

Fintech In Green Finance

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Abstract: The fintech is playing a dominant role in provision of green finance by leveraging big data analytics and artificial intelligence to have a green transition between customers and small, medium enterprises. The Paris Agreement and the accomplishment of the Sustainable Development Goals (SDGs) will necessitate considerable additional investment. New financial technologies ("fintech"), such as blockchain, the Internet of Things, and big data, have the potential to unleash green finance innovations created around the same time as the Paris Agreement and the SDGs. This paper outlines three broad areas where fintech could be used to help with green finance: blockchain applications for sustainable development, blockchain use-cases for renewable energy, decentralised electricity markets, carbon credits, and climate finance, and financial instrument innovation, including green bonds. The study focuses on blockchain applications in sustainable development and renewable energy, with examples from Europe, which has been a pioneer in the field. The article examines the implications for Asian emerging economies and makes early recommendations for policymakers interested in leveraging fintech and blockchain for low-carbon, climate-resilient investment, and the accomplishment of the Sustainable Development Goals.

Key Words: —*Green finance, big data analytics, artificial intelligence, sustainable development goals, blockchain, internet of things, carbon credits, green bonds.*

I. INTRODUCTION

The Paris Agreement's implementation and the accomplishment of the Sustainable Development Goals (SDGs) would necessitate considerable new investment. Indeed, the latter will necessitate extra annual investments of \$2 trillion–\$3 trillion and \$1.4 trillion in developing nations, with low-income countries receiving \$343 billion–\$360 billion and lower-middle-income countries receiving \$900 billion–\$944 billion.

To meet the Paris Agreement's key goal of keeping global average temperature rise "well below" 2°C and achieving the SDGs, trillions of dollars in new investment will be required, including incremental investments to ensure that long-term investments like infrastructure are low-carbon and climate-resilient. Total worldwide yearly investment requirements are estimated to be \$5 trillion–\$7 trillion by the United Nations Conference on Trade and Development (UNCTAD 2014),

with \$3.3 trillion–\$4.5 trillion in poor countries in critical SDG areas (comprising infrastructure, food security, climate change mitigation and adaptation, health and education). According to the OECD (2017), current investment levels are around \$1 trillion per year, which is less than a third of what is needed. To maintain prosperity, reduce poverty, and address climate change, developing nations in Asia would need to invest an estimated \$26 trillion in infrastructure by 2030 (or \$1.7 trillion per year), including \$4.7 trillion for power and \$8.4 trillion for transportation (ADB 2017). (James Joshi, 2019).

To reduce costs and generate cash at the necessary size and speed, technology innovation and new financial tools will be required. Green finance and fintech are important to policymakers, especially in emerging and developing nations, as they work to implement the Paris Agreement and achieve the Sustainable Development Goals. Fintech is defined as "businesses or representatives of organisations that integrate financial services with current, innovative technologies" in a wide sense. "Financial investments pouring into sustainable development projects and initiatives, environmental goods, and policies that foster the development of a more sustainable economy" is what green finance is defined as. New technologies like blockchain, which have the potential to speed the flow of money to a more sustainable economy, as well as financial products like green bonds, which match the

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risk-return needs of investors for sustainable investments, will aid in meeting global policy goals.

“The goal of this paper is to look at how fintech and blockchain may be used in green finance, with a focus on renewable energy as a major component of executing the Paris Agreement and reaching the SDGs. In addition, the study will provide policy recommendations for the future. It uses examples from Europe, which has emerged as a pioneer in blockchain innovation and is thus potentially useful for emerging Asian countries, particularly in the energy industry, when suitable.”

1.1 FINTECH

“The term "fintech" "refers to new technology that aims to enhance and automate the delivery and usage of financial services. Fintech, at its most basic level, is used to assist organisations, company owners, and individuals better manage their financial operations, procedures, and lifestyles via the use of specialised software and algorithms that run on computers and, increasingly, smartphones.” The term "fintech" is a mix of "financial technology" and "financial innovation.”

