Role Of Fintech In Green Finance And Sustainable Development

Dr. Krishnendu Ghosh*

Abstract

Sustainable development is the common goal of human landscape. The evolution to sustainable economy is an inevitable trend of economic development. FinTech and green finance is strong driving force for sustainable economic development. This article aims to discuss the significant interactions among FinTech, green finance and sustainable development. This paper outlines the broad areas for the possible application of FinTech to green finance and sustainable development. The methodology used for the article is mainly the theoretical framework build based on the existing literature. This study could benefit policymakers and researchers in understanding the implications big data and blockchain and draws preliminary recommendations for policy makers interested in connecting FinTech, big data and blockchain with green finance and sustainable development. The study concludes that FinTech plays a vital role in green finance and sustainable development.

Key words : Sustainable development, FinTech, green finance, big data, blockchain

JEL Classifications: O31, O32, O33, Q01, Q55, Q56

INTRODUCTION

Maintaining economic growth with sustainable development is a main challenge worldwide. Sustainable development has become the most important consideration for economic growth and environmental protection. FinTech and green finance is strong driving force for sustainable economic development. With the emerging concept of financial technology, in-depth integration of financial and technology, financial product innovation, financial efficiency improvement and reduction in financial transaction costs has become important driving force of financial sector (Liu, Peng, & Yu, 2018).Connecting FinTech, big data and blockchain with green finance and sustainable development is the need for the days to come. Evidence based on the research work conducted universally shows that FinTech has significant effects on social and environmental ecological benefits (Raluca, Popescu, &Popescu, 2019). The study conducted by

* *Faculty Member, ICFAI Business School, Kolkata*

Deng, Huang & Cheng (2019) on to evaluate sustainability and in-depth analysis of the relationship between FinTech and sustainable development based on data of peer-to-peer platforms (P2P) in 31 Chinese provinces has stated that the process of promoting sustainable development, to show the positive impact of FinTech on sustainable development, countries must reform extensive patterns of economic growth, reinforce the transformation and elevation of the industrial structure, and endorse sustainable development with low consumption, pollution, and emissions. For developing countries to derive full benefit from the potential that FinTech holds important limitations and risks need to be addressed (Hinson, Lensink, & Mueller, 2019).

Objective:

1. To discuss the significant interactions among FinTech, green finance and sustainable development.
2. To understand the broad areas for the possible application of FinTech to green finance and sustainable development.

Research Methods:

The methodology used for the article is mainly the theoretical framework build based on the existing literature.

Results and Discussion:

Sustainable Development:

The world is changing in a rapid manner. To cope up with these changes the approaches called sustainability and sustainable development has gradually become a universal consensus. Be it corporate, social, environmental, political or educational organizations, the challenge of sustainability will strongly affect the competitiveness and perhaps even the survival. Innovation is a key driver for sustainability. Sustainable development is the key challenge to humanity in the 21st century. An extensive range of nongovernmental as well as governmental organizations have incorporated it as the new paradigm of development. In 1972 the challenges of maintaining sustainability in context with economic growth and development was first conveyed to the global stage at the UN Conference on the Human Environment in Stockholm. Due to globalization the global economic growth and the living standards of human being increased rapidly but at the same time it results in deterioration of environment because of increasing pollution, consumption of huge carbon energy, emission of pollutants, shortage of natural resources, ecological deterioration which may lead to a threat for long-term economic growth.The concept of sustainable development is an endeavor to combine rising concerns about an array of environmental issues with socio-economic issues. Sustainable development has the potential to address fundamental challenges for humanity, now and into the future (Hopwood, Mellor &O'Brien, 2005). In 1987, the definition of 'sustainable development' was firstly proposed in the Brundtland Report (Cen & He, 2018). As per the report sustainable development is “a process of change in which the exploitation of resources, the direction of investments, the orientation of technological development, and institutional change are made consistent with future as well as present needs” (WCED, 1987).The World Commission on Environment and Development has defined

sustainable development as "development that meets the needs of the present without compromising the ability of future generations to meet their own needs". The report by the Brundtland Commission developed the most widely used definition of sustainable development as "development which meets the needs of current generations without compromising the ability of future generations to meet their own needs" (WCED, 1987). Sustainable development is a form of development that includes economic growth, social development, consumption emissions, and environmental governance in multiple dimensions (Deng, Huang & Cheng, 2019).

