EMERGING ROLE OF DATA AND FINTECH IN THE DEVELOPMENT OF DIGITAL ECONOMY

FEBRUARY 2021

Table of Contents

EXECUTIVE SUMMARY

This research study was carried out by the Emerging Technologies Research Unit of the Research and Development Department for the Nigerian Communications Commission to ascertain the Emerging Role of Data and FinTech in the Development of Digital Economy and the regulatory implications.

The impact of the ICT revolution is now evident in virtually all countries, Nigeria, inclusive. Hence, the phenomenal global transition towards a "digital economy" with an estimated worth of $11.5 trillion globally, equivalent to 15.5 percent of global GDP and which has grown two and a half times faster than global GDP over the past 15 years, calls for urgent policy measures in Nigeria for the purpose of providing the necessary regulatory framework to support the spread of these new digital technologies and ensuring that greater levels of digitalization of Nigeria's economy and the society at large, are achieved.

The year 2017 witnessed a rise in the total global Start-ups' funding. Globally, up to 45% of all Start-ups focused on financial inclusion and Fin-Tech Start-ups are becoming increasingly attractive. As a result a record $93 million in investment was raised between 2015 and 2017 by Fin-Tech companies globally.

His Excellency, President Muhammadu Buhari, GCFR's, approval of the re-designation of the Federal Ministry of Communications and Digital Economy (FMoCDE) on the 17th of October, 2019, is among the priorities by the Federal Government for a digitised Nigeria. Along with the National Digital Economy Policy and Strategy document 2020-2030, the Federal Government launched an E-Government Plan 2020 with the mission to improve digital operations and services across MDAs in Nigeria. Some key Government digitisation initiatives include the Integrated Payroll and Personnel Information System (IPPIS) platform, and the active role of the development of a Digital Identity Ecosystem by the National Identity Management Commission (NIMC). Others include the Nigerian National Policy for Information Technology (IT), 2000; The Nigeria Vision 20:20 Policy; the National Broadband Plan 2013 – 2018, National Broadband Plan 2020 – 2025; the InfraCo Licence and project, amongst others.

Today in Nigeria, it is estimated that there are about 210-250 FinTech operators/companies operating in the Nigerian space, and these players brought about the valuation of the industry to $153.1 million in 2017 and

are projected to rise up to $543.3 million by 2022. Despite these impressive statistics, Fin-Tech Start-ups in Nigeria still face significant number of problems to their uptake, use and acceptability in Nigeria such as:

1. Bridging existing gap between Fin-Tech firms and traditional banking systems.
2. The Regulatory Environment Remains Challenging.
3. Collaboration, Partnerships & Funding.
4. Access to Financial Infrastructure.
5. Winning Customer Trust and Access to Talent.

These problems pose significant challenges to the data collection and analysis and act as a hindrances to the growth of Digital Economy in Nigeria, and the achievement of the Digital Economy Policy and Strategy of the Nigerian Government.

Furthermore, in Nigeria various Agencies of Government and even large Corporations collect data on Nigerians. The lack of cohesion amongst these data generating and storing Organizations also impact the rollout of a digital Nigeria. Some of these data collecting offices include various Agencies of Government and also private entities managing Nigerian data, a critical analysis of its impact on the proposed Digital Economy is needed. Some of them include the Nigerian Immigration Service, the Nigerian Customs, Government hospitals, Telecoms services providers, private Banks, the Nigerian Identity Management Agency, private hospitals, Insurance companies, the Directorate of Road Traffic Services, the Nigerian Communications Commission, NOTAP, the Central Bank of Nigeria, the National Population Commission, the National Bureau of Statistics, the Electricity Distribution Companies, the Federal Inland Revenue Service, the Corporate Affairs Commission, the Federal Ministry of Education and all its Agencies, data collecting bodies in all State and Local Governments of Nigeria, large supermarket chains.

We further analysed the role of Big Data as driver for each emerging technology such as 5G Mobile Broadband, Internet of Things (IoT), Cloud Computing, Blockchain Technologies, Artificial Intelligence (AI) and Data Analytics. We also analysed the challenges to data mining in Nigeria which include lack of skilled personnel data security and protection; Lack of data coordination/no coordinating body; Poor development of e-governance in Nigeria; Poor uptake of e-services; Rural poor, high cost of services and

lack of internet services in rural area; Duplication and control of national data by various agencies and private sector players; and Data security and privacy issues. In addition, we reviewed the current need for digitalised health care, agricultural and educational sectors of Nigeria's economy.

In understanding how data is gathered, a deep study of the meaning, challenges and correlations between Digital Finance, Digital Financial Inclusion, Financial Inclusion, Financial Data Inclusion is undertaken, and their impact on the efforts of digitisation using data.

Some of the identified FinTechs challenges include: their 'high-risk customers threaten their financial stability; FinTech providers often lack of sustainable revenue base, their services are usually free or negligible. Most FinTechs as new businesses are not deemed trustworthy enough, not have been in operation long enough to determine their survivability during a recession, financial crises or unexpected loan defaults. In addition, as internet access is not universal, FinTechs may not find a ready market.

Whilst analysing some of the positive steps by the Commission in supporting the roll out of a digital economy in Nigeria the following recommendations are emphasized:

1. The Commission should drive collaboration toward informed and effecting regulation with relevant stakeholders such as Ministry of Communications & Digital Economy, CBN, NITDA and NOTAP. Constant collaboration would establish information sharing and boost stakeholder involvement.
2. The Commission should consistently engage with the ITU on FinTech standardization efforts for replication at the National level.
3. Collaborate and partner with Academia and Research Institutions and Start-ups to drive constant and intensive research in the field of Emerging Technologies such as FinTech. This partnership would also foster sensitization and educational reform of Nigerian school curriculums to include ICT and digital skills for retool and reskill of Nigerians for this new era of emerging technology.
4. The Commission should encourage investment in local FinTech start-ups.

5. The Commission and CBN should collaborate and organise forum for FinTechs and Banks, on strengthening their digital infrastructure platforms and systems.
6. Financial service players should be encouraged to provide enhanced digital products, as well as personalized services (digital and non-digital) that could provide significant return on investment.
7. Engage in stakeholder engagement and capacity deployment programmes with SMEs, micro-business, employers, employees, trade groups, among other stakeholders, to enlighten them on the benefits of utilizing digital platforms as a channel for financial transactions and commerce, and as a bridge builder for a digitalised Nigeria

CHAPTER 1: INTRODUCTION

1.1. BACKGROUND

Information and Communication Technology (ICT) has brought about fundamental changes in the way people socialize, learn, work and conduct business activities. The impact of the ICT revolution is now evident in virtually all countries, Nigeria, inclusive, and is likely to continue in the years to come, as technology penetrates and fosters vital changes in all sectors and dimensions of the human life.

With the rapid growth of the internet starting in the mid-1990s, the digital landscape or "digital economy" has expanded tremendously and invariably changed how businesses operate and how consumers engage in transactions with businesses vice versa. Computers and other ICT devices are now considered to be ubiquitous and economies of the world now appears to rely on digital and internet technologies in ways that people could not have anticipated even a few years ago. For example, one of the main distinguishing features of this exponential growth of machine-readable information or digital data over the internet has been the expansion of big data analytics, artificial intelligence (AI), cloud computing and the development of new business models or digital platforms.