Fintech was coined in the twenty-first century to describe the “technology used in the back-end systems of established financial organisations. However, since then, there has been a move toward more consumer-focused services and, as a result, a more consumer-focused definition.” Fintech today spans a variety of sectors and businesses, including education, retail banking, non-profit fundraising, and investment management, to mention a few.”

1.2 Green Financing



Changes in countries' regulatory frameworks, harmonising public financial incentives, increases in green financing from various sectors, alignment of public sector financing decision-making with the environmental dimension of the Sustainable

Development Goals, increases in investment in clean and green technologies, financing for sustainable natural resource-based green economies and climate smart blue economies, and increased use of renewable energy sources could all help to promote green financing.”

1.3 Artificial Intelligence

“The capacity of a digital computer or a computer-controlled robot to do tasks that are usually associated with intelligent individuals. The phrase is widely used to refer to a project aimed at creating systems with human-like cognitive abilities, such as the capacity to reason, discern meaning, generalise, and learn from prior experience.”

Artificial intelligence is changing the way we deal with money in finance. From credit judgments to quantitative trading and financial risk management, AI is assisting the financial industry in streamlining and optimising procedures

1.4 Blockchain

“A blockchain is a decentralised database that is shared across computer network nodes. A blockchain acts as a database, storing information in a digital format. Blockchains are well recognised for their critical function in keeping a secure and decentralised record of transactions in cryptocurrency systems like Bitcoin. The blockchain's novelty is that it ensures the accuracy and security of a data record while also generating trust without the requirement for a trusted third party.”

This fundamental technology in the banking sector allows money transfers to be made with assurance that the transaction is safe and secure.

The following features of blockchain provide benefits:

Distribution: -The ledger is distributed throughout the network in several copies. Every time a new transaction or block is added, a copy is sent to everyone on the network. The ledger is not controlled by a single institution, but it is meant to give everyone with the same information.

Immutability: - A blockchain keeps a detailed, chronological record of all transactions. It's virtually hard to change or delete transactions or add information that hasn't been confirmed because everyone on the network has a copy. To do so successfully, hundreds – if not hundreds of thousands – of people would have to be targeted.

1.5 Internet of Things

“The Internet of Things (IoT) is a network of interconnected, internet-connected items that can gather and transmit data without the need for human interaction across a wireless

network.”

“The opportunities for personal or professional development are limitless. A connected medical device, a biochip transponder (think livestock), a solar panel, a connected automobile with sensors that alert the driver to a variety of potential issues (fuel, tyre pressure, needed maintenance, and more), or any object equipped with sensors that has the ability to gather and transfer data over a network can all be considered a ‘thing.’”

In the financial business, IoT is quite useful. In 2018, the banking and finance industry spent an average of \$153 million on IoT. The Internet of Things has already had a beneficial influence on the financial sector and will continue to do so in the future. By collecting and exchanging data, the Internet of Things saves financial institutions a lot of time and money. Financial organisations may also use IoT to improve their client experience and identify fraudulent activities more effectively. It may reduce risk and improve the overall security of the financial system in a variety of ways, which we'll go over in more detail below.

1.6 Carbon Credits

A carbon credit is a permission to release a particular quantity of carbon dioxide or other greenhouse gases. One credit enables you to emit one tonne of CO₂ or the equivalent in other greenhouse gases.

“Carbon credits are a type of market mechanism for reducing greenhouse gas emissions. Caps on greenhouse gas emissions are imposed by governments or regulatory agencies. The quick reduction of emissions is not economically possible for certain businesses. As a result, they can buy carbon credits to meet the emission quota.” Companies that accomplish carbon offsets (lower greenhouse gas emissions) are frequently rewarded with additional carbon credits. The sale of credit surpluses might be used to support future carbon-reduction efforts.

The Kyoto Protocol recognised the establishment of such credits. The Paris Agreement recognises the use of carbon credits and establishes measures for additional carbon credit market facilitation.

