ISSN 2063-5346

# DEVELOPING A LOW CARBON ECONOMY THROUGH SUSTAINABLE DIGITAL FINANCE: AN EVIDENCE FROM ASIA-PACIFIC

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**Article History: Received:** 12.05.2023 **Revised:** 25.05.2023 **Accepted:** 05.06.2023

**Abstract**

Finance is an important support for the low-carbon transformation of the real economy, and digital finance, as a new direction of financial development, has a significant influence on carbon emissions; therefore, it is critical to investigate the relationship between digital finance and carbon emissions in order to develop carbon reduction strategies from the financial side. In the digital economy, data is arguably the most valuable resource. It has the potential to be a driving force in creating a more sustainable world if used effectively and responsibly. Given its central role in the financial system, as well as its access to and use of data, the potential is especially potent in the financial sector. Data can be captured by sensors in the environment and structured to integrate sustainability into existing financial products and services using technologies such as blockchain, artificial intelligence (AI), mobile technology, internet of things (IoT), and the cloud. These can be creatively combined to create entirely new long-term digital finance products. This paper has attempted to gather and present the data showcasing the scenario of sustainable digital finance in Asia- Pacific. The findings of the study suggested that the region has embraced the ways leading to sustainability.

**Keywords:** SDG, Sustainable finance, Digital Finance, Low Carbon Economy and Asia-Pacific

## Introduction

Environmental concerns in general, and climate change issues in particular, are moving from the domain of corporate Environment, Health, and Safety (EH&S) personnel into the domain of corporate financial strategy, which includes chief executive officers (CEOs), chief financial officers (CFOs), and boards of directors. Few have escaped the impact of this transformation, from companies and cities managing their greenhouse gas emissions to equity and debt analysts paying close attention to climate liabilities as well as physical concerns about the potential impacts of climate change patterns.

Climate change has numerous economic implications that could result in a significant shift in financial services. (Bopp, 2020). Indeed, among the numerous issues critical to the financial industry, this phenomenon is at the top of the business agenda. When considering the relationship between the financial sector and "sustainable development (SD)," at least three significant aspects must be considered. First, the financial sector can have an impact on the environmental and sustainability aspects of its clients, such as projects, debtors, and investors (Thompson & Cowton, 2004; Weber, 2014), which is considered an indirect influence on sustainable development. Clearly, the indirect effects of finance are significant, as access to capital is a critical premise for business success.

In many ways, environmental regulations have influenced and continue to influence the financial sector (Weber et al., 2010). Environmental regulations, for example, concerning pollution of water, soil, and air, influenced how environmental risks were managed in credit risk management during the 1990s. (Boyer &Lafont, 1997). The numerous opportunities and risks associated with sustainability (for example, poverty alleviation and climate change) have increased and continue to emerge, and must be addressed effectively by the financial sector. (Richardson, 2009). However, it should be noted that the financial sector has frequently been reactive rather than proactive in dealing with such sustainability challenges. The pressures exerted by stakeholders with a focus on SD have an impact on financial institutions' reputational risks and financial performance (Evangelinos & Nikolaou, 2009)(Scholtens & Zhou, 2008).

The 17 Sustainable Development Goals (SDGs) are a part of the 2030 Agenda for Sustainable Development, which was adopted by all United Nations Member States in 2015 and is expected to be completed by 2030 (United Nations, 2020). They are a universal call to action to end poverty, protect the planet, and improve the lives and prospects of everyone around the world.

The United Nations estimates that achieving the SDGs will require an investment of $5 trillion to $7 trillion (Craig, 2021). With the unprecedented outbreak of a global pandemic in 2020, the United Nations Development Programme (UNDP) launched the SDG Finance Taxonomy to provide a roadmap for managing the financing and transaction costs of SDG-aligned projects (Wang et al., 2020). The taxonomy also calls for private capital, finance instruments, and financial institution support to help achieve the SDGs. SDG 17, on partnership for goals, is earmarked as a lynchpin for meeting the financial needs required for SDG-related activities (MacDonald et al., 2019; Rizzello & Kabli, 2020).

## Global warming concerns and need of low carbons

Human-caused warming exceeded 1°C (probably between 0.8°C and 1.2°C) above pre-industrial levels in 2017, increasing at a rate of 0.2°C (probably between 0.1°C and 0.3°C) per decade. According to IPCC, global warming is defined as an increase in combined surface air and sea surface temperatures averaged over the globe over a 30-year period. Warming is

expressed relative to the period 1850-1900, which is used as an approximation of pre-industrial temperatures in AR5. Warming refers to the estimated average temperature over the 30 years centered on that shorter period, taking into account the impact of any temperature fluctuations or trends within those 30 years.

Limiting global warming to well below 2°C and achieving the 17 Sustainable Development Goals (SDGs) will necessitate nearly $4 trillion USD in annual funding. Currently, investment is only about 35% of what is needed, leaving a $2.5 trillion USD investment gap1-2. Furthermore, the costs of deep economic decarbonization are difficult to estimate, with a recent MIT study estimating that extracting carbon from the atmosphere will cost up to $535 trillion USD by 2100 if we do not act quickly. In comparison, if global carbon emissions fall by 6% per year beginning in 2021, the cost would be reduced to around $100 to $200 billion USD per year.