Subsequently, the transformative ability of these digital technologies for economic and social interactions, customarily compels Governments, businesses and people to adjust in order to seize the opportunities that are emerging, and deal with pitfalls or challenges that accompanies such emergence. This is very critical as although the pace of digital transformation varies from country to country, all countries are being affected.[1]

In Nigeria, at the heart of this digital revolution, is the Telecommunications Sector, fully liberalised in 2001 and regulated by the Nigerian Communications Commission. The Telecommunications Sector is considered essential to the provision of support services needed to promote growth and transformation of the various Sectors of the Nigerian economy, particularly as it plays a dual role in the provision of telecommunications services, but also as its inherent ICT capabilities results in it being an enabler for economic transformation for the all other Sectors.

1 Digital Economy Policy in Developing Countries. By Rumana Bukht and Robert Heeks. Available at https://www.researchgate.net/publication/327872098_Digital_Economy_Policy_in_Developing_Countries

Hence, the phenomenal global transition towards a "digital economy" with an estimated worth of $11.5 trillion globally, equivalent to 15.5 percent of global GDP and which has grown two and a half times faster than global GDP over the past 15 years, calls for urgent policy measures in Nigeria for the purpose of providing the necessary regulatory framework to support the spread of these new digital technologies and ensuring that greater levels of digitalization of Nigeria's economy and the society at large, are achieved.

This paper will therefore try to explore the possible role of the NCC within the context of a digital economy in Nigeria through the use of big data garnered via the platform of Fintechs.

1.2. GENERAL STATEMENT OF THE PROBLEM

The year 2017 witnessed a rise in the total global Start-ups' funding. Globally, up to 45% of all Start-ups focused on financial inclusion and Fin-Tech Start-ups are becoming increasingly attractive. As a result a record $93 million in investment was raised between 2015 and 2017 by Fin-Tech companies globally.

In Nigeria, the presence of FinTech is equally notable, and like its ecosystem, there is a continuous rise in the number of FinTech start-ups looking to offer better services than pre-existing ones. FinTech in Nigeria are looking to expand the tentacles of the financial sector to reach its un-banked population of 60 million people (more than a quarter of its estimated 200 million population) through mobile apps that make services. It is estimated that there are about 210-250 FinTech operators/companies operating in the Nigerian space, and these players brought about the valuation of the industry to $153.1 million in 2017 and are projected to rise up to $543.3 million by 2022.

However, despite these impressive statistics, Fin-Tech Start-ups in Nigeria still face a significant number of problems to their uptake, use and acceptability in Nigeria such as:

- Bridging existing gap between Fin-Tech firms and traditional banking systems;
- The Regulatory Environment Remains Challenging;
- Collaboration, Partnerships & Funding;
- Access to Financial Infrastructure;
- Winning Customer Trust and Access to Talent;

- Navigating the Current Issues; [2]

These challenges pose tremendous challenges to the data collection, analysis and manipulation of citizens' data which is crucial for the development of a Digital Economy in Nigeria, and thereby, presents as a hindrance to the achievement of the Digital Economy Policy and Strategy of the Nigerian Government.

1.3. SIGNIFICANCE OF THE STUDY

This Study will be a significant endeavour into addressing and/or proffering possible practical and lasting solutions to the aforementioned challenges and problems regarding Data and Fin-Tech and its role in the development of the digital economy with Nigeria firms as a case study.
Understanding how Financial Institutions work and their willingness to adapt to trending technologies, partnership or funding FinTech firms, would propel rapid development in the digital economy in the country. Also, the results of the research would aid Regulatory decision making which is envisaged to lead to improved ICT infrastructure, increased due and protection of Citizenry data, and also increased banking of the unbanked.

1.4. RESEARCH QUESTIONS

This Study will focus on and answer the following research questions:

1. What is the role of FinTech in the development of Digital Economy in Nigeria?
2. What is the role of Data in the development of Digital Economy in Nigeria?
3. What are the challenges to the achievement of Digital Financial Inclusion as needed for a Digital Economy in Nigeria

1.5. LIMITATIONS

This topical field Study is new and understudied hence there is limited information on the Emerging Role of Data and Fin-Tech in the Development of Digital Economy. The scope of the Study cannot

[2] E-commerce broadly describes all purchases and sales of goods and services that occur over computer networks such as Business-to-business (B2B) - utilising the internet to conduct transactions of goods and services by businesses to other businesses; Business-to-consumer

encompass all the various field due to time and resources constraints, hence it is limited to general interdisciplinary survey of literature.[3]

[3] (B2C) – utilising the internet or other electronic means to conduct the sale of goods and services by businesses to consumers or retail e-commerce; and Peer-to-peer (P2P) – known as the sharing economy (platform enabled e-commerce) involving the exchange of goods and services between

CHAPTER 2: LITERATURE REVIEW

2.1. DEFINITION OF DIGITAL ECONOMY

The greatest cause of confusion surrounding the Digital Economy is the lack of a commonly understood definition. What appears to be a consensus is that digitization refers to the encoding of information or procedures into binary bits that can be read and manipulated by computers. Collectively, the changes produced by the different forms of digitization and the effects on economic and social activity constitute digitalization.

The definitions of Digital Economy has always been a reflection of the times and trends from which they emerge. In the early mid-1990s – the definition of digital economy centred on the adoption of the internet and its impact on the economy, and summarizing it as "networking of humans through technology that combine intelligence, knowledge and creativity for breakthroughs in the creation of wealth and social development."

By the early 2000s, e-commerce[4] was incorporated into the scope of Digital Economy (packet switching) alongside the World Wide Web. Another definition of Digital Economy was as an economy based on digital technologies (sometimes referred to as internet economy).

Notably, the definitions of Digital Economy in the early 2000s marked the initial appearance of two important features – on one hand, a differentiation into parts and on another hand, an implicit acknowledgement of the fuzzy boundaries of the Digital Economy with a mix of highly digitised and mixed digitised goods and services as follows:

- Highly digital goods and services – such as online information, services, software sales, online education.
- Mixed digital goods and services – for example, books, hotel rooms plus associated sales and marketing.

[4] E-commerce broadly describes all purchases and sales of goods and services that occur over computer networks such as Business-to-business (B2B) - utilising the internet to conduct transactions of goods and services by businesses to other businesses; Business-to-consumer (B2C) – utilising the internet or other electronic means to conduct the sale of goods and services by businesses to consumers or retail e-commerce; and Peer-to-peer (P2P) – known as the sharing economy (platform enabled e-commerce) involving the exchange of goods and services between consumers facilitated through a digital application (examples are ride dispatching, accommodation rentals, delivery and courier services, landscaping, food preparation, consumer goods rentals, laundry services and so on) (see Barefoot et al. 2018).

- IT-intensive services or goods production – examples are accounting services or complex engineering designs.
- The parts of the IT industry that support the above three segments namely, broadcast and communications services.

For the purposes of this Study, we will be defining Digital Economy as "that part of economic output derived solely or primarily from digital technologies with a business model based on digital goods and services. [5]" This definition will be adopted in this paper because it is extensive and the understanding that concept of Digital Economy will continue to expand to accommodate areas of innovations that might be developed in the coming years.