FinTech:

FinTech, the most cutting-edge technological innovation in the financial industry,is a combination of financial services and information technology.It is the application of technology to finance. It consists of any technological innovation in the financial sector, including financial literacy and education, retail banking, investment, and crypto-currencies. Information Technology plays a significant role in FinTech transactions. The introduction of the Automatic Teller Machine (ATM) in 1967 by Barclays Bank (Lerner, 2013) perhaps marks the initiation of the modern evolution of today's FinTech. Since 2008 FinTech has emerged in both the developed and developing world. Large cutting-edge technology companies and technology startups offer new innovations and technologies have begun to provide financial products and services directly to businesses and the general public. Arner, Barberis& Buckley (2015) recommended this phase as FinTech 3.0. They have suggested FinTech 1.0. from 1967 when the advancement of digital technology for communications and processing of transactions gradually transformed finance from an analogue to a digital industry. They have characterized the phase since 1987 until 2008 as FinTech 2.0 era. During this phase financial services in developed countries had become not only globalized but also digitalized. New technologies include Internet, mobile Internet, big data, artificial intelligence, interconnect technology, distributed system, security technology and so on (Cen & He, 2018). Technology has always influenced the financial industry. The boundary of the traditional finance has been broken.Financial services remain surprisingly expensive. Financial innovations have not contributed substantial benefits to consumers. With advancements of technology there is a change the way the financial industry operates (Goldstein, Jiang &Karolyi, 2019). Arner, Barberis& Buckley (2015) refers FinTech as a contraction of 'financial technology'. They have also described FinTech as 'technology enabled financial solutions'. Fin-tech, so called 'financial tech',is a combination of finance and technology,referring to thefinancial service where various techniques have been introduced, such as bank transfer,personal finance asset management, crowdfunding, and mobile payments (Han, Park & Kim, 2016).Digital finance is therefore a new frontier. FinTech covers ranges of financial activities, including payments, investment management, capital raising, deposits and loans, insurance, regulatory compliance and so on (Cen & He, 2018). Third-party payment, new digital advisory and trading systems, artificial intelligence and machine learning, peer-to-peer lending (P2P), big data credit, robo-advisor, blockchain, virtual currency are few examples of the areas in which new business models, new products and new

organizations are created consisting of some common characteristics – innovative, asset-light, low margin, able to scale, compliance-light and rapid development. FinTech consists of digital innovations and technology-enabled business model innovations in the financial sector (Philippon, 2016). This study has also suggested that digital advances can disrupt present industry structures, expedite strategic disintermediation, reform how existing firms create and deliver products and services, provide new pathways for entrepreneurship, democratize access to financial services, and at the same time also create significant privacy, regulatory and law enforcement challenges. At present FinTech deals with five major areas: (1) finance and investment, (2) operations and risk management, (3) payments and infrastructure, (4) data security and monetization, and (5) customer interface.

Big data:

In the present era of advanced Information Technology managing large, varied and complex data sets is of utmost importance. Financial sector is of no exception. Storing, analyzing and visualizing massive data sets has made big data and its analysis a buzzword of modern days' financial sector. Madden (2012) has defined big data as the data that's too big, too fast, or too hard for existing tools to process. Financial practitioners and analysts consider data management and analytics of different financial products and services as an emerging issue. As the main ingredients of FinTech is huge volume of data hence the key to understanding FinTech is big data and big data analysis. Technological innovation in the form of FinTech and big data plays a huge role to transform and deliver financial services to consumers.Many literature has opined in favour of a deep relationship of financial markets, banking risk and lending, internet finance, financial management, financial growth, financial analysis and application, data mining and fraud detection, risk management, and other financial practices with big data (Hasan, Popp, &Oláh, 2020). In the Internet age, independent analysts and retail investors around the world can work together with each other through the web. Financial social media, search engine, Internet Forum, Web news, etc., brings people, companies, and organizations together. This media provides a massive unstructured data (Big Data) that can be integrated into the decision-making process (Sohangir, Wang, Pomeranets, &Khoshgoftaar, 2018). FinTech accelerate the decision-making process. McAfee, Brynjolfsson, Davenport, Patil, & Barton (2012) in their research has claimed that data-driven decisions are better decisions. Using big data facilitates managers to decide on the basis of evidence rather than intuition which has got the potential to revolutionize management.