Achieving these transformative changes will necessitate not only technological innovation and political will, but also significant financial innovation. The global financial community is pushing for a sustainable finance agenda. Leaders are urging commercial banks and other financial ecosystem actors to collaborate and provide innovative sustainable finance solutions, ranging from the IMF/World Bank's Bali Fintech Agenda4 to the G20 Eminent Persons' Group report titled "Making the Global Financial System Work for All"5.

For lowering the carbon emissions and controlling the global warming and achieving the sustainable goals a complete different, unique and innovative eco-system is required. Sustainability is the need of the hour and can be achieved through some efforts and few changes.

**Sustainable Finance**

Sustainable finance is the process of incorporating environmental, social, and governance (ESG) considerations into financial investment decisions, resulting in longer-term investments in sustainable economic activities and projects. Environmental considerations may include climate change mitigation and adaptation, as well as the environment in general, such as biodiversity preservation, pollution prevention, and the circular economy. Inequality, inclusiveness, labour relations, investment in human capital and communities, and human rights issues are all examples of social considerations. The governance of public and private institutions, including management structures, employee relations, and executive remuneration, is critical to ensuring that social and environmental considerations are included in decision-making.

At the intersection of finance and the SDGs, sustainable finance has emerged as an important concept. In 2020, capital markets raised more than $400 billion in new funds, including $357.5 billion from sustainability bonds and $76.5 billion from green bonds (Refinitiv, 2020; United Nations, 2020). The definition of sustainable finance is very broad, encompassing numerous dimensions of sustainable ways to achieve finance and investment goals. According to the European Commission (2021), sustainable finance is an evolving process that takes into account environmental, social, and governance (ESG) factors in financial and investment decisions. However, this definition is extremely limited to ESG factors. This necessitates a broader and more inclusive definition that speaks to overall sustainability. In this regard, we propose that sustainable finance include all activities and factors that make finance sustainable and contribute to sustainability, a definition that we believe complements the numerous goals set by various stakeholders. Attaining sustainable policy objectives across multiple jurisdictions can

be accomplished through a variety of means, including climate finance, carbon and ESG disclosure, green bonds, and socially responsible investment (Alsaifi et al., 2020; Barua & Chiesa, 2019; Lokuwaduge & Heenetigala, 2017; Migliorelli, 2021; OECD, 2020; Widyawati, 2020).

**Digital Finance**

The use of digital devices and digital technology to acquire, use, and distribute financial resources to economic agents such as individuals, households, businesses, and governments is referred to as digital finance (Siddik and Kabiraj, 2020; Ozili, 2018). During the dot.com bubble in the early 2000s, the use of digital technology in finance began. After the 2007–2009 global financial crisis, financial institutions began to use digital technology to process cross-border payments, manage customers' accounts, save money, and maximize profits.

For a variety of reasons, digital finance is critical to modern finance. One, digital finance is significant because almost all financial instruments traded in global financial markets use digital financial platforms, technologies, or infrastructure (Moșteanu, 2019; Feyen et al, 2021). Two, digital finance is significant because most of today's disruptive financial innovations, such as private digital currency, crypto currency, embedded finance, internet finance, block chain finance, decentralized finance, artificial intelligence (AI) finance, and central bank digital currency, are all the result of varying degrees of advancement in digital finance (An et al, 2021; Wullweber, 2020; Zetzsche et al, 2020; Ozili, 2019). Three, digital finance is important because it saves users time and money by eliminating the need for them to visit a financial institution to perform basic financial transactions (Nagle et al, 2020; Ozili, 2018). Four, digital finance is significant because it allows financial service providers to focus on improving the efficiency of their financial product and service offerings rather than spending too much time resolving soft issues, such as human-side issues (Wang et al, 2020). Five, digital finance is significant because it has the potential to increase financial inclusion by bringing unbanked adults into the formal financial sector, allowing them to access finance (Ozili, 2018; Durai and Stella, 2019; Ozili, 2021). Finally, digital finance is important because it increases consumption spending and investment, which helps to drive economic growth (Li et al, 2020; Guo et al, 2021; Sadigov et al, 2020).

**Sustainable digital finance**

Financial technology (fintech) innovations drive financial innovation by lowering the costs of providing basic and advanced financial services exponentially, opening up new opportunities for banks and start-ups alike. Innovation based on technologies such as AI, IoT, and blockchain has the potential to break down existing barriers to scaling sustainable finance and create entirely new sustainable financial products, services, and markets. This is referred to as "sustainable digital finance."

Sustainable Digital Finance refers to financing, as well as related institutional and market arrangements, that use technological ecosystems - such as mobile payments platforms, crowd-funding, peer-to-peer lending, finance-related big data, artificial intelligence, machine learning, blockchain, digital tokens, and the internet of things - to help achieve strong, sustainable, balanced, and inclusive growth.