1.7 Green Bonds

“A green bond is a fixed-income product designed to raise funds for climate and environmental projects. These bonds are usually asset-linked and backed by the issuing entity's balance sheet; thus, they have the same credit rating as the rest of the issuer's debt obligations. Green bonds function in the same

way that any other company or government bond does.” Borrowers issue these securities to acquire funding for initiatives that will benefit the environment, such as ecosystem restoration or pollution reduction. Investors who buy these bonds might expect to earn when they sell them when they mature. Furthermore, there are frequently tax advantages to investing in green bonds.

“Green bonds may be eligible for tax breaks to make them more appealing to investors. The World Bank is a significant green bond issuer.” Since 2008, it has issued 164 such bonds totalling \$14.4 billion. The terms “green bond,” “climate bond,” and “sustainable bond” are occasionally used interchangeably.”

According to the Climate Bond Initiative, the entire issuance of green bonds in 2020 will be valued almost \$270 billion. The cumulative issuance since 2015 is over \$1 trillion.

1.8 Objective

- To investigate the possible uses of fintech and blockchain for green finance, with a focus on renewable energy as a critical component of executing the Paris Agreement and attaining the Sustainable Development Goals.
- To study connections between these breakthroughs and the People's Republic of China (PRC), which is a pioneer in both green bonds issuing and fintech and blockchain technologies.

II. RESEARCH METHODOLOGY

The data is collected from Asian Development Bank Institute which was published in 2018 which is secondary in nature.

Potential survey respondents were chosen from the “FMM Directory of Malaysian Manufacturers 2013.” The directory includes information on manufacturing enterprises, (big and little) from diverse industries, places, and names, firm name, year of inception, contact information, and email address, yearly sales, personnel count, and so on. This study's population is made up entirely of medium and big businesses in Malaysia which has a total of 37,694 manufacturing enterprises.

The number of suitable respondents for this study is determined by the statistical method utilised - structural equation modelling (SEM). SEM is a big sample method that requires a sample size of more than 200. To achieve the study's aims, a survey questionnaire is being designed to

assess the ‘constructs of GSCM practises, environmental collaboration, and sustainability performance. SEM is used to assess H1 and H2 in a single, systematic, and complete study by concurrently examining the correlations between many independent and dependent factors.’

III. LITERATURE REVIEW

Fintech may be characterised as a shorthand for financial tools; it can also be defined as digital innovation and cutting-edge skills aimed at enhancing, developing, and automating financial services. Fintech is used to assist, promote, and support businesses, business leaders, shareholders, and customers in managing their financial operations via the use of specialised apps and software. (*Nobanee & Al Hammadi, 2019*).

Green finance is a broad word that refers to financial investments made in projects and activities aimed at long-term sustainability, environmentally friendly goods, and policies and processes that encourage the development of a more sustainable economy. Climate finance is included in green finance; however, it is not the only type of financing available. “Green finance can also relate to a broad range of other environmental objectives, such as reducing industrial pollution, purifying water, and conserving biodiversity. Change in climate-related activities is inextricably linked to modification and financial practise. Financial mitigation flows are investments made in projects and programmes that help to reduce or avoid greenhouse gas (GHG) emissions, whereas adaptation financial flows are investments that help to reduce the vulnerability of products and people to the effects of climate change.” (*Puschmann, Thomas and Hoffmann, Christian Hugo and Khmarskyi, Valentyn, 2020*).

Banks also have a significant role to play in facilitating the transfer of funds from savers to borrowers, which is particularly important if the borrowers seek to boost their economic growth. The bulk of bank failures occur because of the economy's dramatic impact. This is because they strive to keep firms, shareholders, and consumers from getting the money they need to grow. So, bearing in mind the bank's key responsibilities in the economy, the bank management should make decisions that are sustainable, allowing business organisations and shareholders to get bank loans for company operations and investment opportunities (*Lin, Arthur Jin and Chang, Hai-Yen, 2019*).

HYPOTHESIS

H0 - There is no Relationship between new technologies “such as blockchain, internet of things, artificial intelligence is related to green financing activities such as green bonds, carbon credits’

H1 – There is *relationship* between new technologies “such as blockchain, internet of things, artificial intelligence is related to green financing activities such as green bonds, carbon credits.

