregated and Diverse

The diverse nature of the payments ecosystem arises from a variety of payment providers, each offering specialised services catering to differing consumer needs and preferences. For instance, there has been a rise of a diversity of non-traditional payment methods such as Central Bank Digital Currencies (CBDCs), Digital Wallets and Buy Now Pay Later (BNPL). The diversity of payment providers necessitates greater interoperability and integration efforts to ensure seamless payment experiences across different platforms and across borders. This further drives the development of digital payments in Singapore and the region.

The digital payment infrastructure has also become more disaggregated. While the payments landscape was previously centralised, processes today are digitalised and segmented. Different parts of the payments process are being targeted by fintechs, allowing them to dedicate more resources to innovation and hone in on their specific niche.

Collaboration, Not Competition

There is a common understanding that collaboration is pivotal towards shaping the continued advancement of digital payment systems and the broader digital ecosystem. Industry stakeholders such as financial institutions, government bodies and fintech startups have continued to push ahead with a diversity of initiatives that are collaborative in nature. These partnerships not only enhance user convenience and experience but also make digital payments more accessible for businesses through the support from diverse stakeholders. Partnerships between various actors are therefore crucial to ensure that Singapore continues to foster and create more secure, innovative and efficient digital payment solutions.

3. Framing of Key Themes

a. Inclusive Digital Society and Economy

Singapore has emphasised the importance of building an inclusive digital economy and society in becoming a Smart Nation. This means ensuring that all Singaporeans are able to benefit from digitalisation.[14] In identifying digital inclusion as a key policy goal, government initiatives have enabled significant progress in increasing digital access, equipping individuals with essential digital skills and encouraging favourable perceptions towards embracing and using digital technologies.[15]

The government has also developed specific initiatives to help small and medium enterprises (SMEs) adopt digital tools and benefit from ongoing digitalisation. SMEs form the backbone of Singapore's economy and play a critical role in building a digital society. Various initiatives like SMEs Go Digital and Chief Technological Officer as-a-service by the Infocomm Media Development Authority (IMDA) have helped SMEs adopt digital solutions and build capabilities to capture opportunities in the digital economy.

Impact of Digital Payments on Financial Inclusion

As the financial services sector undergoes large scale digital transformation, the links between digital and financial inclusion have become increasingly prominent. The digitalisation of financial services and growing prominence of a cashless economy will require businesses and consumers to be well-equipped with relevant skills to access and utilise these services. The government has enabled financial inclusion by establishing a strong foundation for the adoption of digital financial services (DFS).[16] Efforts to strengthen online connectivity, raise financial literacy and increase the ease of adopting DFS have resulted in a 98% bank account penetration rate amongst adults since 2020.[17]

While cards remain the preferred payment method among businesses[18] and consumers,[19] the rise of new payment service providers (PSPs) and fintechs have provided businesses and consumers with more options, including cheaper and more convenient ways to pay. The emergence of Buy Now Pay Later (BNPL) services, for example, provides a line of interest-free micro-credit for consumers which traditional financial institutions are unable to issue. Hence, equipping Singaporeans to utilise DFS for their everyday needs will be crucial to ensure financial inclusion.

Changing Operating Landscape

Ongoing changes in the digital economy landscape will pose new threats to inclusion. Technological advancements have enabled the emergence of new business models and transformed current ones, while the ubiquity of digital platforms has blurred the lines between the roles of business and consumer.

1. **New Technologies:** The rise of new technologies like Artificial Intelligence (AI), Machine Learning (ML) and blockchain presents opportunities for businesses to increase operational efficiencies and bolster cybersecurity. However, many SMEs in Singapore lack the resources and know-how to leverage on these technologies, while workers lack advanced digital skills to take up emerging job opportunities. In Singapore's Financial Services Industry, disruptive technological skills were found to be lower than the global average, indicating a skills gap in the industry.[20]

2. **Changing Business Models:** The use of cloud computing, rise of digital platform models, super applications and social commerce have significantly changed the way businesses operate. While these models provide different alternatives for businesses to engage consumers, they are similar in their need to store and use data online. The move from physical storage systems to digital ones have presented new risks for businesses and consumers, including exposure to a wider range of cyberthreats.

3. **Growth of Micro-Sellers:** As customer-to-customer (C2C) and social commerce grows, the lines defining traditional businesses and consumers are blurring. In a marketplace where individuals can be both buyers and sellers, individuals must be well-equipped to access different payment methods and to understand potential security risks. With e-commerce scams on the rise in Singapore, an online ecosystem where buyers and sellers can transact safely and securely is crucial.[21]

Creating an Enabling Environment for Using Digital Payments

To ensure inclusive growth in the long run, the public and private sector will need to collaborate to address **pain points** for businesses and consumers in adapting to these new developments. This is especially important for SMEs, which comprise the majority of businesses in Singapore, but continue to face challenges in adopting digital solutions.

Pain Points for Consumers and Businesses[22]

SMEs: SMEs are mainly concerned with the day-to-day functions of doing business. This places a primary focus on increasing profitability and reducing costs in the short-term. When considering digitalising out of business necessity, a similar analysis is applied to upgrading payment systems. Thus, SMEs are seeking solutions which meets their business needs, takes the least effort to implement, and are the least disruptive to business operations.

Pain Points:

(1) Unable to identify which digital payment solution is safe, secure and best suited for the business given the large variety of options available
(2) Perception that solutions are complex and will require significant resources (time, monetary cost and talent) to implement
(3) Deterred by the high cost of integrating multiple payment methods which consumers increasingly expect
(4) Difficulty in navigating regulatory challenges to access regional markets

Consumers: Singapore's adoption of cashless payments is highest in the region at 97%.[23] With majority of residents having a bank account and using card payments, many consumers are familiar with the use of digital payment methods. Thus, most efforts have been targeted towards vulnerable segments of society like the elderly. For example, the People's Association (PA)'s Seniors for Smart Nation programme has collaborated with Visa to host educational sessions for the elderly on digital payments,[24] building on existing programmes like the Certificate in Seniors for Smart Nation programme.[25]

Pain Points:

(1) Lack of familiarity with digital tools and payment systems
(2) Trust deficit in digital payments due to the rise of scam and fraud incidences in Singapore

There is also a need to strengthen other digital utilities which support the integration of SMEs into the wider supply chain ecosystem and enable access to new markets. For example, digital identities like SingPass are crucial to support customer authentication and payment authorisation. Serving as a 'digital passport', SingPass contains standardised and verifiable credentials which support a wide variety of business-related services, including accessing financial services and products.[26]

Leveraging Digital Payments for Financial Inclusion

There is potential to leverage digital technologies to promote financial inclusion. The use of NFC technology has enabled Visa's Tap to Phone solution, democratising payment acceptance for small businesses by enabling them to use mobile phones as their point-of-sale terminals through Stripe's payment rails.[27] More recently, emerging technologies like AI and ML have the potential to help companies make sense of large datasets, manage operating costs and help with compliance. Moreover, embedded finance, enabled by Application Programme Interfaces (APIs) can help SMEs provide value-added products and services to customers, creating a more unique experience.