Many fintech solutions are not explicitly designed to provide sustainable finance, but they can be used by banks to do so. The timing is ideal, as the fintech landscape shifted in 2018, from a desire to overthrow banks to start-ups and scale-ups increasingly seeking symbiotic collaboration6. Financial institutions are also increasingly recognizing the importance of collaborating with FinTechs

to innovate their business models and product offerings. In the next three to five years, 82% of these institutions expect to expand their fintech partnerships.

Integrating digitization and sustainability at the strategic and operational levels to become a bank powered by sustainable digital finance is a difficult process. Adoption of new technologies, learning, and changes in long-established practises such as incentive systems and decision-making loci, as well as significant cultural evolution and even revolution, are required for transformation. In practice, transformation is generally non-linear, which means that each new capability underpinning change does not have to be implemented sequentially.

**Objectives of the study**

To understand the concept of sustainable digital finance (SDF)

To present the current scenario of Sustainable Digital Finance in Asia-Pacific

**Research Methodology**

This study is based on descriptive analysis, and all of the data was gathered from secondary sources. The purpose of this research is to investigate the current sustainable digital financial activities practiced in Asia Pacific during last five years. Graphs are used as a data interpretation tool.

**Scenario of Sustainable Digital Finance in Asia-Pacific**

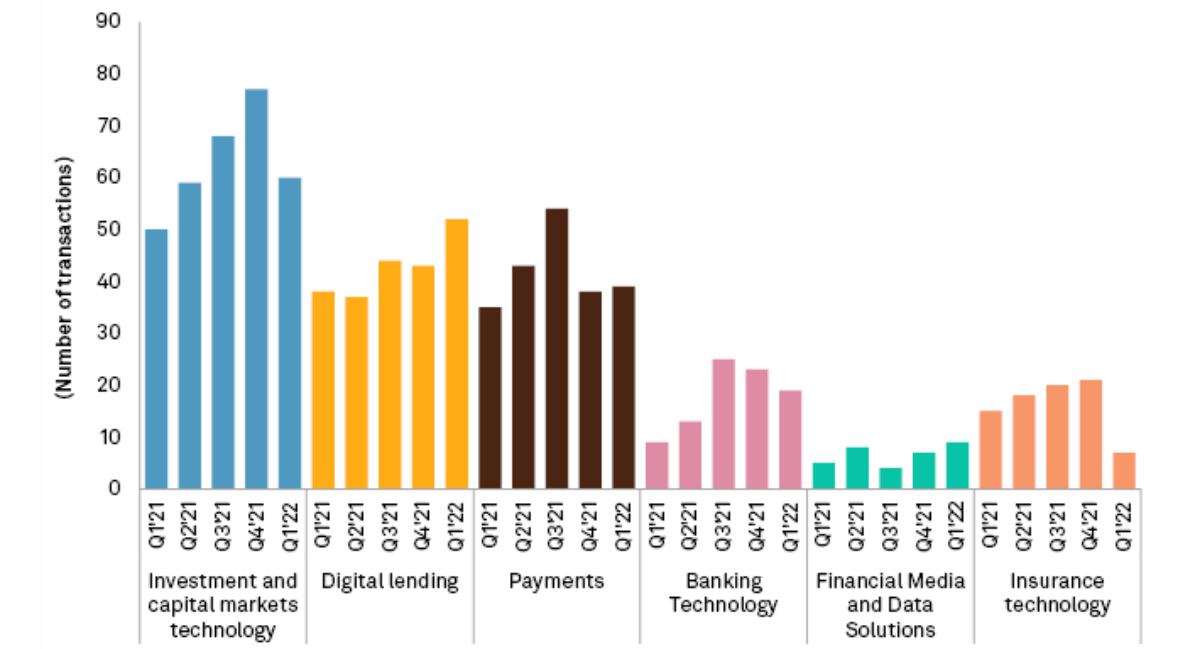
During and Post COVID 19, the finance industry has undergone tremendous changes. The industry has experienced the rise of Fintech services i.e. digital banking, digital payments etc . Innovations in financing activities like crowd funding, peer-to-peer funding is also one of the substantial characteristic of the new era of finance industry. These innovations were adopted and welcomed by the global economies. The evidences of adoption and adaptation to these were more prominent by the young economies of Asia-Pacific.


Fig. 1 SDF Eco-system

The concept of sustainable digital finance has commanded and included the activities like personal finance, lending and borrowing, money transfers, block chain, financial markets wealth management and so on.

According to a McKinsey report, over 700 million Asian consumers use digital banking on a regular basis (Barquin and Hv, 2015). Digital financial services are being used to increase access to finance for the poor and women in India, Indonesia, Mongolia, Myanmar, Pakistan, and the Philippines. In East Asia and the Pacific, there are currently over 775 million potential female mobile money users. According to the Ernest and Young global Fintech adoption index 2019 report, two

Asian countries, China and India, have the highest Fintech adoption rates in the world, at 87% and 87%, respectively, followed by Singapore. According to a 2017 Asian Development Bank report, digital financial services could increase Asian economies' GDP by 14%, with the potential to increase GDP to as much as 32% in Cambodia, a much smaller market.3 Factors assisting the development of Asia's digital finance ecosystem include an enabling framework for payment provision, widespread use of e money, and regulation that allows the use of agents by both ban and ban.