IV. THEORETICAL CONTENT

4.1 Fintech and Blockchain

Fintech originally referred to "technologies used and applied in the financial services sector, primarily by financial institutions on the back end of their businesses," but its scope has expanded "to include technologies that are disrupting traditional financial services, such as mobile payments, money transfers, loans, fundraising, and asset management."

The blockchain system and its use for bitcoin were initially presented in a white paper released in 2008 by an anonymous person or individuals known only as Satoshi Nakamoto. Blockchain, a sort of distributed ledger technology, allows for the establishment of a distributed database that eliminates the need for trusted middlemen to support transactions, such as banks or other organisations. "A blockchain is a form of database that accepts records and organises them into blocks," according to Wikipedia. Using a cryptographic signature, each block is then 'chained' to the preceding block.

Public (open access) or private (closed access) blockchains exist (controlled access). Public blockchains, according to Vitalik Buterin (2015, creator of Ethereum, a decentralised platform that runs self-executing smart contracts,' are ones "that anyone in the world can read, anyone in the world can send transactions to and expect to see them included if they are valid, and anyone in the world can participate in the consensus process" that determines which blocks are added to the chain. Blockchain has the ability to create "a world without intermediaries" by disintermediating organisations that were previously needed to generate trust.

The Blockchain's innovation originates with the fact that it is owned and controlled by no one entity. Data is saved on a worldwide network of computers. When we add a valuable item to the Blockchain, these transactions are cryptographically linked in data blocks, creating a comprehensive history for all of the data in the system. We

know who submitted the record to the network since each transaction is digitally signed. Every asset may also be transferred directly in a secure, quick, and transparent manner.

Data security is unrivalled thanks to the Blockchain. The Blockchain system ensures the integrity of all data stored inside it, removing the requirement for third-party trust. This eliminates duplicate spending, forged asset ownership, and other types of data manipulation. The Blockchain is extremely transparent, with a permanent record of all transactions. As new transactions are uploaded to the database, all users on the system may see them in real time. In addition, the Blockchain is completely auditable. A new transaction is cryptographically connected to every previous transaction every time it is added to the record. As a result, once the Blockchain ledger has been confirmed, it cannot be changed.

“Internet of Things (IoT) and big data technologies can be seen of as complementing blockchain as a platform for the exchange of value, with data as the central underlying ingredient. The Internet of Things (IoT) refers to connecting any object or electronic equipment with a sensor to the Internet, whereas big data refers to the large-scale gathering, analysis, and use of data created by the IoT. IoT and big data provide a foundation of data that can be managed, processed, and acted upon by human or automated decision-making processes.”

This interdependence of technologies will pave the way for the integration of various complimentary technologies in the future. "Blockchains, artificial intelligence, the Internet of Things, autonomous robots, 3D printing, and virtual and augmented reality are all combining to severely disrupt current sectors and create whole new markets and economic models," according to Outlier Ventures (2016, p. 40). The IoT's huge data is "authenticated, vetted, and protected utilising distributed ledgers, consensus, and other decentralised technologies" in this future economy. As IoT, big data, and blockchain continue to grow, their progressive convergence will open up new avenues for achieving sustainability goals in areas where these digital technologies are built with such aims in mind.

4.2 Fintech and Sustainable Development Applications

“Fintech and blockchain have previously been linked to applications and use-cases in the field of sustainability. The United Nations Environment Programme (UNEP 2016) identified more than two dozen fintech applications for sustainable development at various stages of implementation, including four applications in energy that are discussed in

more depth below: Flexible energy supply and demand, peer-to-peer renewable energy, and community distributed generation are all examples of pay-as-you-go resource utilities.”Blockchain technology has been likened by Chapron (2017, p. 403) to "the discovery of double-entry bookkeeping...which allowed the contemporary economy."

Money and payments, financial services infrastructure, agribusiness, governance, healthcare records, and humanitarian and relief applications, such as tracking and delivery of aid, are all examples of blockchain uses in the financial sector, according to the World Bank (2017).