2.1.1. THE GOVERNMENTS ROLE AND INVOLVEMENT IN DIGITALIZATION

In order to take advantage of the many opportunities that emerging technologies offer, the National Digital Economy Policy and Strategy has been adopted to reposition the Nigerian economy. The growth of the digital technology industry in recent years is a strong sign that this industry will act as a catalyst for rapid growth and this is consistent with the vision of GCFR President Muhammadu Buhari to diversify Nigeria's economy away from dependency on the oil and gas industry.

His Excellency, President Muhammadu Buhari, GCFR, approved the re-designation of the Federal Ministry of Communications as the Federal Ministry of Communications and Digital Economy (FMoCDE) on the 17th of October, 2019. This has clearly positioned Nigeria as one of the early adopters of digital technology and it gives us a good opportunity to become major participants in the growing global digital economy. The re-designation of the Ministry is aligned with the priority areas the Federal Government has ordered the Ministry of Communications and Digital Economy to concentrate on. Developing and implementing a Digital Economy Policy and Strategy for Nigeria is among the priorities assigned to the Federal Ministry of Communications and Digital Economy.

[5] Business models based on digital platforms such as transaction platforms - for example Amazon, eBay, Facebook and so on and Innovation platforms such as that creates environments for code and content producers to develop applications and software in the form of, for example, operating systems (e.g. Android or Linux) or technology standards (e.g. MPEG video) – UNCTAD, 2019

The Digital Economy Policy and Strategy is based on the FMoCDE's 8-pillars for the acceleration of the National Digital Economy for a Digital Nigeria. The 8 pillars are:

1. Developmental Regulation
2. Digital Literacy & Skills
3. Solid Infrastructure
4. Service Infrastructure
5. Digital Services Development & Promotion
6. Soft Infrastructure
7. Digital Society & Emerging Technologies
8. Indigenous Content Development & Adoption

These pillars align well with the Economic Recovery and Growth Plan of the Federal Government and also address the 3 key focus areas of the President, namely economic development, anticorruption and security.

The Federal Government pledged its commitment to improving service delivery to become more efficient through reliance on digitization and automation for the purpose of discrete transparency and accountability.[6] Recently, the Federal Government launched an E-Government Plan 2020 with the mission to improve digital operations and services across Ministries, Department and Agencies in the country. The initiative is geared towards achieving the following;

- Improved public administration
- Growth of ICT sector generally leading to creation of employment opportunities
- Improved economic development
- Cost savings resulting in the efficient service delivery
- Enhance transparency and accountability
- Lead to improved public administration.

With commitment and dedication, this initiative will be dedicated to improvement of the efficiency in the public service, block financial leakages and improve transparency in government dealings to reduce corruption to the barest minimum while also bringing government closer to the people.

The implementation will be rolled out in various stages:

- The pre-implementation stage.

[6] https://www.vanguardngr.com/2020/06/fg-to-rely-on-digitisation-automation-for-transparency/

- The implementation phase.
- The post-implementation phase.

The E-government master plan presents three unique opportunities which are:

- Potential to accelerate the digitization of the ease of doing business processes which will allow Nigeria to attract the size of investments that we desire and deserve.
- The ICT network Readiness Report shows very low usage of ICT in Government in Nigeria.
- Projection for private sector investment in a more structured governance environment, with positive impacts on efficiency and effectiveness and most of all on services to the citizens of Nigeria.[7]

Several milestones from these initiatives have been achieved in order to transform the public service for improved delivery of service quality, especially with the initiation of the e-Salary software; the Integrated Payroll and Personnel Information System (IPPIS) platform. Through this platform, billions of Naira has been saved from cleaning human resources, improved governance and administration such as payroll transfers, promotions, recruitment and training.[8]

2.1.2. GOVERNMENTS EFFORTS IN THE DEVELOPMENT OF THE DIGITAL IDENTITY ECOSYSTEM

The Digital Identity Ecosystem is a framework involving the National Identity Management Commission (NIMC) working in collaboration with the public and private service providing partners to create an enabling environment for the effective and efficient mass enrolment of Nigerians and legal residents in Nigeria into a centralized, secure National Identity Database where digital identities are issued to everyone in the form of the National Identification Number (NIN).

The initiative gets its funding from international Bodies such as the World Bank, European Union, and Agence Française de Development (AFD) and

[7] https://www.proshareng.com/news/TECH%20TRENDS/How-E-Government-Plan-Launch-Will-Digitize-Government-Operations-in-Nigeria/45592#
[8] https://www.vanguardngr.com/2020/06/fg-to-rely-on-digitisation-automation-for-transparency/

the aim is to improve identity authentication of citizens and make all identity-related transactions safe within and outside the country.[9]

Another move initiated by the Government are future plans to replace the issuance of plastic national identity cards with digital forms of identification. The physical possession of the cards would however be by convenience as the valuable data required can be retrieved using the allocated individual identification number.[10]

2.2. COMPONENTS OF DIGITAL ECONOMY

The different technologies and economic aspects of the Digital Economy can be broken down into three broad components[11].

- **Core Aspects:** Foundational aspects of Digital Economy otherwise referred to Digital-enabling infrastructure. These comprise of fundamental innovations (semiconductors, processors), core technologies (computers, telecommunications devices) and enabling infrastructures (internet and telecoms networks).
- **Digital and Information Technology (IT) Sectors:** This produces the key products or services that rely on core digital technologies, such as digital platforms, mobile applications and payment platforms. The digital economy is to a high degree affected by innovative services in these sectors that its contributions to the economy is growing and also provides opportunities for potential spill over effects to other sectors; and
- **A Wider Set of Digitalising Sectors:** Which includes those where digital products and services are being increasingly used (e-commerce). This includes digitally enabled sectors in which new activities or business models have emerged and are being transformed as a result of digital technologies. Examples include – finance, insurance, agriculture, health, media, tourism and transportation.

The importance of delineating the components of the digital economy is largely to aid calculation of its contribution to national Gross Domestic Product (GDP). Furthermore, it is crucial and essential for the Regulatory and policy decision making as it provides for easy comparison between

[9] https://www.nimc.gov.ng/digital-identity-ecosystem/
[10] https://www.thisdaylive.com/index.php/2020/08/14/digital-identification-to-replace-plastic-national-id-card/
[11] United Nations Conference on Trade and Development DIGITAL ECONOMY REPORT2019. Available at https://unctad.org/system/files/official-document/der2019_en.pdf

countries in the areas of Skills, Funding, Capability, Policy and Infrastructural gaps in the core aspect, the IT or digital sectors, or in the wider set of digitalizing sectors.

The growth of digital economy is attributable to the growth of the global collection, use and mining of data. This is data that is collected from daily socio-economic activities of an increasingly connected world. As the experts collect and collate this data, the emergence of digitalization and emerging ICT technologies, powered by the internet and the growth of 5G, have resulted in new and innovative ways to develop a knowledge based economy, premised on the use of ordinary data.