*Source : S&P Global Market Intelligence*

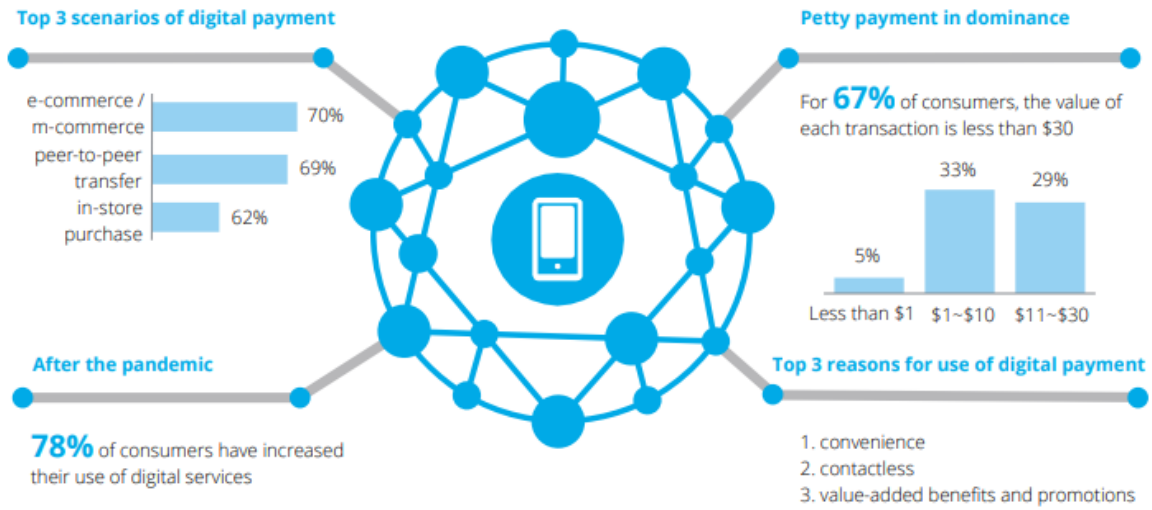
Fig. 2 Digital Finance in Asia-pacific

Post COVID 19 Asia-Pacific is experiencing a boom in digital financing and fintech sectors. The shift from traditional to digital is very much evident throughout. In 2021, institutions and individuals have shifted to digital, in various quarters and under various sectors, the shift was experienced.

**Rise of Sustainable Digital finance in Asia-Pacific**

***Digital Payments and fintech scenario in Asia-Pacific***

Asia's young and vibrant economies are rising stars in the digital economy's development. The region has emerged as the "next wave," offering enormous opportunities in digital life adoption. The rapid rise in digital consumption in South and Southeast Asia can be attributed to four factors, First, the region's population is large and young, with digital lives boosted by social media. Second, the region's large unbanked and under banked population has spurred the growth and rapid adoption of digital financial services accessible via smart phones, which further promotes the adoption of digital payment. Third, with a high mobile penetration rate in the region, consumers are more inclined to opt for m-commerce transactions.