Blockchain:

Digital cash had been conceptualized in a setting with a central server trusted to prevent double-spending long before the advent of the blockchain (Chaum, 1983). Recently, cryptocurrency has drawn huge attentions from both industry and academia. Bitcoin is often called as the first cryptocurrency. The blockchain is the fundamental mechanism for the Bitcoin (Zheng, Xie, Dai, Chen, & Wang, 2018). Bitcoin and its blockchain have allowed mutually mistrusting entities to execute financial payments without depend on a central reliable third party while offering a transparent and integrity protected data storage (Nakamoto, 2009). Though Bitcoin is the most well-known blockchain application,

blockchain can even be applied into different applications apart from cryptocurrencies. As an emerging technology blockchain can be used in various financial services such as digital assets, remittance and online payment as it allows payments to be finished without any bank or any intermediary (Peters et al., 2015; Foroglou and Tsilidou, 2015) which results in significant reduction of the server costs including the development cost and the operation cost and ease the burden at the central server. Babitt and Dietz (2014) has defined the crypto-economy as an "economic system, which is not defined by geographic location, political structure, or legal system, but which uses cryptographic techniques to constrain behaviour in place of using trusted third parties". In conventional centralized transaction systems, each transaction needs to be validated through the central trusted agency e.g., the central bank whereas a transaction in the blockchain network can be conducted between any two peers (P2P) without the authentication by the central agency. Blockchain is interpreted by Meunier (2018) as, "a machine to build trust, transparency, reliability, speed, and effectiveness in peer-to-peer and automated transactions".

A blockchain consists of a sequence of blocks which holds a complete list of transaction records like conventional public ledger. "The name blockchain stems from its technical structure — a chain of blocks". A block is a data structure which permits to store a list of transactions (Wüst, &Gervais, 2018). Each block points to the immediately previous block via a cryptographic hash value of the previous block called parent block (Zheng, Xie, Dai, Chen, & Wang, 2018). The first block of a blockchain, known as genesis block, has no parent block. To validate the authentication of transactions an asymmetric cryptography mechanism used by Blockchain (NRI, 2015).A transaction is final once it is included in the blockchain (Dwyer, 2014). People all over the world can trust each other and transfer different kinds of assets peer-to-peer over the internet using cryptography. The information in the blockchain can no longer be changed (Nofer, Gomber, Hinz, &Schiereck, 2017). Each user can interact with the blockchain network with a generated address to avoid identity exposure. Since each transactions on the blockchain is authenticated and recorded with a timestamp, users can easily validate and trace the previous records through accessing any node in the distributed network. In Bitcoin blockchain, each transaction could be traced to previous transactions iteratively which increases the traceability and the transparency of the data stored in the blockchain (Zheng, Xie, Dai, Chen, & Wang, 2018).

Green Finance:

From the time when the Industrial Revolution has gained its momentum, finance has been a powerful enabler of human evolution (Sachs, Woo, Yoshino &Taghizadeh-Hesary, 2019). They have also stated that to accomplish the Sustainable Development Goals (SDG) and to avoid the worst climate change outcomes, we need to upgrade the financing of investments through new financial instruments and new policies, such as green bonds, green banks, carbon market instruments, fiscal policy, green central banking, 'FinTech,' community-based green funds, etc. which will provide environmental benefits collectively known as 'green finance'. To accomplish the 2030 Agenda for Sustainable Development and the Paris Climate Accord, investment will have to