Exposing SMEs to Emerging Technologies

Larger companies can help familiarise SMEs with emerging technologies by embedding them into software solutions. For example, Microsoft's 365 Copilot Programme in collaboration with Enterprise Singapore and AI Singapore aims to help SMEs build AI capabilities through accelerating the adoption of Copilot for Microsoft 365. Copilot is Microsoft's AI tool which utilises large language models (LLM) to improve productivity on Microsoft applications. This allows SMEs to experience using AI in their daily operations and could subsequently encourage the utilisation of more advanced AI applications in the future.[28]

Access to Other Financial Services

These benefits have the potential to extend beyond payments to other financial services which are crucial for SMEs looking to scale. This includes access to micro-loans and the ability to provide tailored insurance products.

- **Access to Financing:** Experian is using AI to assign SMEs with alternative credit scores to provide lenders a view on the creditworthiness of a company. This helps SMEs, which do not have the relevant financial information required for a traditional credit evaluation, to access working capital needed for expansion.[29]

- **Insurance:** Prudential's AI-powered Pulse application includes a feature which offers SMEs simplified access to insurance and employee benefits. This allows SMEs to manage, submit or view their coverage plans on a single platform.[30]

b. Secure Digital Ecosystem

Changing Digital Threat Landscape

The digital threat landscape has evolved significantly over the last few decades, driven by the digitalisation of systems and services as well as advancements in technology. As the world becomes more interconnected and reliant on digital technologies, businesses are exposed to new vulnerabilities, increasing the 'attack vector'[31] that threat actors are able to leverage. As a result, cyber-related incidents have grown in frequency, with the number of malicious cyber incidents nearly doubling relative to the period before the pandemic.[32]

This trend is similarly mirrored in Singapore – the country's status as an open financial hub with a relatively affluent population has made it a prime target for cybercrime. In 2023, Singapore experienced a higher-than-average digital fraud attack rate compared to other Asia Pacific countries.[33] Phishing scam campaigns and ransomware were the most prevalent types of threats, with the number of phishing cases doubling between 2021 and 2022 and ransomware incidents remaining comparatively high.[34]

As Singapore's digital economy continues to grow, third-party vulnerabilities, increasing reliance on the cloud and the rise of emerging technologies have resulted in greater exposure to cyber risks. Recognising these changes, the Cybersecurity Agency of Singapore (CSA) has amended the Cybersecurity Act in 2024 to mandate owners of critical information infrastructure (CII) to report a wider range of cybersecurity incidents, including those that occur within their supply chains.[35] However, regulation alone is insufficient given how digital technology has become an integral part of the way that people live, work and play. As Singaporeans spend an increasing amount of time online, there is a need to raise the level of cyber hygiene in society and rethink current approaches to cybersecurity.

Key Cybersecurity Threats in Singapore

1. **Supply Chain Vulnerabilities:** As supply chains become more complex and interconnected, threat actors are targeting upstream software and hardware vendors to gain access to protected systems. These vendors are often SMEs which may not have robust cybersecurity capabilities. This has increased the attack vector for hackers to access a network or computer and presents a significant risk as most companies lack oversight over their vendors. As products and services become more complex, there is a higher chance for single points of failure, compromising the security of the final product or service.

2. **Increased Reliance on the Cloud:** There will be more attacks on cloud software as more businesses continue to store valuable information and data online. Singapore has emerged as an advanced public cloud market, with 30% of organisations reported to have implemented cloud computing.[36] However, the move from physical to virtual storage systems have presented new risks for businesses and consumers. Increased reliance on the cloud exposes companies to a wider range of cyberthreats, many of which target networks hosting multiple tenants and systems peripheral to businesses providing critical services.

3 **Use of Emerging Technologies:** Emerging technologies have enabled an increase in the intensity and sophistication of cyberthreats. Malicious actors have leveraged AI and ML to process large pools of data, automate and enhance hacking abilities. Deepfakes, for example, which use AI to manipulate audio and visual media to impersonate an individual or fake authenticity, have become an increasing cause of concern given its rising prevalence in the region.[37] Widespread access to these technologies has also lowered the barrier to entry for threat actors, given the low cost and ease of engaging in these activities.

Cyberthreats in Financial Services Sector

The financial services sector (FSS) continues to have the greatest exposure to cyber risk, given the availability of large amounts of sensitive data and transaction information. According to the International Monetary Fund (IMF)'s Global Financial Stability Report in 2024, almost one-fifth of reported cyber incidents in the last two decades have impacted the financial sector, causing approximately US$12 billion in monetary losses since 2004.[38] Payment fraud has been on the rise, with 80% of organisations being victims of either fraud attacks or attempts in 2023, which is a 15% point increase from the previous year.[39] New fraud types can be expected as RTPs are adopted and innovations in payments create new forms of payment methods.

In Singapore, most attacks by automated bots in 2023 targeted e-commerce payment transactions, with more than 80% of reported phishing sites masquerading as entities within the Banking and Financial Services sector.[40] With digital money gaining traction in Singapore and the rise of non-traditional financial services, it is expected that more companies will collect and utilise sensitive financial and user data for their business operations.[41] Given that these firms are not subjected to the same regulatory and reporting standards as established players in the sector, they are at greater risk of data breaches.

Singapore's status as a financial hub has also increased its risk for money laundering activities.[42] While the country has strict rules on Anti-Money Laundering / Countering Financing of Terrorism (AML/CFT) and is part of the Financial Action Task Force (FATF), the proliferation of high-value transactions and use of emerging technologies to conceal cross-border money flows have made it increasingly difficult to identify illegal transactions. As a result, Singapore and other financial centres have experienced a surge of money laundering cases over the last few years.[43] [44]

Erosion of Digital Trust

While the financial cost of cybercrime is acknowledged and understood, the impact on digital trust must also be considered. 'Digital trust'[45] is a crucial pillar of the digital economy and supports the development of an inclusive digital society. It enables businesses and consumers to participate in the digital economy, remain open and trusting of digital technologies as they evolve. This affects their receptiveness towards technological innovation.