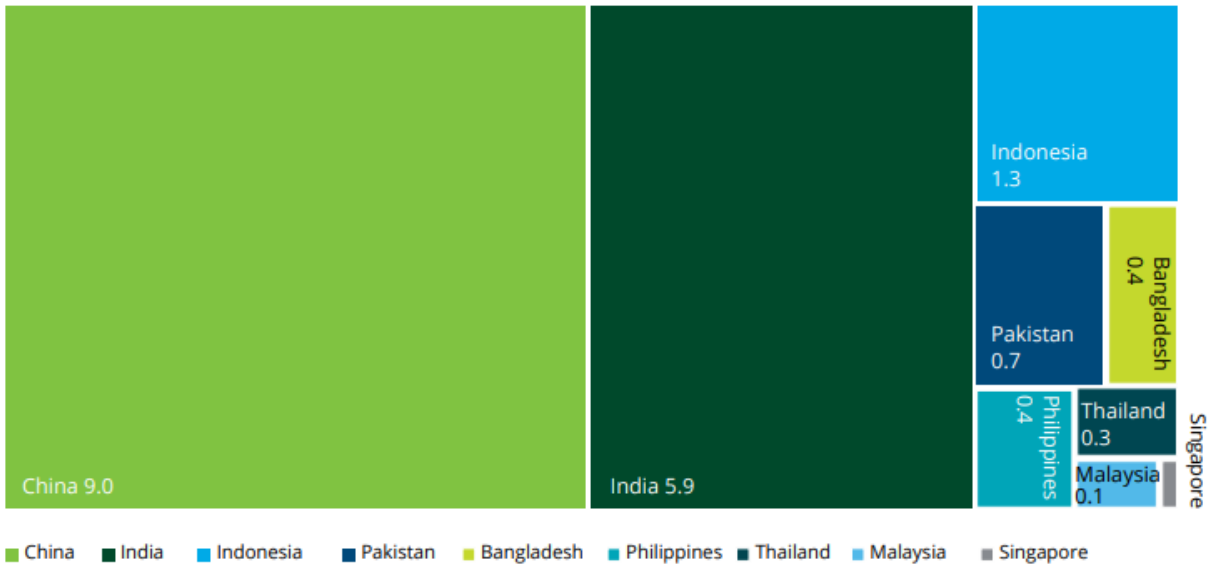



*Source: Deloitte Research*

Fig. 3 Portrait of Digital Payment in Asia-Pacific

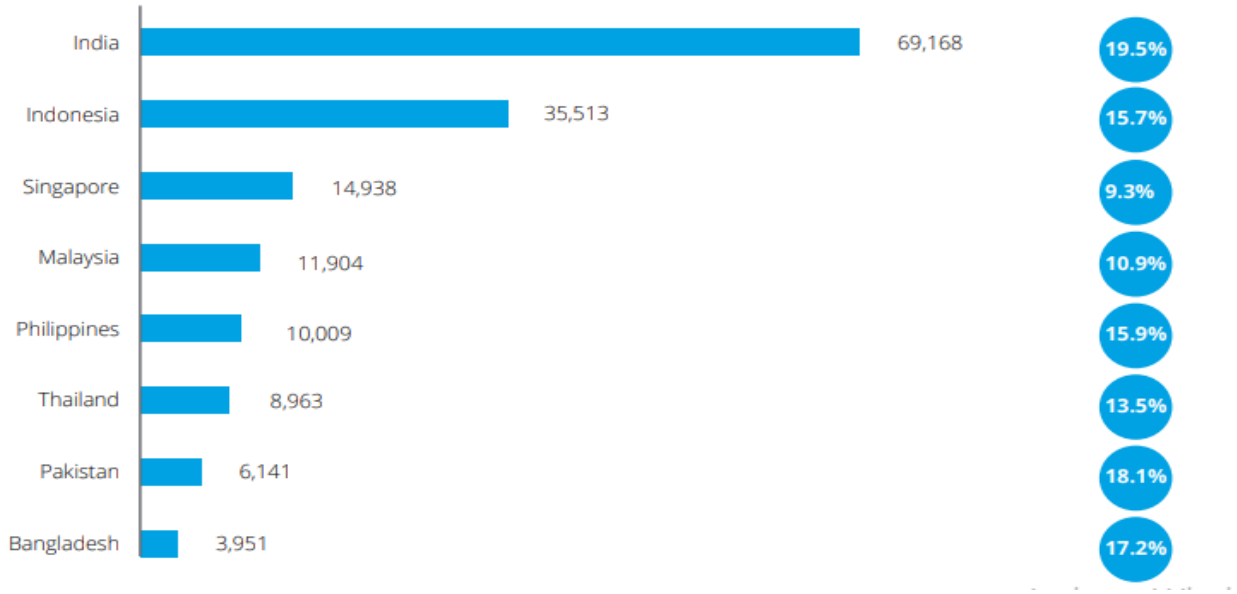
In 2019, 87% of people in China and India reported using fintech apps. The adoption of fintech apps is 67% in Hong Kong and Singapore, reminding us that the variety in the Asian region is vast and should be considered. In general, China appears to be ahead and most willing to adopt fintech. Money transfer and payment solutions are used by 95% of the Chinese population. This accounts for 75% of the world's population. For in-store mobile payments, non-bank fund transfers, and peer-to-peer (p2p) payments, Chinese consumers prefer fintech applications over traditional methods. Finally, the adoption rate of SMEs is 61%, the highest adoption rate in the world. In the United States, which ranks second, the adoption rate among SMEs is 23%.

From 2017 to 2019, global users of electronic wallets increased from 500 million to 2.1 billion, with developing countries accounting for the lion's share of the growth, and China and India accounting for 70% of all users. Digital payments advanced at an unprecedented rate in 2019. Initially, mobile currency was only available in a few select markets. It has now become a global phenomenon, with surprising growth in emerging markets, benefiting a large number of users. In terms of the quantity and scale of digital payment use, China, Japan, and South Korea have a clear lead. In China, the proportion of digital payments is as high as 86%, and its popularity is roughly three times the global average. India and Indonesia have reached the second tier of digital payment volume due to their large population bases.In China, the proportion of digital payments is as high as 86%, and its popularity is roughly three times the global average. India and Indonesia have reached the second tier of digital payment volume due to their large population bases.