be channelize away from carbon and resource-intensive investments, and toward sustainable investment (Dikau&Volz 2018).Green finance, also known as sustainable finance or environmental finance, is an innovative financial arrangement intended at the environmental protection and the accomplishment of sustainable utilization of resources. The main objective of green finance is to connect financial sector and protection of environment. Active financial tools can promote the use of renewable energy to achieve environmental protection (Wang, &Zhi, 2016).FinTech has got the potential to integrating environmental and social considerations across the globe. The financial sector will have to play a significant role in this green revolution. As suggested by Berensmann, &Lindenberg (2016) banks, institutional investors and international financial institutions as well as central banks and financial regulators are the key players channelizing the development of green finance related projects. As per ICMA (2018) the projects which are usually considered as 'green' projects are renewable energy; energy efficiency; pollution prevention and control; environmentally sustainable management of living natural resources and land use; terrestrial and aquatic biodiversity conservation; clean transportation; sustainable water and wastewater management; climate change adaptation; eco-efficient and/or circular economy adapted products, production technologies and processes; and green buildings.FinTech companies to digitalize green assets using blockchain technologies to guarantee the genuineness and traceability of green products. Sachs et al. (2019) has stated green finance as a collection of green bonds, green banks, carbon market instruments, fiscal policy, green central banking, financial technologies, community-based green funds, etc., which are collectively known as financing of investments that provide environmental benefits, through new financial instruments and new policies. They have also suggested that if we want to achieve sustainable development goals, we need to concentrate on green projects and improve the financing of investments that provide environmental benefits. The main drivers of the development of green finance is the rendezvous of international financial organizations and the development of concrete market incentives for investors to issue or to buy green securities. The key considerations of green finance are proper enclosure of environmental risks in the investors' decision-making process, the effective channeling of the demand, the creation of specific green financial products, facilities and also the political initiative of the international community toward the environment goals (Migliorelli&Dessertine, 2019).

Relationship:

FinTech is important for sustainable development. Financial Institutions (FI), especially banks, have a significant impact on sustainable development due to their intermediary role between savers and borrowers, and also in terms of their role in financing economic projects, corporate innovation and investments (Varga, 2018). Economies are recommended to emphasis on developing strategies for digital financial transformation in the form of FinTech to achieve the Sustainable Development Goals (SDGs) (Zetzsche, Buckley &Arner, 2019). A study conducted by Legowo, Subanidja&Sorongan (2020) in context with Indonesia has established the fact that

FinTech, has a significant role in sustainable development in the Financial and Banking Industry. FinTech can act as a driving force for the fourth industrial revolution (Shin & Choi, 2019). Financial ecosystem is the backbone of global economy. With the advent of innovative technology in the financial industry has improved the financial products and services. FinTech has lower transaction cost, reduced trading time, providing a wide range of financial services for small and medium-sized businesses, improved the efficiency, increased the transparency, decreases information asymmetry, accelerate value creation and detects invisible financial demands of investors. Integration of financial innovation in terms of big data analysis, blockchain technology, cloud computing, Internet of Things (IoT) and artificial intelligence with FinTech has also enhanced risk management ability of the financial sectors.The behavior of banking customers has changed because of online banking and multi-bank-relations. The rapid diffusion of mobile devices and digital financial services has facilitated customers to attain universal access to financial information. Fintech offers the vision of fast-tracking the assimilation of the financial and real economy, improving opportunities for shaping greater decentralization in the transition to sustainable development (Castilla-Rubio et al., 2016). FinTech has transformed financial services to green to a large extent and also pioneering at creating new green products which are environment friendly. The aim of green finance is to protect environment by connecting financial industry with environment protection which will act as the main enabler of sustainable development. In their study Deng, Huang & Cheng (2019) supported the fact that there is a U-shaped relationship between the FinTech and sustainable development. Many researchers have opined that digital ecosystems can become today a influential factor in inclusive growth, contributing to economic and social assimilation, apprehending all the sustainable development areas, such as: quality education; decent work and economic growth; industrialization, innovation and infrastructure; inequality reduction; sustainable cities and towns; responsible consumption and production; effective development institutions; partnership for sustainable development, etc., (Albekov et al., 2017; Vovchenko et al., 2017, Vovchenko et al., 2019).Financial institutions and FinTech companies in various countries in the world, especially in Europe, the United States, and China, have tried to assimilate FinTech and financial technology by actively using blockchain, artificial intelligence, big data, and the Internet of Things in the global sustainable financial development process combining green finance to carry out green finance technology investigation and practice (He et al., 2020). They have also stated that to stimulate sustainable development, green financial services have become the key trend of financial development.Firms need to shape up or reshape in order to suit the green finance evolution (Ferri, & Lipari, 2019). FinTech can expedite the progress of green finance as a financial strategy which can guarantee the sustainable development of the economy and ecological environment (Yang, 2020). In spite of several barriers, such as, low enthusiasm in participation, low efficiency, high trading cost, lack of information communication mechanism, and difficult to regulate, etc. the evolution worldwide to cleaner, greener, knowledge-richer, more equitable economies, is ensuing rapidly. Sustainable finance as defined by Goglio&Catturani (2019) is a "non-