"If public trust in the digital domain is lost, users may be reluctant to carry out digital transactions. Citizens will not be able to reap the benefits of convenience and time-saving from the use of digital services. And the economy will have to forgo the productivity gains, and the growth that comes from new digital services."

Senior Minister Teo Chee Hean, 8th Singapore International Cyber Week (SICW) 2023[46]

Safeguarding Trust in Payments

As society becomes increasingly cashless, encouraging safe and secure online transactions will be crucial in cultivating digital trust. Technological innovations have enabled new solutions which safeguard trust by default throughout the payments journey. These solutions help create a secure environment for businesses and consumers to conduct online transactions and help with the detection of cyberthreats to mitigate further losses.

Digital Identification

Information and data that authenticates an individual's identity in the digital world. These include the use of biometrics, fingerprints and voice or facial recognition.

Carousell's use of SingPass enabled greater identity verification, with verified sellers earning a blue tick next to their names, improving visibility and trust amongst consumers. Such verification not only protects consumers against fraudulent behaviour, but also leads to the creation of a trusted marketplace between buyers and sellers.[47]

Tokenisation

Involves the use of tokens which are randomly generated to substitute sensitive data like credit card information. Tokens with no intrinsic value are being transmitted and stored, reducing the risk of data breaches in the event of a cyberattack.

Visa uses network tokens for card-not-present (CNP) transactions via Visa's Token Service (VTS), a client solution which merchants and financial institutions can adopt. In 2024, merchants who adopted VTS for their digital payments saw a 58% reduction in payment fraud rates for Asia Pacific.[48]

Fraud Detection

AI, ML, and biometrics have been used for fraud detection. Their adeptness in identifying ever-evolving fraud patterns allows organisations to flag potential threats and address them before they occur.

The Anti-Scam Centre (ASC) of Singapore's Police Force (SPF) has collaborated with four banks in Singapore to identify and warn victims of fraud through the automation of information sharing, processing and SMS alerts.[49] *Further collaboration between GovTech and the ASC enables the police to leverage SingPass fraud analytics capabilities to identify and flag unusual account activities.*[50]

Challenges in Establishing a Secure Digital Ecosystem

There remain challenges in establishing a secure digital ecosystem in the evolving digital landscape.

Shared Responsibility and Ownership

The issue of shared responsibility and ownership has received increasing focus after a series of phishing scams in 2022 involving local banks. While there needs to be certain degree of personal ownership, it has not been decided how this should be split between businesses and consumers, especially if businesses have already adopted necessary security and scam measures mandated by the government. While the MAS and IMDA have published a draft consultation paper on an equitable loss-sharing framework for financial scams in 2023, the question of personal responsibility and therefore full restitution regardless of circumstance is still being debated.[51]

E-commerce platforms are also increasingly under scrutiny given their nexus with payments, and therefore payment fraud. Only second to job scams, e-commerce scams comprised 20% of total reported cases in 2023.[52] While e-commerce platforms have implemented various measures, including in-app payments, escrow payment methods, user/seller verification and the development of the E-commerce Marketplace Transaction Safety Ratings,[53] consumers continue to fall prey to C2C scams due to fewer protections on these platforms.

Supporting SMEs – No Desire, Can't Rewire

SMEs continue to be more susceptible to cyberthreats. Less than 50% of SME executives are fully aware of the scope of possible cyber risks and the number of SMEs without any protection against cyber risks have increased.[54] SMEs are especially vulnerable to cyberthreats primarily due to a **(1) lack of awareness on the scope and impact of cyberthreats**, and **(2) a lack of cybersecurity know-how – including expertise, domain knowledge and resources**.

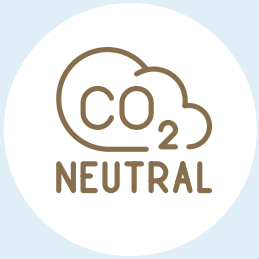
- **Barrier 1: Lack of awareness on the scope and impact of cyberthreats:** The main challenge is convincing SMEs that cybersecurity is integral in doing business. SMEs are typically more concerned about the revenue-generating aspects of business and perceive that they are unlikely to be a target of cyberattacks given their small size. Oftentimes, the perceived cost of compliance in adopting cybersecurity standards deters SMEs, given that there is no immediate or visible value-add.

- **Barrier 2: Lack of cybersecurity know-how:** SMEs often lack the expertise, domain knowledge and resources required to combat cyberthreats. While the 'Cyber Essentials Mark' by the CSA provides guidance on which measures SMEs should prioritise, the 2023 CSA Cybersecurity Hygiene Report revealed that most companies in Singapore have only adopted about 70% of the essential measures, with the adoption of the full suite of essential measures being significantly lower. While the reasons for this vary, majority of the organisations polled attributed this to the lack of knowledge or experience in implementing relevant measures.[55] With the fast-evolving nature of cyber risks and adoption of emerging technologies, this gap is likely to increase.

Cross-Border Payment Fraud

As digital systems become more connected, it will become increasingly challenging to protect financial systems against cross-border syndicate fraud. Criminals can target companies' operations in countries with less robust data security requirements to access wider networks, making it almost impossible to track and recover funds. Moving forward, there will be a need to enhance capabilities to detect and prevent financial crime. This will require greater efforts between the public and private sector to enable the sharing of intelligence and best practices among a wider range of stakeholder groups. A good example of this effort is the Collaborative Sharing of Money Laundering / Terrorism Financing (ML/TF) Information & Cases (COSMIC) Program developed in collaboration between MAS and six major commercial banks.[56] Launched in 2024, it allows these financial institutions to securely share information on customers which may be involved in financial crime according to stipulated thresholds.

c. Digital Sustainability



Greening Tech: The need to mitigate carbon emissions from the digital economy, comprising the provision of digital services (software) and the foundational digital infrastructure (hardware) used to power them.

E.g., Leveraging technologies like AI and blockchain to increase operational efficiencies in data centre operations and reducing energy consumption.

Tech for Green: Leveraging digital technologies and tools to support sustainability initiatives; therefore, furthering efforts towards achieving sustainability goals.

E.g., Optimising resource efficiency through the digitalisation of supply chains, providing companies with greater insight into their value chain, allowing them to accurately track, collect and report their emissions.

The concept of digital sustainability has been increasingly adopted by digital economy actors in recognition of the interplay between digitalisation and sustainability. Best encapsulated in the framework **"Greening Tech"** and **"Tech for Green"**, the term broadly describes the need to mitigate carbon emissions from digital infrastructure and services while leveraging the potential of digital tools to help address sustainability challenges.

"Our digital sustainability efforts are a commitment to ensure that innovation and sustainability go hand in hand."