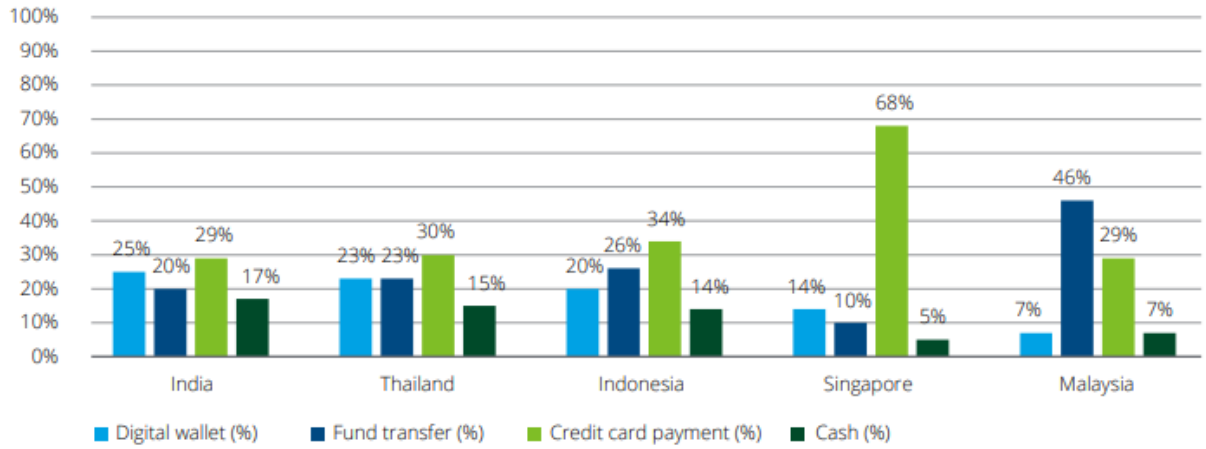

*Source: Deloitte Research*

Fig. 4 Digital payment users in Asia-Pacific (2020, 100 million people)




*Source : Statista*

Fig. 5 Value of digital payment in Asia-Pacific (USD million) and expected 2020-2024 annual CAGR(%)




*Source: JPMorgan*

Fig.6 Digital payment preferences in Asia-Pacific

Despite the difficulties that the year 2020 brought to governments and people across the Asia Pacific, the fintech industry was one of the few bright spots. Throughout the region, billions of people and businesses have gone digital, a movement hastened by the pandemic. Fintech is one of the few areas of the economy that has risen in recent years. The fintech industry is expected to grow at a rapid pace in Asia-Pacific.

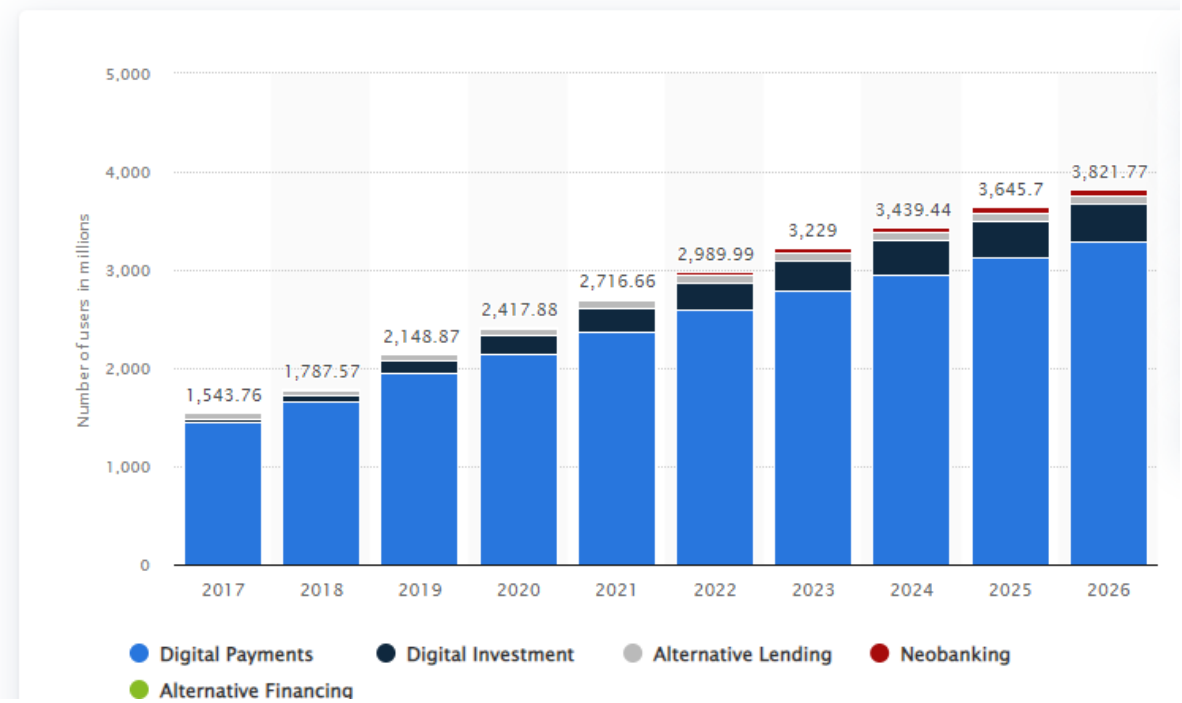
The Asia-Pacific fintech industry is expected to expand rapidly. There are numerous opportunities in the rapidly changing Asia-Pacific fintech market, and investment in them is rapidly expanding. Open banking and other regulatory initiatives are reshaping the financial services industry, and third-party providers can now access data from previously owned bank customers.