2.3. IMPACT OF DIGITAL ECONOMY ON NATIONAL ECONOMIC DEVELOPMENT

There is a well-documented contention that digitalisation results in national economic growth and development.[12] From e-commerce all the way to business process outsourcing, the operation of firms have been completely reinvented globally through digital technology.[13] Furthermore, means of communication have been revolutionised with the means of Governments engagement with citizens through e-Government platforms.[14]

Nigeria is strategically and uniquely positioned to harvest the benefits of the developing digital economy. Statistics reveal that Nigeria accounts for about 47% of West Africa's population, and half of the country's 200 million people are under the age of 30. The largest mobile market in sub-Saharan Africa has been identified in Nigeria and it is strongly supported by effective mobile broadband infrastructure with improved international connectivity. Yet minimal fixed broadband infrastructure and connectivity in rural areas is leaving a significant number of the most marginalized segments of the population without Internet access.[15]

Data from reports indicate that despite availability of broadband infrastructure, many Nigerian citizens and businesses remain excluded from the digital ecosystem as a result of limited access to broadband and no availability of adequate internet compliance devices to fully utilize the

13 Bukht and Heeks, 2017
14 Lacity et al., 2016; Liu and Aron, 2014
15 Zhao et al., 2015
16 Adeyemi, S. (2018). A Guide to the Payments and Fintech Landscape in Nigeria. [Online] Available at: https://fintechpub.herokuapp.com/assets/Nigeria_FinTech_Guide.pdf

benefit of the Internet. The report also gives clear highlights of the progress in digital infrastructure, finance, skills, and entrepreneurship, among others.

As digital economy and economic transformation is driven by data, there is a need to understand what data is.

2.4. DEFINITION OF DATA

- Data can be defined as characteristics or information, usually numerical, that are collected through observation. In a more technical sense, Data are a set of values of qualitative or quantitative variables about one or more persons or objects, while datum (singular of data) is a single value[16].

- Data as a general concept refers to the fact that some existing information or knowledge is represented or coded in some form suitable for better usage or processing.

- In Academics, data are simply units of information.

- Although the terms "Data" and "Information" are often used interchangeably, these terms have distinct meanings. Data are said to be transformed into information when they are viewed in context or in post analysis.

- Data are employed in scientific research, business management (e.g. sales data, revenues, profits, stock price) finance, Governance (e.g. crime rates, unemployment rates, literacy rates) and in virtually every other form of human organizational activity (e.g. censuses of the number of homeless people by non-profit organizations).

- In computing, data can be defined as information processed or stored by a computer. This information may be in the form of text documents, image, audio clips, software programs, or other types of data. At it is most rudimentary level, computer data is a bunch of ones and zeros, known as binary data. Because all computer data is in binary format, it can be created, processed, saved, and stored digitally.

17 Available at https://en.wikipedia.org/wiki/Data

- Data can be in a processed or raw form. Raw data (unprocessed data) is a collection of numbers or characters before it has been "cleaned" and corrected by researchers. Processed data is measured, collected and reported, and analysed, after which it can be visualized using graphs, images, or other analysis tools. Data processing commonly occurs by stages, and the "processed data" from one stage may be considered the "raw data" of the next stage.[17]

2.5. ROLE OF DATA IN THE GROWTH OF EMERGING DIGITAL TECHNOLOGIES

Big Data is a collection of data that is huge in volume, yet growing exponentially with time. It is a data with of large size and complexity that none of traditional data management tools can store it or process it efficiently. Big data is also a data but with huge size[18]. Some examples Of Big Data include the New York Stock Exchange which generates about one terabyte of new trade data per day; social Media sites generate about 500+terabytes of new data daily. There are 3 types of Big Data: Structured; Unstructured; and Semi-structured[19].

Big Data (BD) is likely to be of tremendous benefit to developing countries. It is anticipated that geo-locating a rural African farmer working in his farm with the help of an app installed in his cell phone, identifying the soil type and needs of the field, and offering advice regarding appropriate seeds, where they can be purchased, and how they can be planted and harvested is not far in the future. (Patel, 2013)

Massive amounts of data generated by social media, cell phones, and other digital communication tools, which are being increasingly used in developing countries, are a true form of Big Data. While such data has not been traditionally used in developmental issues, it is likely to be a useful indicator of human well-being and is thus a relevant BD source for development (Global Pulse, 2012).

[17] https://www.adb.org/news/events/understanding-digital-economy-what-it-and-how-can-it-transform-asia
https://corporatefinanceinstitute.com/resources/knowledge/finance/fintech-financial-technology/https://techterms.com/definition/data
[18] Available at https://www.guru99.com/what-is-big-data.html
[19] Available at https://www.guru99.com/what-is-big-data.html

There are noteworthy and encouraging trends in Big Data's utilization in developing economies. Big Data is playing an increasingly important role in several key development areas such as healthcare, agriculture, biotechnology, education, and environment monitoring. BD has been effectively used to evaluate and measure the impacts of humanitarian aid and similar interventions such as providing real-time information on social and economic indicator.[20]

The rapid advances in increasingly converging technologies having been enabled by a surge in capacity of data storage, processing and transmission. The fulcrum and catalyst that propels the digital economy are the following frontline technologies:

- **5G Mobile Broadband**

5G is a fifth generation network which will enable data collection and computation for billions of devices by providing a seamless and continuous connectivity. This technology is predicted to become the underlying fabric of an entire ecosystem of fully intelligent sensors and devices, capable of overhauling economic and business policies, and further blurring the geographical and cultural lines with huge potential of unlocking around $12.3 trillion of revenue across a broad range of industries.[21]

- **Internet of Things (IoT)** [22]

The growing array of internet-connected devices such as sensors, meters, radio frequency identification (RFID) chips and other gadgets that are embedded in various everyday objects enabling them to send and receive various kinds of data. 5G mobile broadband will greatly facilitate the adoption of IoT.

- **Cloud Computing**[23]

[20] Nir Kshetri, (December, 2014). The emerging role of Big Data in key development issues: Opportunities, challenges, and concerns,

[21] https://www.toppr.com/guides/business-environment/emerging-trends-in-business/digital-economy/ https://techterms.com/definition/data

[22] European Commission, Strategic Policy Forum on Digital Entrepreneurship (July 2016), A digital compass for decision makers: toolkit on disruptive technologies, impact and areas for action, http://ec.europa.eu/DocsRoom/documents/17924, p. 11. Available at https://ec.europa.eu/growth/industry/policy/advanced-technologies/strategic-policy-forum-digital-entrepreneurship_en

[23] European Commission, Strategic Policy Forum on Digital Entrepreneurship (July 2016), A digital compass for decision makers: toolkit on disruptive technologies, impact and areas for action, http://ec.europa.eu/DocsRoom/documents/17924, p. 11. Available at https://ec.europa.eu/growth/industry/policy/advanced-technologies/strategic-policy-forum-digital-entrepreneurship_en

It is a technology that delivers IT resources (such as software, computing power for data analytics, data storage) online as a service. The cloud is transforming business models, as it reduces the need for in-house IT expertise, and offers flexibility for scaling, and consistent applications rollout and maintenance.

- **Blockchain Technologies**[24]

They are a form of distributed ledger technologies that allow for multiple parties to engage in fast, secure, trusted and verified transactions without any intermediary. It allows community collaboration and business consolidation in various industries including payments, business services and logistics.

- **Artificial Intelligence (AI)** [25]

Developments in AI, including machine learning, are enabled by the large amount of digital data that can be analysed to generate insights and predict behaviour using algorithms. This enables new forms of automation combining robotics and machine learning and it is estimated to have the potential of generating around $13 trillion by 2030.