predatory finance, attentive to the production of value and aimed at fostering sustainable development". Fintech and blockchain operate in decentralized systems, sidestepping traditional intermediaries such as banks or other financial institutions, decreasing costs and inefficiencies. Block Chain facilitates effective monitoring, reporting and verification, increases transparency and accountability and reduces the risk of green washing.

CONCLUSION:

Finance is the driving force of the development of infrastructure projects, including energy projects. Financial sector is accomplishing a significant role towards the modern day society, though its activities are counter-productive to the economy in many cases. Hence it is the urge of the society to maintain sustainability. Retail and institutional investors should look for more sustainable savings and investment solutions. The financial institutions should offer a diverse and qualitative range of socially responsible, climate friendly and sustainable financial products which can quicken the evolution towards a carbon-free economy. Integration of financial innovation in terms of big data analysis, blockchain technology, cloud computing, Internet of Things (IoT) and artificial intelligence with FinTech facilitate access to new sources of finance products and investment which can reveal the pathway for utilization of green finance and to overcome respective barriers.Growing global awareness and current developments in financial technology will help remove some of the barriers. There is a huge scope for further studies to understand the legal and regulatory issues related to FinTech, Green Finance and Sustainable Development which was not considered in this article.

REFERENCES:

1. Albekov, U.A., Vovchenko, N., Andreeva, G., Vladimirovna, O. and Sichev, R.A. 2017. Block Chain and Financial Controlling in the System of Technological Provision of Large Corporations. European Research Studies Journal, 20(3B), pp. 3-12.
2. Arner, D. W., Barberis, J., & Buckley, R. P. (2015). The evolution of FinTech: A new post-crisis paradigm. Geo. J. Int'l L., 47, pp. 1271.
3. Babbitt, D. & Dietz, J. (2014). Crypto-economic Design: A Proposed Agent-Based Modelling Effort. Swarm Fest 2014: 18th Annual Meeting on Agent-Based Modelling & Simulation. University of Notre Dame. USA. June 29 – July 1. Retrieved from http://www3.nd.edu/~swarm06/SwarmFest2014/Babbitt.pdf.
4. Berensmann, K., &Lindenberg, N. (2016). Green finance: actors, challenges and policy recommendations. German Development Institute/Deutsches Institutfür Entwicklungs politik (DIE) Briefing Paper, pp. 23.
5. Castilla-Rubio, J. C., Zadek, S., & Robins, N. (2016). Fintech and sustainable development: Assessing the implications. UNEP Inquiry. Retrieved from http://unepinquiry.org/wp-content/uploads/2016/12/Fintech_and_Sustainable_Development_Assessing_the_Implications.pdf
6. Cen, T., & He, R. (2018, December). FinTech, Green Finance and Sustainable

Development. In 2018 International Conference on Management, Economics, Education, Arts and Humanities (MEEAH 2018), pp. 222-225. Atlantis Press. https://doi.org/10.2991/meeah-18.2018.40.