“Supply chain transparency, identification and financial inclusion, and property rights are examples of potential use-cases that are pertinent to sustainable development, as outlined below.”

4.3 Supply Chain Transparency

Supply chain transparency is one of the most important use cases with consequences for long-term growth. The use of blockchain in asset tracking is extending into natural resources, with the potential to revolutionise the way natural resources are documented and traced across a variety of industries, from forestry and fisheries to carbon accounting and energy. DeCaprio and Beck (2017) cite the example of a pilot blockchain project in Indonesia to “establish a sustainable supply chain for skipjack and yellow fin tuna caught by local fishermen, which enables compliance at origin and could replace the current system of hard-to-verify paper records that are prone to corruption.”Maersk, the world's largest shipping business located in Denmark, and IBM announced intentions to launch a joint venture in 2018 to "offer more efficient and secure means for conducting global commerce utilising blockchain technology," with the goal of lowering costs and inefficiencies.

Blockchain solutions are a unique breakthrough that may serve both a commercial and a social purpose. Regulators, social entrepreneurs, and civil society groups are set to use the transparency and accountability provided by blockchain-based solutions to address supply chain issues such as hazardous labour conditions and ecologically damaging activities.

4.4 Digital Identity and Financial Inclusion

“Due to a lack of sufficient identity and credit history, many people in developing countries are unable to participate in the financial economy (including capital formation through savings, opening a bank account or borrowing money from a

financial institution, or financial leverage to support investment and growth)." "The combination of identification and commerce, resulting in a worldwide, verified, and controllable asset," says one definition. This identity is made up of digital or electronic credentials that define a person's economic history in the global market" (BanQu 2018).

Having an official identification may be the single most important element affecting a person's capacity to partake in the benefits of global progress. Voting, financial account ownership, loan applications, company registration, land titling, social protection payments, and school enrolment are all official services that need identification.

The vital infrastructure of digital identification is required for a functional digital economy. Emerging advances in digital identity hold the promise of more inclusive biometrics, exploiting digital footprints to identify those who lack formal identification, and possibly offering individuals with more easy, safe, and portable identification choices.

4.5 Property Rights

Property rights and land titles are closely linked to the use of fintech and blockchain for economic identification and financial inclusion. People in practically every country rely on a well-established and often complex collection of paperwork to prove that they own property. These documents attest that the title holder has a legal claim on the property. In certain jurisdictions, title insurance is necessary if there is a disagreement between the parties about the legitimacy of the property transfer.

Several nations, including Estonia, Georgia, Ghana, Honduras, and Rwanda, have begun to investigate the feasibility of placing land titles on a blockchain platform, therefore simplifying the transfer of title and reducing the likelihood of future conflicts. Sweden, whose land records are already digitally stored, may be the country that has advanced the farthest in this pilot testing procedure. The importance of this application for both established and emerging countries was underscored in a recent report on the second part of Sweden's test on the possibility of placing property rights on a blockchain.

4.6 Blockchain Technology for Renewable Energy and Distributed Electricity Systems

Fintech and blockchain have "major early use-cases in the energy industry, including peer-to-peer energy trade, climate finance, and carbon credit trading, in addition to their prospective implications for SDGs. Blockchain's potential is

to improve the efficiency of settlement and other intermediary functions has piqued the interest of the financial sector."

"According to the World Energy Council (2017, p. 3), blockchain is "one of the most critical uncertainties" and "is perceived by energy leaders globally to be an issue of both relatively high impact and uncertainty," with IoT blockchain ranking first in terms of impact and uncertainty among issues facing the energy sector."

"Europe has been a leader in blockchain-related energy and clean technology innovation and funding. The number of companies or consortia involved in the broader blockchain ecosystem has grown from about 35 to over 150 in the last year, according to data from the Cleantech Group, which tracks firms spanning energy, logistics and supply chains, blockchain and IoT, mobility, agriculture, and other applications." By the end of May 2018, European businesses have raised \$723 million. In comparison, Asia received \$251 million, while North America received \$140 million (Besnainou 2018).