- **Data Analytics**[26]

Sometimes dubbed as "big data", it refers to the increasing capacity to analyse and process massive amounts of data which are essential to make data-driven decisions rapidly.

The common feature of all of these examples of digital technologies that fuels the digital economy is the strong reliance of "data." It will therefore

[24] European Commission, Strategic Policy Forum on Digital Entrepreneurship (July 2016), A digital compass for decision makers: toolkit on disruptive technologies, impact and areas for action, http://ec.europa.eu/DocsRoom/documents/17924, p. 11. Available at https://ec.europa.eu/growth/industry/policy/advanced-technologies/strategic-policy-forum-digital-entrepreneurship_en

[25] European Commission, Strategic Policy Forum on Digital Entrepreneurship (July 2016), A digital compass for decision makers: toolkit on disruptive technologies, impact and areas for action, http://ec.europa.eu/DocsRoom/documents/17924, p. 11. Available at https://ec.europa.eu/growth/industry/policy/advanced-technologies/strategic-policy-forum-digital-entrepreneurship_en

[26] European Commission, Strategic Policy Forum on Digital Entrepreneurship (July 2016), A digital compass for decision makers: toolkit on disruptive technologies, impact and areas for action, http://ec.europa.eu/DocsRoom/documents/17924, p. 11. Available at https://ec.europa.eu/growth/industry/policy/advanced-technologies/strategic-policy-forum-digital-entrepreneurship_en

seem to suggest that the absence of "data" will invariably slow the migration into digital economy.[27]

2.6. BENEFITS OF DATA IN THE GROWTH OF A DIGITAL NIGERIA

1. The statistical trends in the Nigerian telecommunication market will confirm the huge potentials and significant strides achieved thus far in its drive towards a digital economy. Key indicators showing the growth in the sector includes the following: a remarkable teledensity[28] growth which in 1999 was 0.45%, took a huge leap to 80.95% in 2012 and has consistently been above 90% thereafter, currently standing at 91.04% for 2019 (Q2); a gradual increase in the total number of broadband subscriptions and its penetration level which is now over 45%[29]; a steady increase in its contribution to the growth rate of Gross Domestic Product (GDP) – this stood at 11.39 % in 2019 in the second quarter, which is over 1 % increase from the same period of 2017 (kindly view table 1 in appendix 2, for ease of reference).

2. Highlighting further on the relative success Nigeria has made towards the transformation of its economy digitally, is the evidence of transition of ICT driven system and processes in various sectors of the economy (Abubakar, 2019). Table 2 in appendix 3, provides a summary of some of these sectorial transitions.

3. Other efforts by the Government of Nigeria to have a digital economy were:

    i. Nigerian National Policy for Information Technology (IT), 2000, with a vision of "To make Nigeria an IT capable country in Africa and a key player in the Information Society by the year 2005, using IT as the engine for sustainable development and global competitiveness."
    ii. The Nigeria Vision 20: 2020 Policy with the ICT sector *"targeted at encouraging research and development as well as initiatives*

[27] European Commission, Strategic Policy Forum on Digital Entrepreneurship (July 2016), a digital compass for decision makers: toolkit on disruptive technologies, impact and areas for action, http://ec.europa.eu/DocsRoom/documents/17924, p. 11. Available at https://ec.europa.eu/growth/industry/policy/advanced-technologies/strategic-policy-forum-digital-entrepreneurship_en

[28] Teledensity, defined as the number of active telephone connections per one hundred (100) inhabitants living within an area and expressed as a percentage by the International Telecommunications Union (ITU)

[29] A 30% target was set for 2018

that would facilitate and enhance local manufacture, capacity and content development in the key areas of ICT…" and

iii. National Broadband Plan 2013 – 2018, with a vision "*The broadband vision for Nigeria is one of a society of connected communities with high speed internet and broadband access that facilitate faster socioeconomic advancement of the nation and its people."*

iv. Conscious of the pivotal role pervasive broadband penetration plays in the actualisation of a digital economy, the NCC, as a fallout of the National Broadband Plan 2013-2018, has licensed Six infrastructure companies (InfraCo)[30], with the 7th yet to be licensed, to deploy metro and intercity fibre and broadband point of access with a minimum capacity of 10 gigabits per second (10 Gbps) across the 774 Local Government Areas of Nigeria.

v. A total of 84,580.7km of Fibre Optics (73,157.7 terrestrial fibre & 11,423km submarine cable) has been deployed in Nigeria by December, 2018 (NCC 2018 Subscriber/Network Data Report) and the NCC plans to further increase this number of fibre deployment in Nigeria to 127,000 by the end of 2019, with the support of the InfraCos.

However, despite all of these ICT driven system and processes, several difficulties have been observed as militating against the full transformation into a digital economy. These are according to Okonji (2018) are: having the will power by the Government to transcend into a digital economy; delay in approval for Right of Way (RoW) - largely with State Governments; multiple taxations (Federal, State and Local Governments); levies and fees on same existing infrastructure; fragmented and limited distribution of fibre and telecoms infrastructure to several areas of the country, creating large swathes of un-served and under-served communities within States and Local Government areas; long delays in the issuance of permits for new infrastructure; severe power outages and multiple Agencies of Government doing the same things.

[30] These InfraCos have been grouped in regional basis – Lagos (InfraCo Nigeria Limited); South West (Oodua Tel); South East (Zinox Technologies); South South (Raeanna Nigeria Limited); North West (Fleek Networks Limited); North East (Brinks Integrated Solutions Limited) and NC (Yet to be awarded).

Addressing these bottlenecks appears to be essential to having a truly digital transformation of the Nigerian economy.

2.7. DIGITIZED USAGE OF DATA ACROSS VARIOUS SECTORS OF NIGERIA'S ECONOMY

"As the biggest economy in Africa with one of the largest populations of young people in the world, Nigeria is well-positioned to develop a strong digital economy, which would have a transformational impact on the country," said Isabel Neto, the World Bank Senior Digital Development Specialist. "Through innovations and investments, the Nigerian economy can harness digital data and new technologies, generate new content, link individuals with markets and government services, and roll out new, sustainable business models." The country's digital economy revolves around five pillars of the Digital Economy for Africa initiative (DE4A);

Digital infrastructure, platforms, financial services, entrepreneurship and skills key foundational elements of a digital economy. These have further been distilled into the National Digital Economy Policy and Strategy Document 2020-2030, with 8 pillars for the nation's Digital Economy as follows[31]:

Pillar 1: Developmental Regulation
Pillar 2: Digital Literacy and Skills
Pillar 3: Solid Infrastructure
Pillar 4: Service Infrastructure
Pillar 5: Digital Services Development and Promotion
Pillar 6: Soft Infrastructure
Pillar 7: Digital Society and Emerging Technologies
Pillar 8: Indigenous Content Development and Adoption

2.7.1. THE USAGE OF DIGITIZED DATA IN THE HEALTH CARE SECTOR:

A brief census of the health care system in Nigeria reveals its records and documentations are majorly paper filings on cabinets.