7. Chaum, D. (1983). Blind signatures for untraceable payments. In Advances in cryptology, pp. 199-203. Springer, Boston, MA.
8. Deng, X., Huang, Z., & Cheng, X. (2019). FinTech and sustainable development: Evidence from China based on P2P data. Sustainability, 11(22), pp. 6434.
9. Dikau, S., &Volz, U. (2018). Central banking, climate change and green finance.
10. Dwyer, G. (2014). The Economics of Bitcoin and Similar Private Digital Currencies. July 8. dx.doi.org/10.2139/ssrn.2434628.
11. Ferri G., Lipari F. (2019) Sustainable Finance Management. In: Migliorelli M., Dessertine P. (eds) The Rise of Green Finance in Europe. Palgrave Studies in Impact Finance. Palgrave Macmillan, Cham. https://doi.org/10.1007/978-3-030-22510-0_4.
12. Financial Services Development Council: The Future of FinTech in Hong Kong (2017), p.6.
13. Foroglou, G., &Tsilidou, A. L. (2015, May). Further applications of the blockchain. In 12th student conference on managerial science and technology, pp. 1-8.
14. Han, K. S., Park, S. J., & Kim, J. B. (2016). A Study on the Trends of Fin Tech. International Journal of u-and e-Service, Science and Technology, 9(7), pp. 71-80.
15. Hasan, M. M., Popp, J., &Oláh, J. (2020). Current landscape and influence of big data on finance. Journal of Big Data, 7(1), pp. 1-17.
16. He, Z., Liu, Z., Wu, H., Gu, X., Zhao, Y., & Yue, X. (2020). Research on the Impact of Green Finance and Fintech in Smart City. Complexity, 2020.
17. Goglio S., Catturani I. (2019) Sustainable Finance: A Common Ground for the Future in Europe?. In: Migliorelli M., Dessertine P. (eds) The Rise of Green Finance in Europe. Palgrave Studies in Impact Finance. Palgrave Macmillan, Cham. https://doi.org/10.1007/978-3-030-22510-0_10.
18. Hinson, R., Lensink, R., & Mueller, A. (2019). Transforming agribusiness in developing countries: SDGs and the role of FinTech. Current Opinion in Environmental Sustainability, 41, pp. 1-9.
19. Hopwood, B., Mellor, M., & O'Brien, G. (2005). Sustainable development: mapping different approaches. Sustainable development, 13(1), pp. 38-52. https://doi.org/10.1002/sd.244.
20. ICMA (International Capital Market Association). 2018. Green Bond Principles Voluntary Process Guidelines for Issuing Green Bonds June 2018. Paris: ICMA.
21. Itay Goldstein, Wei Jiang, G Andrew Karolyi, To FinTech and Beyond, The Review of Financial Studies, Volume 32, Issue 5, May 2019, pp. 1647–1661, https://doi.org/10.1093/rfs/hhz025.
22. Legowo, M. B., Subanidja, S., &Sorongan, F. A. (2020, September). Model of Sustainable Development Based on FinTech in Financial and Banking

Industry: A Mixed-Method Research. In 2020 3rd International Conference on Computer and Informatics Engineering (IC2IE), pp. 194-199. IEEE.

23. Lerner, T. (2013). Mobile payment, pp. 1-151. Springer.
24. Liu, Y., Peng, J., & Yu, Z. (2018, August). Big Data Platform Architecture under The Background of Financial Technology: In The Insurance Industry As An Example. In Proceedings of the 2018 International Conference on Big Data Engineering and Technology, pp. 31-35.
25. Madden, S. (2012). From databases to big data. IEEE Internet Computing, 16(3), pp. 4-6.
26. McAfee, A., Brynjolfsson, E., Davenport, T. H., Patil, D. J., & Barton, D. (2012). Big data: the management revolution. Harvard business review, 90(10), pp. 60-68.
27. Meunier, S. (2018). Blockchain 101: What is blockchain and how does this revolutionary technology work? In Transforming climate finance and green investment with Blockchains, pp. 23–34. Academic Press. https://doi.org/10.1016/B978-0-12-814447-3.00003-3.
28. Migliorelli M., Dessertine P. (2019) Green Finance Today: Summary and Concluding Remarks. In: Migliorelli M., Dessertine P. (eds) The Rise of Green Finance in Europe. Palgrave Studies in Impact Finance. Palgrave Macmillan, Cham. https://doi.org/10.1007/978-3-030-22510-0_11.
29. Nakamoto, S. (2009). Bitcoin: A peer-to-peer electronic cash system Bitcoin: A Peer-to-Peer Electronic Cash System. Bitcoin.org. Disponibleenhttps://bitcoin.org/en/bitcoin-paper.
30. Nofer, M., Gomber, P., Hinz, O., &Schiereck, D. (2017). Blockchain. Business & Information Systems Engineering, 59(3), pp. 183-187.
31. NRI (2015) Survey on Blockchain Technologies and Related Services, Technical Report.
32. Peters, G.W., Panayi, E. and Chapelle, A. (2015) Trends in Crypto-Currencies and Blockchain Technologies: A Monetary Theory and Regulation Perspective.
33. Philippon, T. (2016). The FinTech opportunity (No. w22476). National Bureau of Economic Research.
34. Raluca, G.H.; Popescu, C.; Popescu, G.N. An Exploratory Study Based on a Questionnaire Concerning Green and Sustainable Finance, Corporate Social Responsibility, and Performance: Evidence from the Romanian Business Environment. J. Risk Financ. Manag. 2019, 12, pp. 162.
35. Sachs, J., Woo, W. T., Yoshino, N., & Taghizadeh-Hesary, F. (2019). Importance of green finance for achieving sustainable development goals and energy security. Handbook of green finance: Energy security and sustainable development, pp. 3-12.
36. Sachs, J. D., W. T. Woo, N. Yoshino, and F. Taghizadeh-Hesary. 2019. "Importance of Green Finance for Achieving Sustainable Development Goals and Energy Security." In Handbook of Green Finance. Sustainable Development, edited by J. Sachs, W. Woo, N. Yoshino, and F. Taghizadeh-Hesary, pp. 3–12. Singapore: Springer.