Senior Minister of State Janil Puthucheary at the SCS Sustainable Tech Forum 2024[57]

What Does Digital Sustainability in Payments Look Like?

Digital sustainability in the context of digital payments has been less explored given that the links between digital payments and their environmental impact are less clear. However, by applying a similar framework to unpacking digital payments, digital sustainability refers to the need to (1) 'green' payments and (2) leverage digital payments to promote sustainability goals.

Greening Payments

The market for traditional payment methods such as cash and credit cards remains substantial. The environmental impact of these methods is mainly attributed to the emissions and waste generated across the value chain, including the production of physical credit cards, paper receipts, POS terminals and ATMs. Many companies have already considered this and have implemented various initiatives to reduce their carbon footprint. Some examples include the use of recyclable materials to make eco-friendly credit cards and manufacture hardware, packaging and other accessories that come with the distribution of POS terminals. Others have attempted to address the resultant waste through disposal programmes for expired credit cards and old POS hardware.

With the increased adoption of digital payment methods, the conversation has expanded to include considering the carbon footprint of e-payment transactions. This has been largely driven by the regulatory push towards developing Environmental, Social and Governmental (ESG) standards for reporting, with companies attempting to measure their own emissions and set net-zero targets. These range from utilising AI and blockchain technology to automate and make internal processes more efficient, to using renewable energy to power operations where available.

However, there is also a need to consider emissions produced from the overarching digital infrastructure that supports digital payments. While a one-to-one comparison between traditional payments and digital payments shows that the latter produces 80% less carbon dioxide, this figure is less substantial after considering the carbon footprint of data centres (DCs) and cloud infrastructure required to enable these transactions. The International Energy Agency (IEA) estimates that DCs and data transmission networks contribute to 1% of global energy-related Greenhouse Gas (GHG) emissions.[58]

While efforts to limit energy demand growth from DCs have been successful thus far, the computing power required to support emerging technologies like AI and ML will be extremely energy intensive. Rough estimates indicate that AI power consumption will grow at a CAGR of 25% to 33%, outpacing overall growth of DC power demand at 10%.[59] Moving forward, reducing emissions will require collective effort and commitment from relevant stakeholders part of the financial services industry to develop new frameworks and solutions. The government has begun exploring the potential of green software – a system designed to minimise the amount of energy used to process code – and has since committed funding for research and trials with industry leaders to set common standards and explore solutions in this area.[60]

Leveraging Digital Payments for Sustainability

One key way to leverage digital payments for sustainability is by considering how payment platforms and providers can make sustainability more **affordable** and **accessible** for businesses and consumers. These companies contain a wealth of data from transactions which can generate valuable insights on customer's interests, behaviours and consumption habits. PSPs can explore using such data to incentivise their clients and users towards greener practices.

Incentivising Green Practices in Clients and Users

Incentivising Green Practices in Clients

- **Encouraging responsible and sustainable practices in clients:** Oracle Cloud Services offers a Climate Change Analytics Cloud Service with built-in AI to help banks understand their environmental footprint as well as the companies they finance or invest in.[61] With AI and Natural Language Processing (NLP) tools, Climate Change Analytics can identify publicly available information on companies' climate change initiatives, aiding in banks' overall assessment of climate risk and providing a clearer picture of their performance against compliance frameworks.

Providing Users with Opportunities to Participate in the Green Economy

- **Increasing awareness of one's carbon footprint:** Stripe's partnership with the firm Climatiq offers customers embedded carbon emission estimates for Stripe payments, as well as analysis on the sources of these emissions.[62]
- **Motivating green purchases through reward systems:** DBS has developed an eco-friendly card that offers cardmembers 'green rewards' such as cashback deals and discounted prices when they patronise eco-friendly and sustainable businesses.[63]

The government is also exploring how to develop digital utilities which facilitate the development of reliable ESG data for the financial services sector with Project Greenprint.[64] It launched Gprnt in 2023, an integrated digital platform for ESG data collection and reporting, which is expected to help companies automate ESG reporting processes and allow financial institutions, regulators and large corporates to access relevant data to support sustainability initiatives.[65] The MAS has also collaborated with the United Nations Development Programme and Global Legal Entity Identifier Foundation which leverages capabilities established in Greenprint to help SMEs. Known as Project Savannah, this initiative helps SMEs worldwide to digitalise basic ESG credentials, strengthening their access to global financing and supply chains.[66]

d. A Hub for Innovation, Technology and Enterprise

Singapore has reiterated its ambitions to establish itself as a global-Asia node for innovation, technology and enterprise.[67]

Singapore as an Innovation Hub

5th among 132 economies globally

1st among 16 economies in Southeast Asia, East Asia and Oceania

Source: Global Innovation Index (GII) 2023[68]

Singapore's efforts are distinguished by a whole-of-government approach to cultivate a Smart Nation, which has established a strong foundation required to develop an innovation ecosystem in the country. Its favourable business and regulatory environment, skilled workforce and overall competitiveness are some of its key distinguishing factors which attract multinational companies (MNCs) from around the world.

Establishing a Strong Foundation for Innovation[69]

1. Pro-Business Environment

- Ranked as world's best business environment for the last 15 years, according to the EIU[70]
- Political and economic stability and favourable regulatory environment has made it conducive for businesses
- Further supported by government incentives and grants to attract businesses in key sectors

2. Competitiveness

- Ranked 1st in the International Institute for Management Development (IMD)'s World Competitiveness Ranking in 2024[71]

3. Supporting Business Infrastructure

- Transport and logistical infrastructure have been consistently ranked amongst the best in the world[72]
- 2023 World Digital Competitiveness report revealed that Singapore is 3rd in the world on digital economy infrastructure due to its world-leading country credit rating and Internet bandwidth speed[73]

4. Skilled Workforce

- Singapore's diverse and skilled talent pool has made it attractive for multinationals looking to establish innovation centres and headquarters in the region
- Ranked 1st in Asia-Pacific and 2nd in the world for talent competitiveness according to the 2023 Global Talent Competitiveness Index (GTCI) report by INSEAD[74]

5. Strong Legal Protections

- Strict laws on data privacy and robust intellectual property (IP) regime
- Singapore's Personal Data Protection Act (PDPA) is comparable to international standards
- Ranked 2nd in the International Property Rights Index in 2022, and 5th in the 2024 World Trademark Review IP Office Innovation Ranking[75]

6. Connectivity

- Strengthen linkages to the region and the rest of the world to help start-ups and local businesses to scale
- Embarked on various bilateral agreements and Memorandums of Understanding (MOUs) with like-minded partners to further develop its innovation ecosystem

These factors are especially important for companies in the financial services industry (FSI) given the volume of sensitive financial data that flows through the country and the importance of being open and connected to other hubs around the world. With support from MAS to further promote and develop Singapore's FSI, the country has successfully developed strengths in certain core sectors, including banking and finance, asset management, capital markets and fintech startups.[76] This has aided in its ongoing efforts to become a global financial centre.