Nigeria as a country has a vast geography in terms of habitable land mass with a statistically meaningful population size. Hence there exists a great opportunity for the advancement in the health care and health efficiency

[31] Available at https://www.ncc.gov.ng/docman-main/industry-statistics/policies-reports/883-national-digital-economy-policy-and-strategy/file

especially when the data are harvested and used effectively. Subsequently, the profitability of leveraging on health and pharma data sets could lead to better outcomes for Nigerians in the health sector through regional, State and federal collaborations.

A major challenged posed to the Government is in the area of using patient data which have been amassed over decades, to better address health issues facing the country and its citizens.

Indeed, there is a clear cut and urgent need to proffer effective policies over the country to better the health system for its residents. This responsibility falls immensely on the shoulders of the Federal and State Governments and their collaborations with local health service and Local Government health services. The possibility of achieving perfection in this endeavour is achievable through data and information sharing, specifically by encouraging and engaging financial technology based companies and organizations (Fin-Tech).[32]

Information sharing across the healthcare ecosystem relies on the interoperability between disparate data which are distinctly different in kind and the Information and communications technology (ICT) solutions. This has been greatly facilitated with the inclusion of various Fin-tech companies acting as third parties.

In fact, the improvements in health data liquidity is the ability of patient's data to move through the healthcare system securely and effectively which will immensely benefit Nigerians both medical and non-medical personnel in the following ways:

- Better health-data sharing improves continuity of care, over time, and across different care-delivery sites. Evidence shows that improved care continuity directly impacts and improves individual patient outcomes.

[32] https://www.techopedia.com/definition/29059/data-ownership
https://www.mckinsey.com/industries/financial-services/our-insights/monetizing-data-a-new-source-of-value-in-payments#
https://www.sisense.com/data-monetization/

- Individual patient data can be identified and used to drive population level analytics. Through machine-learning, algorithms can run and execute virtual randomized controlled trials on these big data to identify "positive outliers.
- Through harmonization of individual and corporate data, payment methods of medical and health bills become easy and seamless.

On both an individual and population basis, better health is directly related to better economic performance. Although the goal of our healthcare system is to improve Nigerians health and wellbeing, success and this contributes to our overall GDP.[33]

2.7.2. THE USAGE OF DIGITIZED DATA IN THE AGRICULTURAL SECTOR

Like every other nation in the world, data collection, analysis and processing are processes and activities which occur literally every minute in different forms in Nigeria. It is no hidden issue the challenges the agricultural sector in Nigeria has faced and is still facing. Like the health sector, data collections are manually done and filed in office cabinets. Gaining access to these data when in urgent or dire situations for analysis can sometimes be painstaking and tedious.

The digitization of data means that all data previously accumulated are transformed into digital formats and would by default be in same format for use. [34]

[35] https://en.wikipedia.org/wiki/Data_monetization
KPMG report (The Pulse of FinTech 2018)
https://www.Usaid.gov/div/grandchallenge

[36] Feed the future " innovation for data-driven agriculture" Key Findings Report | April 27-28, 2017 | Boulder, CO
Aker, Jenny, and Blumenstock, Joshua (2015). The Economic Impacts of New Technologies in Africa. The Oxford Handbook of Africa and Economics: Volume 2: Policies and Practices.
Available at https://en.wikipedia.org/wiki/Data
https://www.adb.org/news/events/understanding-digital-economy-what-it-and-how-can-it-transform-asia

The current milestone advances in technology has paved way for the development of new means of utilizing digitized agricultural data collection, analysis and processing:

- **Digitized Remote (Big) Data Collection and usage with Sensors, Drones, Satellites and More**

Utilizing the remote technological system by employing the use of remote sensors, unmanned aerial vehicles (drones) and satellites among others has proven to be very effective, time saving and to some extent highly accurate and precise in data collection and its digitizing process thereby boosting the efficiency of the agricultural system in terms of production (crop).

- The use of digitized satellite data (imagery) provides the ability for landscape monitoring, observance of pattern of changes over time as well as spectral analysis.
- Data and information such as population distribution and land use, crop yields and health are monitored through spectral analysis and allow for food security in areas otherwise inaccessible due to conflict or other crises. This technique is well utilized in conflict zones such as Syria and some local Governments in Nigeria where crisis has been prevalent. A significant and practical example is the Land Potential Knowledge System (Land-PKS), an application on the mobile platform that performs incredible functions ranging from digital assessment of site vegetation type digital assessment, cover and other key factors required for environmental monitoring and farm location and soil data, cross-referenced with global soil databases, to produce a high resolution estimate of local soil characteristics. Land-PKS results are currently being used at some

East African test sites to predict factors such as potential crop yield, soil erosion risk and drought vulnerability of different soils.[35]

- **Utilization of digitized data to feed the world:**

The technology behind Fin-Tech is majorly successful and progresses based on availability of data, not just ordinary data but data such as financial data. These are obtainable majorly from financial institutions such as the central bank of Nigeria or banks. The collaboration between financial institutions and Fin-Tech companies has to some extent greatly improved over the years with innovations such as;

- Bank loans of considerable amounts are easily accessible through technological platforms.
- Simplified applications with more user friendly interfaces relating to agriculture has paved way for easy access to considerable loans amounts of loan to farmers from various banking and financial bodies.
- Financially related online technical programs such as the Tony Elumelu Entrepreneurship Program in collaboration with United Bank of Africa has boosted the availability of funds to farmers who use them judiciously and thereby boosting the economy of Nigeria.

2.7.3. DIGITIZED DATA USAGE IN THE EDUCATIONAL AND LEARNING SYSTEM

Digitization has no doubt changed our education system, but we cannot say that it has diminished the value of our old time classroom learning. Neither do we want something so priceless to turn into dust.[36]

[37] https://www.techuk.org/insights/news/item/7636-are-you-be-a-big-data-hero https://corporatefinanceinstitute.com/resources/knowledge/finance/fintech-financial-technology/

[38] https://elearningindustry.com/digitization-of-education-21st-century

The current society, economy, and community are connected and involved in terms of information and technology usage. Most educational institutions are already striving to achieve the status of being autonomous, however the structures still remain inefficient because papers are still being used for record keeping purposes.[37]

Up to date digitized educational systems can be used in numerous creative and result driven ways such as providing many pictures but less content. This would task the instructors to possess comprehensive knowledge on the subjects being taught using and online media to present an interesting and accessible media to the students.

It is undeniably and evidently visible to even the lay man that the new phase of learning involving various advanced techniques has begun, with technologies such as Online courses, Online exams, and Digital textbooks now the norm.

Through digitized data and information, the educational and learning system has become remote thereby providing remote platforms for the purchase of learning materials and resources from different parts of the world. It is possible to pay for legitimate classes, and earn quality certifications online though associated web portals offering diverse courses. This was a feat that was not possible in contemporary times where in students must be physically present at the locations. However, through fin-tech companies and organization, platforms which are secured have been provided which aid easy payments.

However, taking a quick scan across the educational and learning systems in Nigerian and making relevant comparisons of the past and present and also foreseeing into the near future, it can be observed that not much and sufficient improvements have been made considering the vast availability of technology. The increased use of Fintech and maximisation of data would help drive the digitalisation in the educational sector of Nigeria.