According "to an analysis of companies and pilot projects working with blockchain and energy, more than half are based in Europe, followed by North America and Asia, and nearly three-quarters were founded in either 2016 or 2017, indicating their early stage of development (SolarPlaza 2018)."

4.7 Peer -To-Peer Energy Transactions

"Peer-to-peer energy exchange, including from distributed energy systems using renewable energy, is a prominent set of use-cases of blockchain technology for sustainability applications (Tapscott 2018)." According to PwC (2017, p. 16), "so-called 'prosumers' not only consume energy but also dispose of generation in the form of solar systems, small-scale wind turbines, or CHP plants; additionally, blockchain technology could enable them to sell the energy they generate directly to neighbours."

As a result, "blockchain-based energy processes would no longer require energy companies, traders, or banks" (for payments). "Instead, a decentralised energy transaction and supply system would emerge, with blockchain-based smart contract applications empowering consumers to manage their own electricity supply contracts and consumption data." (PwC 2018, p. 18)

Over 40 energy trading organisations in Europe have banded together under the Enerchain project, a blockchain-based platform for peer-to-peer trading in the wholesale energy market.

“Enerchain is now in the proof-of-concept stage, and its goal is to see if a decentralised “blockchain-based model can handle the high trading volumes and transaction speeds required for trade execution in the gas and electricity markets (World Energy Council 2017). Other early-stage initiatives include Alliander in the Netherlands, which is testing a blockchain-based energy tool to help consumers manage and “share their renewable energy, and Conjoule, a start-up launched by Innogy in Germany that is developing blockchain-enabled peer-to-peer energy markets (World Energy Council 2017).”

4.8 Trade and Exchange of Carbon Credit

According to the World Bank (2018), present climate asset markets have resulted in a "patchwork" of climate activities with various units, governance structures, registries, and laws, resulting in a system that does not promote economic efficiency, size, or complexity. Simultaneously, the fast-evolving technical landscape is opening up new possibilities for climate asset harmonisation across systems, instruments, and assets. "Blockchain, Big Data, the Internet of Things (IoT), smart contracts, and other disruptive technologies hold out the possibility of solving the needs of next generation climate markets post-2020," according to a recent World Bank report (World Bank 2018, p. 4).

“Marke (2018) investigated how blockchain could improve the efficiency of emissions trading schemes, including suggesting more efficient systems for transferring or trading carbon credits, proposing the networking of carbon markets using blockchain technology, boosting peer-to-peer renewable energy trading, and speeding up international climate finance transfers.”

4.9 Climate Finance

The Climate Chain Coalition was recently created by a diverse coalition of “over 40 organisations, including the International Emissions Trading Association (IETA), formerly the Carbon Disclosure Project (CDP), the Energy Web Foundation, and Power Ledger (CCC).” To work together to facilitate the use of distributed ledger technology ('DLT'), including 'blockchain' and related digital climate solutions". Climate Chain Coalition (Climate Chain Coalition, 2018). The UNFCCC has endorsed the CCC. Effort, as well as "the potential of blockchain technology to aid with climate change mitigation, action and long-term viability (UN Climate Change News 2018).

Climate finance and green investment are the greatest places to start using Blockchain as a 'fintech' that combines technology with finance. The energy sector acts as a feedback

loop, providing significant production data for study.

whereas new financial products gain from research and development

Reciprocally, the energy industry big data and cloud are examples of fintechns.

Blockchain technology is a combination of computing, machine learning, and distributed computing, the most revolutionary and impactful (green) finance at the grassroots level especially in terms of cutting regulatory costs and expanding regulatory authority.

4.10 Financial Innovation and Green Bonds

As a result, financial tools that can mobilise public and private money toward low-carbon, climate-resilient investment are critical to success. One of the most popular green bonds are dynamic tools in the field of sustainable finance are fixed-income instruments whose proceeds are used for environmental purposes by the issuer. Investor demand for these products has increased dramatically over the last decade, rising in response to policy and funding allocation alterations as a result of growing concerns. A about climate change and long-term sustainability According to Moody's (2018), the global. Green bond issuance is expected to increase to between \$175 billion and \$200 billion in 2018.