Innovation as the Lifeblood of the Financial Services Industry (FSI)

Cultivating innovation is key for Singapore to retain its position as a global financial hub. E-payments continue to be a crucial aspect of the FSI and underpin MAS' intentions to create a Smart Financial Sector, where innovation is pervasive and fintech is widely used.[77] Various models of partnership have been crucial to support this – both between the public and private sector (PPPs), as well as among private sector players (B2B).

Public-Private Partnerships (PPPs)

PPPs have emerged as a key model for collaboration in the process of establishing an 'e-payments society' and have been crucial in promoting innovation and creating a responsive policy environment.

(1) **Promoting Innovation:** The government has focused on creating an enabling environment to explore the feasibility of new payments technologies and solutions.
(2) **Creating a Responsive Policy Environment:** Through consistent engagement, regulators are aware of the need to review policies to ensure that they keep pace with technological development, while ensuring that regulation does not stifle innovation in new business models.

Promoting Innovation

The government has created an enabling environment for innovation through the **provision of incentives** to support the development of common utilities for the FinTech ecosystem, **providing platforms to encourage collaboration** and **use of regulatory sandboxes for experimentation**.

Provision of Incentives: The Financial Sector Technology and Innovation Scheme (FSTI 3.0)[78] and Financial Sector Development Fund (FSDF)[79] are some examples of funding support provided by the government.

Platforms for Collaboration: The Singapore FinTech Festival and the Singapore Week of Innovation and Technology (SWITCH) are both in their ninth editions and bring together financial ecosystem players to explore opportunities for partnership. The IMDA's Open Innovation Platform (OIP) enables companies to crowd-source for innovative digital solutions from other ecosystem players, including start-ups, research institutes and technology providers.[80]

Regulatory Sandboxes: The use of regulatory sandboxes creates opportunities for innovation and experimentation in a live environment. These sandboxes relax regulatory and legal requirements for a specific duration, allowing companies to test the feasibility of solutions.[81]

Case Study: Project Orchid – Pilot initiative launched in 2021 to explore the technical feasibility and infrastructure required for a digital Singapore dollar (SGD).[82]

The project explores how a digital SGD would interact with existing payment systems and its applications for businesses and consumers. The first phase explored potential use cases for a programmable digital SGD and the infrastructure required. The second phase is currently ongoing and focuses on the commercial application of a digital SGD in Singapore and the development of core infrastructure components in the 'Orchid Blueprint'. Exploring the feasibility of wholesale CBDCs to settle large-value interbank transactions are part of this phase, where MAS will pilot the "live" issuance of wholesale CBDCs with local banks.[83]

Responsive Policy Environment

The MAS has also reviewed frameworks and policies on digitalisation and related assets, rules on fair dealings, as well as assessing the overall stability of the financial sector. Part of this process involves working closely with industry partners and fintech players to ensure that there is balance between regulation and innovation to explore the potential of new business models.[84]

Case Study: Approach to Regulating Buy Now, Pay Later (BNPL) Services[85]

The introduction of BNPL services in Singapore in the late 2010s showcases the government's approach to regulating new innovations in payments. BNPL provides consumers an alternative to upfront payments by dividing the total initial cost into equal payment instalments over a period of time. Through various consultations with industry players to understand the viability of the business model and potential opportunities and risks that come with it, the government eventually decided that an industry-led standard would be sufficient to mitigate the risks in Singapore's BNPL landscape. This considers its current utilisation rate and the experience of other countries where BNPL services are more prevalent. Guided by the MAS, the BNPL Working Group comprising of the Singapore FinTech Association (SFA) and industry players launched a BNPL Code of Conduct in 2022 to address notable risks and safeguard consumer interests.[86]

B2B Partnerships for Innovation

In addition to PPPs, initiatives developed through private sector partnerships have spurred innovation in new areas. These initiatives have made payments seamless and safer for consumers and have made payments and other financial services more accessible in traditional industries.

- **Example:** Amazon and HSBC are exploring the use of Purpose Bound Money (PBM) as a common protocol in the tokenisation of payables from Amazon to merchants in supplier financing.[87] This would encode disbursement conditions for tokenised payables,[88] thereby addressing financing needs for sellers and unlocking liquidity for merchants, improving their access to financing and working capital.

- **Example:** Visa, UOB and Doxa have collaborated to transform payment processes for the construction industry.[89] By leveraging Visa's network and Accelerator Programme, Doxa would be able to connect contractors, subcontractors and financiers on a single platform to digitalise the previously manual workflow of reviewing and documenting progress claims, certification and payments on an embedded finance platform.[90]

Understanding Singapore's Role in the Global Marketplace

Unpacking Singapore's key strengths in innovation reveals that its distinctive value can be attributed to its connectivity to the rest of the region. While Singapore's enabling environment has encouraged solutions to be explored and tested in the country, the eventual goal for most companies is to ensure these solutions are scalable and relevant regionally, if not globally.

To this end, successful innovations that move beyond proof of concept to live implementation are typically those that address an unmet need affecting a sizeable proportion of the population or have potential applications beyond Singapore. Unlike pilots which are less resource-intensive, implementing a live solution often requires long-term buy-in from multiple stakeholders. Hence, it is important to ensure that innovation is purpose-driven and does not occur for innovation's sake. This could include focusing on certain key principles and objectives that are aligned with the country's overarching priorities, like overcoming barriers to financial inclusion, or by considering the larger business problem which needs to be solved.

Moreover, as the market for innovation in emerging areas continues to grow and change the digital payments landscape, Singapore will need to differentiate itself on quality and value. For it to remain competitive amidst rising costs, it must continue attracting a diverse range of talent and ensure that its local talent pool is equipped with relevant skills to strengthen its Research, Innovation and Enterprise (RIE) ecosystem. While Singapore's penetration rate for disruptive tech skills is above the global average, the penetration rate in the FSI is comparatively lower. This indicates that greater investment in training and development initiatives to enhance disruptive tech skills required for this industry will be needed moving forward.

"All advanced economies at this level have to push on innovation and productivity to move forward, and we are in this stage of development as well now where we really have to work harder on productivity and innovation."