2.8. CHALLENGES WITH DATA MINING IN NIGERIA

The term Data mining is defined as a process engaged or used in the extraction of usable set of data from a larger set of any raw data for the

[39] https://www.intechopen.com/online-first/digitized-educational-system
https://www.guru99.com/what-is-big-data.html
[47] Nir Kshetri, (December, 2014). The emerging role of Big Data in key development issues: Opportunities, challenges, and concerns

purpose of information sharing, among others. There exist massive pool of data yet untapped and considered to be one of the most valuable available resources. The new economy is considered to be focused on the rapid real time analysing the flows of unstructured data often in the forms of streams of photos and videos generated by users of social networks, streams of information produced by commuters on their way to work, flood of data from hundreds of sensors in a jet engine and more.[38]

Data mining like any other process has its own sets of challenges either specific to a region or globally. Some of which are highlighted as;

2.8.1 LACK OF SKILLED PERSONNEL

When humans consume information, a great deal of heterogeneity is comfortably tolerated. In fact, the nuance and richness of natural language can provide valuable depth. However, machine analysis algorithms expect homogenous data, and cannot understand nuance. In consequence, data must be carefully structured as a first step to (or prior to) data analysis. Computer systems work most efficiently if they can store multiple items that are all identical in size and structure.[39]

For the goal of data mining to be achieved, there has to be active engagement of well learned and technically sound knowledge and skill. Personnel's involved in this process are mostly researchers. This cuts across diverse sectors such as the educational, agricultural[40], telecommunication[41] and health care system. The process involves critical investigation of data from every environment and as such researchers have to be well equipped with basic and advanced level of computer literacy and operations, internet surfing, and ability to conduct research making use of quality and reliable data. This is a major challenge due to the low level of available, competent and motivated personnel in Nigeria.

---

[40] https://guardian.ng/technology/experts-see-economic-potential-in-data-mining-in-nigeria/#:~:text=Data%20mining%20is%20a%20process,for%20information%20sharing%2C%20among%20others.
[41] Divyakant Agrawal, UC Santa Barba, Philip Bernstein, Microsoft Elisa Bertino,…(2012), " Challenges and Opportunities with Big Data",
[42]https://www.researchgate.net/publication/337254374_A_Data_Mining_Framework_for_Improving_Agricultural_Production_in_Nigeria_Computing_Information_Systems
[43] https://academicjournals.org/journal/IJPS/article-full-text-pdf/B6B3DA363627

2.8.2. DATA SECURITY AND PROTECTION

Clearly, privacy is considered a serious issue whose importance, particularly to customers, is growing as the value of Big Data becomes more apparent. However, people do still care about what and how their personal information is used, especially if it could become disadvantageous or harmful to them. There is a certain class of data which can easily become 'toxic' should a Company suffers any loss of control, and it includes: personal information, strategic IP information, and corporate sensitive data.[42]

Many FinTech companies collect and process a vast amount of data in order to provide financial services efficiently and inexpensively. Most of these data are highly sensitive information that can be misused if they fall into the wrong hands, thus, it behoves on FinTech companies to ensure compliance with data protection and cyber security laws.

The Nigeria Data Protection Regulation issued by the National Information Technology Development Agency (NITDA) in January 2019 lays down regulations for the processing of data. These regulations apply to persons of Nigerian descent residing in or outside Nigeria. It provides that data may only be collected and processed for a specific lawful process upon the grant of consent by the Data Subject.[43]Furthermore, data may only be stored for the period within which it is reasonably needed and must be secured against all foreseeable hazards.

One of the numerous measures to protect data under the Regulation is data encryption, which is also a data protection requirement under the CBN regulatory framework for the use of USSD. The USSD regulation provides that USSD-based financial transactions and data stored by the USSD application at Financial Institutions shall be encrypted.

The CBN Consumer Protection Framework for Banks and other Financial Institutions also regulates the protection of consumer assets and privacy. It provides that consumers' financial and personal information shall be securely stored at all times and shall not be released to a third party without the written consent of the consumer.

---

[44] brian runciman(2013), "it now big data focus, autumn 2013", www.bcs.org, retrieved 03/02/14.

[45] https://www.cert.gov.ng/
https://www.ncc.gov.ng/technical-regulation/cybersecurity#ncc-csirt
https://knowledge.insead.edu/career/the-worlds-most-talent-ready-countries-2015_4467

In addition, the Nigerian Communications Commission (NCC) Draft Consumer Code of Practice Regulations requires Licensees to adopt and implement a Protection of Consumer Information Policy, which shall provide for the proper collection, use and protection of information and be made available to its consumers in a readily accessible form and easy to read manner.

The socio-cultural peculiarities of a country gives rise to the scope, definition and understanding of the term cybercrime. It can be defined in terms of "any criminal act which utilizes or uses the computer as an instrument, target or as a means for devising or perpetuating crimes.

It also encompasses other forms or means of crimes where the computer is an object or means of conducting criminal activities utilizing cyberspace. Cyber space is a great part of daily life and activity which encompasses the internet and countless computer devices with modern internet connectivity. It has become an important and fundamental features of the modern world thereby creating unique realities in the developed and developing world.

The general law on Cyber security in Nigeria is the Cybercrime (Prohibition, Prevention, Etc.) Act67. The Act was signed into law in Nigeria to create a legal framework for prosecuting and mitigating cybercrimes in the country. Cybercrimes such as phishing, hacking, electronic theft, cyber stalking, cybersquatting, and cyber terrorism. The Act, however, is silent on mechanisms institutions need to put in place to strengthen their cyber defences.

In response to this, the CBN recently issued the Risk-Based Cyber-Security Framework and Guidelines for Deposit Money Banks and Payment Service Providers, which took effect on 1 January 2019, to outline the minimum cyber security baseline to be put in place by Deposit Money Banks (DMBs) and Payment Service Providers (PSPs) in order to enhance their cyber security resilience. [44] The Guidelines make provision on cyber security Governance and Oversight, cyber security Risk Management System, Cyber Resilience Assessment, cyber security Operational Resilience, Cyber-Threat Intelligence and Metrics, Monitoring and Reporting.

[46] https://www.ncc.gov.ng/media-centre/news-headlines/651-press-release-ncc-assures-nigerians-of-pervasive-broadband-penetration-irrespective-of-location.
https://www.techuk.org/insights/news/item/7636-are-you-be-a-big-data-hero

2.8.3. LACK OF DATA COORDINATION/NO COORDINATING BODY

Statistical data culled from various experiences of Millennium Development Goals (MDGs) implementation in Nigeria point to critical challenges posed by lack of comprehensive, up-to date, monitored and harmonized data. Also inclusive is the obvious lack of comprehensive data production strategy for proper monitoring as the roles and responsibilities of those who produce the data has not been properly outlined and no appropriate methodologies for computation of indicators have been established. This has resulted in the denial of the establishment and realisation of most of the Millennium Development Goals as far back as 2015.[45]

Having best management processes and right policies in business and health advancement need quality statistics derived from credible and quality data. Right statistics is a catalyst for making informed decisions across industries such as health, medicine, learning, research, social sciences, natural resources and business. Lack of critical data or statistics or its improper coordination has every tendency to thwart the growth and development of any nation, industry or business.[46]

2.8.4. POOR DEVELOPMENT OF E-GOVERNANCE IN NIGERIA

E-governance is the use of information technology to improve governance, promote efficiency and effectiveness in the delivery of public service. The Federal Government in the year 2020 recognized the need and importance of transforming the public service into the modern day system to promote and improve transparency, accessibility and information dissemination to the public in the public service through the use of information technology. This realization resulted to the introduction of the National Information Technology policy with the primary objective of improving governance in Nigeria.