4.11 Subnational Pooled Financing Mechanisms

The use of a structure known as subnational pooled financing mechanisms (SPFMs) as a means of generating sustainability-oriented money from financial markets has been one of the significant financial innovations for green finance at the institutional level.

An SPFM pools its members' financial needs into a pooled financing agency (PFA), which subsequently issues debt and distributes the bond revenues to its members. Most SPFMs necessitate the establishment of a Special Purpose Vehicle (SPV) with transparent governance structure and processes, according to the International Institute for Sustainable Development (IISD) (2018). These SPVs are in charge of contracting debt and performing debt service payments, and their structure is determined by national regulations. SPFMs "have been successfully used in securing finance for both large and small local projects, securing over \$1 trillion in finance in the US and Europe, and over \$2.6 billion in developing countries" (FMDV 2017, p. 6), according to the Global Fund for Cities Development (FMDV) or Fonds Mondial pour le Développement des Villes.

The initiative, conducted by Stockholm Green Digital Finance

and supported by the Norwegian Center for International Climate Research (CICERO), applies the notion of sustainability attribution to green financial assets. As explained by CICERO (2018):

The project's purpose is to provide green investors with the technology they need to better meet the goals of the Paris Climate Agreement and the Sustainable Development Goals. The wallet is built on open-source technology designed specifically for capital market participants. The system will provide a platform for green investment confirmation as well as effect reporting. The Green Assets Wallet will aid in the efficient channelling of “private institutional funds to green initiatives around the world, with a focus on green developing markets investments.”

“Despite the green bond market's rapid growth, investors are concerned about transparency. The growth of the green bond market, and more broadly, the extension of green finance, will be dependent on the use of proceeds being transparent (Santibanez et al. 2015; Kyriakou 2017; Linsell 2017). Developing countries in Asia and other regions may expand the use of green bonds, adopt financing models such as SPFMs, and further develop and implement innovative fintech and blockchain approaches to enhance and “promote the growth and transparency of their growing green bond markets in order to raise capital for the implementation of the Paris Agreement and the SDGs.””

4.12 Implications for Asia

Major Asian developing countries have recently begun to adopt and expand innovative green finance initiatives. People's Republic of China (PRC) has in its thirteenth Report, the United Nations listed the construction of a green financial system as a goal. Central Committee of the Communist Party of China (CPC) Five-Year Plan (2016) has been in the forefront of developing new institutional structures and incentives for green initiatives, green bonds and finance The Green Financial System Establishment Guidelines, published by the People's Bank of China (PBOC), the Ministry of Finance, and the Ministry of Commerce in 2016. The National Development and Reform Commission, as well as environmental protection (NDRC).

The People's Bank of China, as well as the banking, insurance, and securities commissions, all stress the importance of developing a green financial system that includes "financial instruments such as green credit, green bonds, green stock indices and related products, green development funds, green insurance, and carbon finance, as well as relevant policy

incentives to support the green transformation of the economy" (People's Bank of China, 2016). The PRC's increased engagement in the green bond market has driven the country to the forefront, and green bond issuance from this country is one of the largest in the global green bond market (Climate Bonds Initiative 2017).

4.13 Green Fintech in The People's Republic of China

“In the People's Republic of China, the ANT Financial Services Group, formerly known as Alipay and a leading fintech firm, initiated a large-scale experiment to involve users in modifying their behaviour in ways that are consistent with green finance at scale. Chen et al. (2017, pp. vi-vii) describes the pilot's design and highlight its immediate impact as well as long-term potential:”

The 'Ant Forest' encourages Ant's users to reduce their carbon footprint in three ways: (a) providing individualised carbon savings data to people's smartphones, (b) linking their virtual identity and status to their earnings of “green energy' for reduced carbon missions, and (c) providing carbon offset rewards through a physical tree planting programme.

The Ant Forest pilot considerably exceeded expectations in terms of drawing a large number of users in a short period of time, as well as in eliciting considerable behavioural change.”