Deputy Prime Minister Lawrence Wong at the post-Budget 2023 Roundtable[91]

e. Encouraging Regional Growth and Connectivity

Understanding Singapore's role in the global marketplace highlights the importance of facilitating interoperability in strengthening its position as an innovation and global trading hub. Broadly defined as the ability of a system, product or service to communicate and facilitate seamless data exchange with technically different ones,[92] interoperability of different systems and services ensures that solutions: (1) extend beyond local use cases and can be utilised in other markets and (2) help drive market growth by enabling seamless cross-border commerce between businesses.

Being open and connected to regional markets is thus crucial to Singapore's strategy given its small domestic market and its role as a global financial centre. Singapore has a major role in facilitating regional and international payment flows and the government has acknowledged the importance of payment interoperability as one of four key pillars crucial in facilitating end-to-end digital transactions.[93]

Digital Payments: The Last-Mile in Cross-Border Commerce

Enabling seamless and secure cross-border digital payments is a key enabler for cross-border commerce. Payments are the last-mile in cross-border commerce and underpins the systems required to complete any digital transaction. Common methods of cross-border digital payments include wire transfers, credit card transactions, electronic funds transfers (EFTs), digital wallets, fintech platforms and cryptocurrencies.[94]

Enhancing Cross-Border Payments

In recent years, greater focus has been dedicated to making cross-border payments **faster**, **more accessible**, **affordable and transparent**.[95] This has been supported by collective effort among both public and private sector players in the region to consolidate domestic payment systems and establish common payment rails and networks.

Collaboration Between Payments Ecosystem Players for More Convenient Cross-Border Payments

Visa and SWIFT have collaborated to streamline international business-to-business (B2B) payments by strengthening connectivity between their networks.[96] This partnership will increase the speed and efficiency of cross-border payments by using SWIFT's Payment Pre-validation of Visa's B2B Connect Payments to identify and eliminate potential errors before transactions were conducted, thus reducing delays. Tracking data powered by SWIFT will also increase end-to-end transaction visibility.

PPPs to Test the Feasibility of New Technologies in Cross-Border Payments

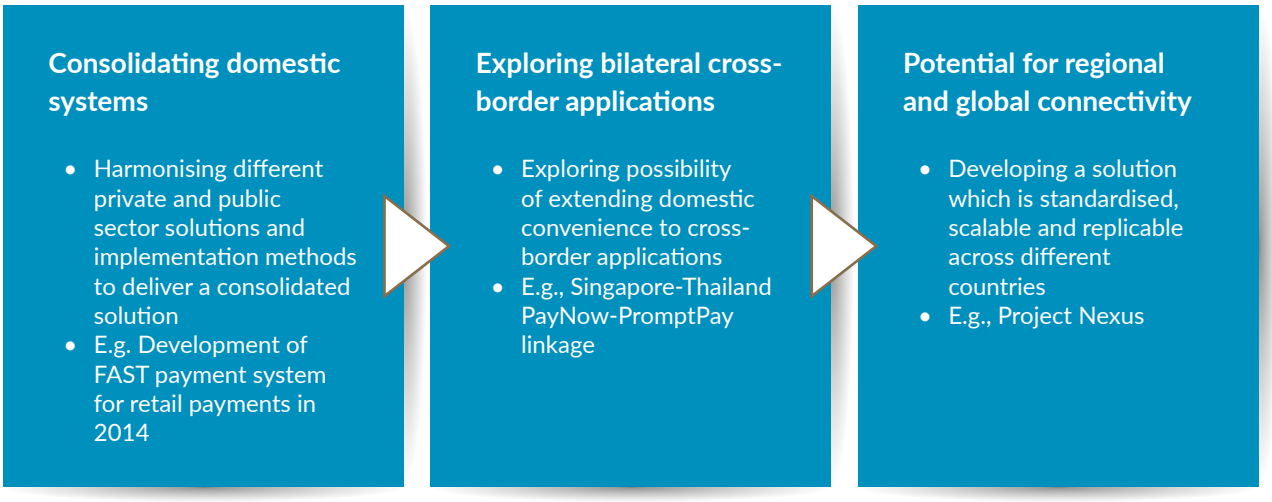
The government has embarked on various initiatives with the private sector to encourage greater interoperability across payments solutions. These initiatives leverage technological advancements to lower the cost and enable greater efficiencies in cross-border payments, thereby increasing inclusion and access for businesses and individuals. An area that has seen significant progress is the development of payments infrastructure which enables cross-border retail real-time payments (RTP). This was developed with the primary aim of lowering the cost of remittances by offering greater convenience and access in small value cross-border transfers.

Case Study: Linking National Retail Payment Rails with Project Nexus

As domestic fast payment systems (FPS) reached a level of maturity in the region, there presented opportunities to link these systems and develop cross-border payment infrastructure. After the success of multiple bilateral linkages in the region which provided a blueprint for connecting FPS,[97] the next step was to explore a model which could scale efficiently and facilitate greater interoperability between FPS globally. In 2022, the Bank for International Settlements (BIS) and MAS launched a proof-of-concept for Project Nexus, which explored the feasibility of enhancing global payments network connectivity via multilateral linkages of countries' national retail payment systems onto a single cross-border network.

The creation of a working prototype of Project Nexus was subsequently used to connect the test systems of three established RTP systems: the Eurozone's TARGET Instant Payment Settlement system, Singapore's FAST system and Malaysia's Real-time Retail Payments Platform. The prototype illustrated that connecting RTPs multilaterally is technically feasible and could have significant benefits for participating countries.[98] This project has most recently completed its third phase in 2024 and is looking towards the live implementation involving Bank Negara Malaysia, Bangko Sentral ng Pilipinas, the MAS, the Bank of Thailand and the Reserve Bank of India.[99]

Process in Exploring Applications in Retail Real-Time Payment (RTP) Systems



Other trials have explored how new payment technologies can enable more **secure** cross-border transactions across retail and wholesale transactions.

- **UBIN+** – Cross-border foreign exchange (FX) settlement with wholesale CBDCs: UBIN+ builds on Project Ubin which explores the use of blockchain and distributed ledger technology (DLT) for the clearing and settlement of payments and securities.[100] UBIN+ focuses on studying potential business models and governance structures, developing technical standards and infrastructure, establishing policy guidelines for cross-border FX settlement and includes the use of cryptography to increase the protection of data and identity.[101]

- **Project Guardian** – Use of blockchain in institutional digital assets trading: This project explores the use cases for secured borrowing and lending on a public blockchain-based network and would enable stakeholders to assess the risks and benefits offered by the tokenisation of assets. This includes the introduction of regulatory safeguards and controls into financial protocols to minimise the risk of tokens being compromised.[102]

Key Challenges in Facilitating Interoperability

These projects have been crucial in revealing challenges in connecting various national payments systems and facilitating interoperability. Projects at this scale will need to address challenges surrounding **technical** and **regulatory interoperability**. The latter remains a key barrier given the disparities in regulatory frameworks and governance structures across different countries.