Financial services are much more prevalent in China and India. Singapore already has the best mobile payment solutions to promote island acceptance. Advanced FinTech technologies are quickly becoming woven into the fabric of daily life in mature countries such as Australia and Japan.

Consumer use of FinTech-powered services has increased, and in some cases tripled, in key Asia-Pacific economies in just two years. FinTech adoption is 67% in Hong Kong, Singapore, and South Korea,. Except for India, which is now nearly tied with Asia's leading digital power, most markets still lag far behind China's 87% penetration.

Fintech apps are rapidly gaining popularity in the Asia Pacific, outpacing other regions. It was discovered that there were over 1230 fintech apps available in the Asia Pacific as of 2020, and marketers spent USD 244 million to acquire new users in 2020 alone. Within this region, a total of 2.7 billion installations occurred between Q1 2019 and Q1 2021. India, Indonesia, and Brazil account for nearly half of global fintech app downloads.

In general, developing markets have 70% more finance app installs than developed markets. Fintech app demand increased in Indonesia, the Philippines, Thailand, and Vietnam in 2020. The region's rapid growth in financial app installations reflects the changing finance and banking landscape, as well as consumer demand.



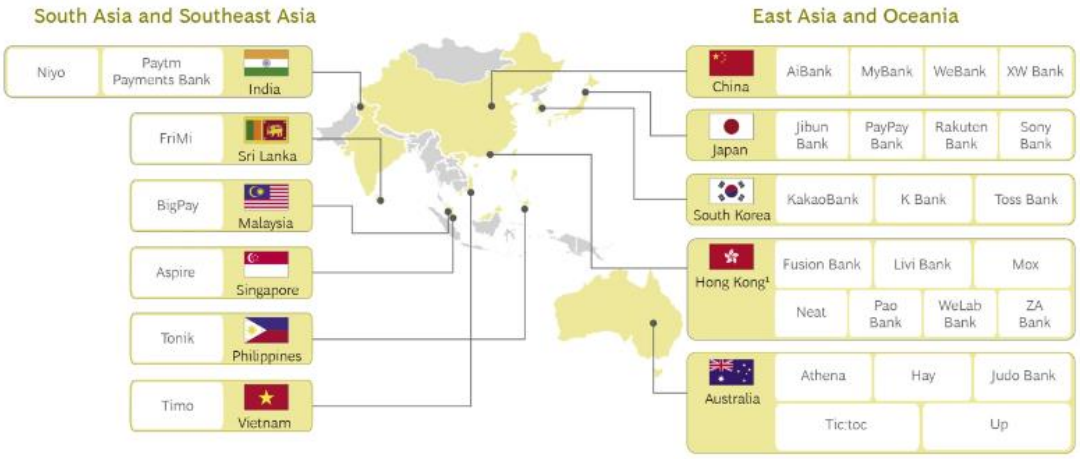

*Source : Statista*

Fig. 7 Fintech Scenario in Asia-Pacific

***Digital Banking Scenario in Asia-Pacific***

Digital banking is booming across Asia Pacific, with many new entrants and a significant increase in traffic due to COVID-19 lockdown measures. Because of high smartphone ownership and penetration, a young, digitally savvy population, and good internet infrastructure, the region has some of the most engaged users in the world. A slew of countries, including Australia, Hong Kong, the Philippines, Singapore, and Malaysia, are also about to offer digital-only banking licenses, which will spur further growth.

Digital banking is taking off in APAC, and the battle for digital consumers has begun. APAC accounts for 20% of the world's 250 digital banks. They operate throughout the region, and many are rapidly expanding. They, too, have wealthy parents: among their corporate backers and joint venture partners are incumbent local banks, global banks, technology and telecommunications firms, and e-commerce ventures. They aim to provide customers with diverse and personalised offerings, and they share key features such as electronic client servicing, a comprehensive digital infrastructure that underpins their operations, and 100% digital customer delivery.




*Source : BCG*

Fig. 8 Selected Digital Banks in Asia-Pacific

APAC is home to approximately 50 digital banks, the majority of which are consortium players backed by technology behemoths and non-financial institutions such as tech and telecom firms(Fig.8). They seek to capitalize on existing user bases, data, and technology to gain a competitive advantage. Many of these companies are new to the market. More than 70% of them were established between 2016 and 2020. The data from APAC suggest that around 64% of the total digital customers have started using the digital banking services.

### *Digital Lending scenario in Asia-Pacific*

The digital lending platform enables lenders and borrowers to lend money in an electronic or digital format, resulting in greater ease of use, a better user experience, and lower overhead due to time savings from client verification. User registration is the first step, followed by online documentation collection, client authentication and verification, loan approval, loan distribution, and loan recovery.