37. Sachs, Jeffrey D. and Woo, Wing Thye and Yoshino, Naoyuki and Taghizadeh-Hesary, Farhad, Why Is Green Finance Important? (January 22, 2019). ADBI Working Paper 917 (2019), Available at SSRN: https://ssrn.com/abstract =3327149or http://dx.doi.org/10.2139 /ssrn.3327149.

38. Shin, Y. J., & Choi, Y. (2019). Feasibility of the fintech industry as an innovation platform for sustainable economic growth in Korea. Sustainability, 11(19), pp. 5351.

39. Sohangir, S., Wang, D., Pomeranets, A., & Khoshgoftaar, T. M. (2018). Big Data: Deep Learning for financial sentiment analysis. Journal of Big Data, 5(1), pp. 1-25.

40. Varga, D. (2018). FinTech: Supporting Sustainable Development By Disrupting Finance. Budapest Management Review, 8(11), pp. 231-249.

41. Vovchenko, G.N., Andreeva, V.A., Orobinskiy, S.A. and Filippov, M.Y. 2017. Competitive Advantages of Financial Transactions on the Basis of the Blockchain Technology in Digital Economy. European Research Studies Journal, 20(3B), pp. 193-212.

42. Vovchenko, N. G., Galazova, S. S., Sopchenko, A. A., &Dzhu, O. S. (2019). FinTech ecosystem as an instrument of sustainable development provision.

43. Wang, Y., &Zhi, Q. (2016). The role of green finance in environmental protection: Two aspects of market mechanism and policies. Energy Procedia, 104, pp. 311-316.

44. World Commission on Environment and Development. Our Common Future; Oxford University Press: London, UK, 1987; Available online: https:// sustainabledevelopment. un.org/content /documents/5987ourcommon-future. pdf.

45. World Commission on Environment and Development. (1987). Report of the World Commission on Environment and Development: Our Common Future. UN Documents: Gathering a Body of Global Agreements.

46. Wüst, K., & Gervais, A. (2018, June). Do you need a blockchain?. In 2018 Crypto Valley Conference on Blockchain Technology (CVCBT), pp. 45-54. IEEE.

47. Yang, X. (2020). FinTech in Promoting the Development of Green Finance in China against the Background of Big Data and Artificial Intelligence.

48. Zetzsche, D. A., Buckley, R. P., &Arner, D. W. (2019). FinTech for financial inclusion: driving sustainable growth. Sustainable Development Goals: Harnessing Business to Achieve the SDGs through Finance, Technology, and Law Reform, pp. 177-203.

49. Zheng, Z., Xie, S., Dai, H. N., Chen, X., & Wang, H. (2018). Blockchain challenges and opportunities: A survey. International Journal of Web and Grid Services, 14(4), pp. 352-375.