Technical Interoperability: Harmonising different technical standards, messaging formats and processing flows across different domestic systems.

E.g., Adoption of ISO20022 for payments: *An open global standard for financial information. It provides consistent, rich and structured data useable for every type of financial business transaction, enabling interoperability between stakeholders in the payments ecosystem.*[103]

Regulatory Interoperability: Ensuring there is consistency in legal, regulatory and supervisory frameworks across different countries. This covers a broad range of regulatory frictions which vary for each PSP. These include data privacy and security legislation, differences in regulatory and oversight frameworks, compliance with AML/CFT and limited access to payment systems and infrastructure.[104]

E.g., Regulations on cross-border data flows: *Data collection and information-sharing across borders are necessary for effective supervision, oversight and risk management for regulators and PSPs. Recent policies mandating specific types of data to be localised pose additional barriers to cross-border payments, leading to delays in processing speeds and increasing overall cost. Regulators will need to balance enabling cost-efficient cross-border payments and ensuring sufficient protections for data. Considering the heterogeneity of data governance frameworks around the world, other mechanisms will be needed to set baseline rules and standards which enable data flows.*

Promoting ASEAN Integration

Singapore has attempted to strengthen connectivity by deepening its linkages with like-minded partners through various mechanisms. These include more formalised mechanisms like Digital Economy Agreements (DEAs) to set rules and standards for the digital economy, as well as various Memorandums of Understanding (MOUs) on areas of mutual interest. Some of these initiatives aim to connect different domestic digital utilities[105] and systems, for example through establishing linkages between RTP systems and encouraging digital trade.[106] Whilst exploring opportunities with like-minded partners globally, Singapore has concurrently emphasised the importance of ASEAN in developing rules and standards of its own, especially amidst increasing global economic fragmentation.

"Singapore believes a more integrated and connected digital ASEAN will benefit all of us. This is especially so if we can identify areas of potential to unlock."

Minister for Digital Development and Information of Singapore, Mrs Josephine Teo at the 4th ASEAN Digital Ministers' Meeting and Related Meetings (ADGMIN) 2024[107]

ASEAN economic integration is thus imperative for the region's long-term growth. Initiatives to deepen trade integration and collaboration to facilitate cross-border flows of goods, services and people must also extend to digital payments and its enabling mechanisms. Current ASEAN-level initiatives such as the 2023 ASEAN Leaders' Declaration on Advancing Regional Payment Connectivity and Promoting Local Currency Transaction,[108] Strategic Action Plan (SAP) for Financial Integration (2016– 2025)[109] and Policy Guidelines of the ASEAN Payments Policy Framework for Cross-Border Real Time Retail Payments[110] have sought to improve the availability, accessibility, affordability, sustainability, safety and efficiency of cross-border payments. Moving forward, the ASEAN Digital Economy Framework Agreement (DEFA) has great potential to establish rules and standards for key issues in the digital economy and reconcile different approaches to data governance. Achieving consensus on some of these areas can help reduce regulatory frictions and therefore compliance costs for businesses.

Coexistence and Collaboration, Not Competition

Encouraging interoperability in cross-border payments will require stakeholders across the ecosystem to commit substantial time and resources. This includes the need to upgrade legacy infrastructure and encourage wide-scale adoption of technical and regulatory standards in cross-border payments.

These areas are especially challenging to move on for pilots testing the feasibility of new payments solutions given the lack of an established regulatory landscape and thus the need for multiple iterations to address complex challenges. Project Nexus, for example, was conceptualised in 2021 and has only recently completed the blueprint required for connecting domestic RTP systems, preparing for live implementation in 2024.[111] Other pilots involving digital money, including the use of wholesale CBDCs, will likely take more time given that domestic live implementation will only commence in 2024.[112]

There will continue to be a market for existing cross-border payment methods and, looking ahead, for different PSPs to co-exist and collaborate with one another. The value of improving on existing payment systems and methods should not be overlooked amidst ongoing innovations in new payment technologies. B2B partnerships in this area have supported innovation and encouraged open networks to enable greater ease of cross-border payments.

Ultimately, the value of a diverse payments ecosystem lies in its ability to cater to a broad range of different needs, enabling greater choice for consumers and businesses. There will continue to be trade-offs between speed, cost and coverage among different cross-border payment methods, which will determine its usage. Ongoing efforts to facilitate greater interoperability in cross-border payments should thus focus on how to ensure consumers can access and confidently use new forms of payment, leveraging partnerships to build on individual efforts where relevant.

4. Policy Recommendations

1. Digitalising the Wider Supply Chain Ecosystem

To create an enabling environment for businesses to adopt digital payments, greater efforts must be directed to digitalising trade processes across the entire supply chain. While digital trade facilitation has seen progress over the last few years, digitalising trade documents and processes will require concerted efforts among all stakeholders to develop frameworks for global trade and overcome barriers to adoption. Globally, the International Chamber of Commerce and World Trade Organization have developed a Standards Toolkit for Cross-Border Paperless Trade, which provides an overview of existing standards to drive trade digitalisation and identify gaps which need to be addressed.[113] Regional efforts to facilitate greater interoperability must also keep pace. Governments in the region must develop consensus on digital trade rules and equip supply chain ecosystem stakeholders with tools to digitalise and adopt interoperable standards.

SMEs, in particular, will require greater support to digitalise and adopt digital payment solutions. While the government has introduced initiatives towards this end,[114] SMEs continue to face issues related to access and affordability. Future efforts can consider further segmenting SMEs by digital maturity to assess their level of readiness in adopting digital payments, which would also help larger companies develop tailored solutions to address them. For example, companies with entrenched legacy payment systems will require more support and resources to transition to updated ones, while newer SMEs will find plug-and-play solutions easier to implement.

2. Developing Products and Frameworks that are Secure-by-Design

Given that cyberthreats are becoming more complex and convincing, it will become more challenging for businesses and consumers to identify and respond cyberthreats when they occur. Current efforts to raise the level of cyber hygiene in society through education and awareness will no longer be sufficient. Moving forward, there is a need to build resilience into business processes and technology by developing standards and creating products which are secure-by-design.

- **Technology:** A greater responsibility should be placed on the developers of software and hardware to ensure that products have robust security features and undergo rigorous testing before launching them. This would address the issue of supply chain vulnerabilities and the likelihood of single points of failure. While it will impact the time-to-market of new products and solutions, these standards are important to ensure that innovation does not compromise on security.