The increased emphasis on digital channels by both financial institutions and their customers has resulted in an increase in the market volume of payment transactions. This is expected to drive demand for digital lending platforms to handle transaction processing. In addition to existing customer data, the digital lending platform simplifies the lending process by utilising industry best practises and personalised models. It also eliminates the risk of making poor decisions, which is common in traditional lending. However, challenges such as data theft and privacy concerns are expected to stymie market growth. The digital platform is heavily reliant on technology and internet access.

A single technical issue with a device or a power outage can render a user's ability to use a digital platform virtually inoperable. Other barriers, such as underdeveloped countries' reliance on traditional lending methods and a lack of digital literacy, are expected to limit market growth to some extent.

Several companies are developing next-generation, end-to-end cloud-based lending platforms. Furthermore, advancements in payment methods are encouraging financial institutions to implement Digital Lending Platform (DLP) to increase productivity, revenue, and service speed. According to Data Bridge Market Research, the digital lending platform market was valued at 1.73 billion in 2021 and is expected to reach USD 7.59 billion by 2029, at a

CAGR of 20.3% over the forecast period.During the forecast period, the Asia Pacific Digital Lending Platform Market would grow at a 22.5% CAGR. (2019-2025).

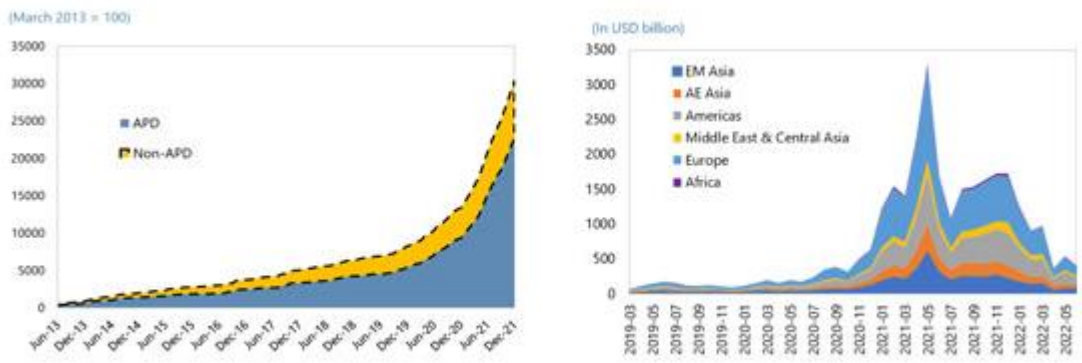

*Source : Data Bridge Market Research Market Analysis Study 2022*

Fig. 9 Digital Lending in APAC

***Digital Block chain and scenario in Asia-Pacific***

The block chain market in the Asia Pacific region has grown significantly as the number of investments in block chain-based companies has increased. According to the report of IMF, the market will reach $16 billion in the coming years, most likely by 2024. In terms of digital block chain and trade development, major Asian economies can be divided into three categories: mature markets, developing markets, and early-stage markets. China, South Korea, Singapore, and Japan are examples of mature markets; Thailand, Malaysia, Indonesia, Vietnam, and the Philippines are examples of developing markets; and Myanmar, Cambodia, Laos, and Brunei are examples of early-stage markets.

The Asia-Pacific region includes countries with a wide range of income levels and stages of financial development; as a result, there is considerable variation in their progress towards developing CBDCs. The number of times CBDCs are mentioned in speeches (Figure 10,) reflects the growing interest in CBDCs in recent years. The Asia-Pacific region's rapid increase in CBDC consideration is not limited to more advanced economies with developed financial markets. While China has been at the forefront of CBDC research, emerging markets such as India and Thailand have made rapid progress, and several low-income and Pacific Island countries (PICs) such as Nepal and the Marshall Islands are investigating CBDCs.




*Source : BIS, IMF*

Fig. 10 Total crypto asset volume in Asia – Pacific

## Conclusion

This paper has attempted to highlight the key elements of sustainable digital finance and there implementation in Asia Pacific. Researchers found that Asia Pacific has emerged as one of the epicenters of the fintech revolution, owing to the rise of tech behemoths and the expansion of payment-capable IoT devices and accompanying services. Furthermore, an additional 663 million people are expected to use mobile internet for the first time by 2025, fueling the growth of the fintech ecosystem. Consumer usage of fintech services has doubled, and in some cases tripled, across APAC between 2018 and 2020. China leads the market revolution with a penetration rate of 87%, followed by Hong Kong, Singapore, and South Korea at around 67% and Australia at 58%.

Finally, due to differences in technological advancement, willingness to embrace change, policy and regulatory support for digital finance transformation, and understanding of the risks associated with new digital finance innovation, digital finance transformation is likely to take different forms in different parts of the world. Financial institutions and Fintech players in some countries will take a cautious approach to digital finance transformation. Whereas, the evidences from Asia-Pacific has clearly signified that the region and its people are ready to embrace the change in the traditional finance, and are ready to lead to a low carbon economy through accepting the new ways of digital finances.

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