During the first six months of the campaign, 200 million people across the PRC freely signed up. By January 2017, behavioural change had resulted in an estimated 150,000 tonnes of saved carbon emissions and nearly one million trees planted. The Ant Forest experiment might be expanded with the help of additional digital finance companies to inspire billions of people to minimise their carbon impact.

"Asia could become a dynamic testing ground for the new business models promised by blockchain, as the region has high demand for financial inclusion and the need for more efficient, convenient, and affordable products and services," according to a recent assessment of blockchain technology's potential in Asia and the Pacific region (Cognizant 2017, p. 8). Blockchain is the most major technical opportunity of the next decade for the Asia-Pacific region, and it is likely to be a fountain of inventive ideas for leaders throughout the world. The cost savings and business effectiveness potential of distributed ledger technology have already been recognised by thoughtful watchers of the blockchain phenomena.

“For enterprises and leaders in the Asia-Pacific region, blockchain presents a once-in-a-lifetime opportunity to set an

example for the rest of the globe on how the blockchain revolution will unfold (Cognizant 2017, p. 22). According to recent statistics, the PRC was the most active filer of blockchain-related patent applications in 2017, accounting for 56 percent (226) of the 406 blockchain-related patent applications filed in 2017. (Desouza et al. 2018; Noonan 2018; Thomson Reuters 2018). According to Desouza et al. (2018), despite a surge of interest in blockchain commerce, many organisations are still sceptical.”

Despite a surge of interest in blockchain technology, many corporations are keeping their engagement in blockchain-related goods under wraps due to governmental uncertainties. The central government's stance on bitcoin is unfavourable. It was quite clear in September 2017 when it outlawed initial coin offers (ICOs) and all bitcoin exchanges were later banned from functioning in the PRC. Yet blockchain, the technology that underpins cryptocurrencies, is still regulated. Given the difficulties of knowing what is legal and what is not, business owners must exercise caution. If blockchain products are fully compliant with government regulations, even if no government regulations exist. There are cryptocurrencies involved. Getting to the bottom of the regulatory ambiguity blockchain is critical to the future of innovation.

V. CONCLUSION

“The development and implementation of blockchain, IoT, big data, and other similar technologies in the future holds the possibility of systemic transformation: a radically new financial and capital allocation system focused toward inclusive and sustainable growth. These new technologies are still in the early stages of development, making accurate predictions about their future paths impossible. However, applying fintech and blockchain technology to the wide range of potential use cases outlined above will have the net effect of significantly improving reliability (such as identity and financial inclusion), increasing access to services (such as energy, banking, and property ownership), and, most importantly, lowering overall system costs.”

“Even critics like Roubini and Byrne (2018), who called blockchain "one of the most overhyped technologies ever" due to its inefficiency compared to existing databases and its higher demand for storage space and computing power, among other limitations, have conceded that blockchain could have "potentially far-reaching implications" if combined with "secure, remote automation of financial and machine processes" and in "specific, well-defined, and complex"

applications.”

REFERENCES

- [1]. Anon., n.d. www.bis.org.
- [2]. Anon., n.d. www.coursehero.com.
- [3]. Change, u. n. c., 2018. UN supports blockchain technology for climate action.
- [4]. Dhaval prajpati, d. p., 2021. Understanding the preference of individual retail investors on green bond in India: An empirical study. s.l., s.n.
- [5]. James joshi, s. n., 2019. Blockchain. Blockchain – ICBC 2019.
- [6]. Nassiry, D., 2018. www.adbi.org.
- [7]. Nisha Prakash, M. S., n.d. Leveraging Fintech for Sustainable development in emerging economies. International Journal of Innovative Technology and Exploring Engineering.
- [8]. Sachs, j. d., 2019. hand book of green finance. s.l.: springer reference.
- [9]. Thoo ai chin, z. s., n.d. green supply chain management. Green Supply Chain Management, Environmental Collaboration and Sustainability Performance.
- [10]. Value, i. i. f. b., 2022.