- **Processes:** Introducing greater friction in business and consumer processes can help deter or prevent individuals from taking certain actions. These measures can include increasing the downtime after making a large-value transaction, or introducing tiered authentication checks when authorising large sums of money. The introduction of Money Lock by local banks in 2023 is a good example of a measure that limits the amount of money customers can transfer digitally.[115]

3. Nudging Secure and Safe Behaviour

As most scams continue to be self-authorised, there is a need to nudge safe and secure behaviour among consumers, particularly for younger adults which currently comprise the majority of scam victims in Singapore.[116] This demographic tends to believe that they are less susceptible to scams given their familiarity with digital technology and higher levels of financial literacy. Thus, it is important to increase awareness of the types of scams this demographic faces and develop more compelling ways to engage them. Financial services platforms can facilitate this by leveraging user data to create an archetype which represents this demographic, or by developing new narratives which are more engaging.

4. Enhancing the Quality and Availability of Sustainability Data

The flow of reliable ESG data is crucial for firms to mobilise capital for sustainable projects, monitor their progress in achieving net zero targets and assist with sustainability reporting. While larger firms are mostly equipped to collect and process financial data, the collection of sustainability data continues to be challenging due to difficulties in certifying the reliability and accuracy of data. This is considering that SMEs make up most supply chains and often do not have the capabilities to adopt digital tools. This will require addressing challenges surrounding ESG compliance and supporting firms to develop the necessary infrastructure to reliably track and manage sustainability data. Project Greenprint has been gaining traction among larger players, and future efforts should explore how to increase its accessibility and overcoming barriers to adoption among SMEs.

5. Strengthening Public-Private Partnerships (PPPs)

PPPs have been successful as a model of collaboration by leveraging strengths from both the public and private sector to spur innovation. While there are multiple ongoing pilots in this space, the main challenge for PPPs is having sufficient buy-in from a broad range of key stakeholders to scale a successful proof of concept. Future PPPs can thus consider adopting a 'purpose-driven' approach to innovation and involve a broader range of stakeholders in conversations prior exploring a proof-of-concept.

- **Purpose-driven innovation:** Considering the limited bandwidth to embark on multiple live projects, exploring future innovation would need to be more targeted and focus on specific areas Singapore wants to develop moving forward. This will require compelling use cases for solutions not just in Singapore, but for the region.

- **Involving a broader range of stakeholders:** Given that non-financial industries have a nexus with payments, and digital payments are becoming more borderless, it is imperative to consider the perspectives of stakeholders who have been integrated into the new ecosystem. This ensures that innovation remains relevant, and regulation is fit-for-purpose. As the ecosystem grows, part of this includes ensuring that payment infrastructure is accessible to a wider range of stakeholders.

6. Ensuring Regulation Keeps Pace with Innovation

Regulation must remain responsive to innovation even as emerging technologies spur the growth of new NFIs and FinTechs. This will require regulators to periodically review and improve on current regulatory frameworks and take efforts to understand the risks and opportunities in a nascent area. Striking a balance between innovation and regulation is crucial to cultivating an innovation ecosystem, particularly in enabling start-ups, which continue to face high compliance costs. In addition to PPPs and other working groups, regulators can also consider strengthening other mechanisms to in response to new solutions. For example, regulatory sandboxes can include longer time horizons for new projects, providing more time for start-ups to iterate and explore the technical feasibility of a solution.

7. Cultivating Talent Pool

Upskilling workers to ensure that they are well-equipped with relevant skills in a fast-evolving digital landscape will be crucial to ensure Singapore remains competitive as a regional hub. Rising costs have become an increasing concern for international firms,[117] and cultivating a skilled workforce will be key in distinguishing Singapore's value proposition. Skills that are required to support the growing RIE ecosystem are changing rapidly, even within the same jobs. This phenomenon is likely to be compounded with the advent of generative AI, given its potential to augment and disrupt current jobs.[118]

Given that the return on investment to upskill and hire new talent is only visible in the medium to long-term, the government should continue subsidising upfront costs for SMEs to hire and provide training and development programmes to enhance tech skills in the current workforce. This must be complemented with efforts to reframe employers' current approach to hiring. To strengthen Singapore's workforce in the long-term, a 'skills-first' approach must be adopted given the dynamic nature of the job market.

5. Conclusion: Collectively Shaping Our Digital Future

The future of payments in Singapore will be simultaneously shaped and influenced by key trends within the payments space and broader themes in the digital economy. By showing how inclusion, security, sustainability, innovation and interoperability are influencing the payments landscape, we hope to highlight how the growth of digital payments will be supported by several underlying enablers which are crucial in creating a safe, secure, and inclusive financial ecosystem. These include the importance of providing greater support for SMEs, ensuring a diverse and well-equipped talent pool and ensuring a responsive regulatory environment.

There will be a need to strengthen these enablers in response to an increasingly complex operating environment. Collaborative efforts between governments, businesses and other financial ecosystem players will be crucial in ensuring existing measures remain relevant. We have consolidated these as recommendations that financial ecosystem stakeholders can consider implementing.

While this report focuses on Singapore, we hope that our recommendations may serve as a point of reference for the broader region as it accelerates digital adoption. Examples of innovations in payment technologies highlighted in this report have immense potential to help countries achieve their goals of inclusive and sustainable growth, while some of the practices featured could provide countries with solutions to emerging challenges they may face in digitalising the financial sector. This will be useful even as ASEAN negotiates the DEFA, which aims to develop rules and standards for key areas of the digital economy, with the aim of promoting greater regional digital integration.

6. Appendix: Participating Organisations

The SIIA would like to thank the following organisations for their contributions to the report. We are grateful to all parties for sharing their insights and perspectives with us.

1	Accredify
2	Agridence
3	AI Singapore
4	Airbnb
5	Amazon
6	American Chamber of Commerce Singapore
7	Atome
8	Bank for International Settlements (BIS)
9	Cisco
10	Creative Eateries
11	Cyber Security Agency of Singapore (CSA)
12	DCS
13	Enterprise Singapore
14	Evonik
15	Experian
16	Google
17	Grab
18	IBM
19	International Chamber of Commerce, Digital Standards Initiative
20	KPMG

21	Lalamove
22	LGT Bank
23	LinkedIn
24	Monetary Authority of Singapore (MAS)
25	Maybank
26	Angsana Council
27	OCBC
28	Paypal
29	PCI Security Standard Council
30	PwC
31	SAP
32	SEA Group
33	Singapore Business Federation (SBF)
34	SMBC
35	Standard Chartered
36	SWIFT
37	Tech for Good Institute (TFGI)
38	UOB
39	Ya Kun

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