However, despite the huge investment in ICT with the aim to realise the objectives stated, very little progress has been achieved and few set targets and goals met. This poor implementation can be attributed to factors such

[47] https://www.vanguardngr.com/2015/09/absence-of-reliable-data-nigerias-bane-statistician-general/

[48] https://www.legit.ng/1083750-how-lack-accurate-data-killing-nigerian-businesses.html

"The impact of Fin-Tech start-ups on incumbent retail banks' share price" Yinqiao Li, Renee Spigt, Lauren Swinkels (2017).

"*Financial Technology-Fintech*" Julia Kagani (2019)

2.8.5. POOR UPTAKE OF E-SERVICES

E-governance practice has encountered strong opposition from both the over-bloated public service and from Labour Bodies whose members perceive this practice as a deliberate attempt by Government to retrench workers. As a result, their efforts although well intentioned, have often frustrated frustrate the effective application and delivery of e-governance in Nigeria. They will definitely dislike a system that will reduce to the minimum, face to face contact between citizens and Government service providers. Furthermore, most Civil Servants are resistant to Change as they prefer and are still used to the old way of carrying out Government activities working with lots of paper, movement of files from one desk to the other or from one office to the other. Some of the reasons for their resistance, is that most of the public servants are not computer literate, not qualified, have little or no training in the installation, maintenance, designing and implementation of ICT infrastructure.[47]

2.8.6. RURAL POOR, HIGH COST OF SERVICES AND LACK OF INTERNET SERVICES IN RURAL AREA

Rural areas of the developing world are the last frontier of the information technology revolution. Telephone and internet penetration there remains a small fraction of what it is in the developed world. Limited means of electronic communication with the outside world are just one source of isolation of rural communities and economies from the forces of national and global integration, albeit an important one. Without roads and electricity, the benefits of extending ICT access would be greatly diminished. Conversely, where these other elements of infrastructure are in place, those benefits can be multiplied. The costs of ICT provision to rural areas tend to be higher than to more densely populated urban areas, and the ability to pay of potential subscribers lower.

---

[49] http://89.136.240.76/index.php/administratio/article/view/2899/2913

[63]"*Fin-tech and banking: what do we know?*" Anjan V. Thakor, Washington University in St. Louis (2019).

ADB Accelerating financial inclusion in south-east Asia with digital finance Technical report Asian Development Bank (2016)

https://www.researchgate.net/publication/292151098_Challenges_of_E-Government_Implementation_in_the_Nigerian_Public_Service

2.8.7. DUPLICATION AND CONTROL OF NATIONAL DATA BY VARIOUS AGENCIES AND PRIVATE SECTOR PLAYERS

In Nigeria, there are very many Agencies of Government as well as private Sector players who hold data on citizens. For example, the Nigerian Immigration Service, the Nigerian Customs, Government hospitals, Telecoms services providers, private Banks, the Nigerian Identity Management Agency, private hospitals, Insurance companies, the Directorate of Road Traffic Services, the Nigerian Communications Commission, NOTAP, the Central Bank of Nigeria, the National Population Commission, the National Bureau of Statistics, the Electricity Distribution Companies, the Federal Inland Revenue Service, the Corporate Affairs Commission, the Federal Ministry of Education and all its Agencies, all data collecting bodies across all State and Local Governments of Nigeria, large supermarket chains using e-payment platforms, amongst many many others.

The issue of duplicate data may not be considered as a major problem or agenda especially when it is viewed by senior management as a timely and idle investment. However, from experience culled from experts who are constantly working with data and helping customers to reduce duplicates, a strong point of disagreement is elaborated:[48]

Wasted Cost and effort: The cost of dealing with duplicate data is highly alarming when expressed into monetary terms.. Imagine the wasted costs of sending five of the same catalogues or data to one person.

In addition to the money wasted on duplicate print and postage costs, there is also the potential negative effect on response rates and the overall ROI of your marketing activity.

Lack of Single Customer in View: With 2 or more data for the same person, it is difficult to view an accurate picture of your customers and their behaviour. With each customer interaction being recorded against

[50] https://www.qgate.co.uk/blog/10-reasons-why-duplicate-data-is-harming-your-business/
http://89.136.240.76/index.php/administratio/article/view/2899/2913
https://www.qgate.co.uk/blog/10-reasons-why-duplicate-data-is-harming-your-business/
https://dataprivacymanager.net/security-vs-privacy/#:~:text=In%20short%2C%20data%20privacy%20and,means%20to%20secure%20personal%20data.

different data, makes it challenging to view what communication has taken place and if there are any outstanding actions.

From a sales and marketing perspective, it is tricky to evaluate what marketing effort has been successful and at what stage of the sales funnel the customer is if the same customer is in the database more than once.

Poor Business process: When there is loss of confidence in the Customer Relationship Management (CRM) because of the number of duplicates and inaccuracy of data, there can be a downgrading to using traditional methods of recording data, such as Excel and Post-It notes. Using such processes limit the view of your customer and inadvertently limit the growth of business.

Missed Opportunities: Poor quality data is one filled with inaccurate and duplicate record. This can be very costly in terms of missed investment and development opportunities. A lot of time would be wasted on implementing strategies which are supposed to be a means of advancement based on false or inaccurate data.

To help reduce wasted costs, there is need to be able to identify duplicates and prevent additional duplicate records being entered into CRM, This will provide the best the best position possible to maintain a healthy database and save your resources by minimising wasted income and stopgap data cleansing solutions.[49]

There is an urgent need for a central controlling body for all Nigerian data.

2.8.8. DATA SECURITY AND PRIVACY

Cyber security refers to protective measures that are put in place to protect digital assets from harmful events such as human and technical errors, malicious individuals and unauthorized users.[50] This entails confidentiality which refers to preventing important information from reaching the wrong hands and at the same time making sure the right people have access to it and can use it, integrity in maintaining the

[51] https://www.qgate.co.uk/blog/10-reasons-why-duplicate-data-is-harming-your-business/
[52] https://dataprivacymanager.net/security-vs-privacy/#:~:text=In%20short%2C%20data%20privacy%20and,means%20to%20secure%20personal%20data.

consistency and trustworthiness of the data, and availability of thee data when it is needed.

Data privacy on the other hand is the appropriate use of data. This is exemplified when companies and merchants use data or information provided or entrusted to them, according to the agreed purposes.[51]

There has been evidence of stunted growth of data security and privacy in Nigeria traceable to various factors which are:

- Inadequacy of data privacy and protection legislation
- Deplorable consciousness of data privacy rights/laws
- Lack of enforcement-will/drive
- Dearth of judicial decisions on data privacy violations.[52]

Advancement in Digital technology has translated in devices generally becoming much smaller, lighter, faster, and more versatile than they used to be and also means that huge amounts of data and information can be stored locally or remotely and moved from place to place almost instantaneously. There are downsides to these advancement too:

- Just a single breach can mean vast amounts of private information going into the hands of criminals, terrorists, business rivals, foreign adversaries, or other malign entities.
- Minor glitches in the operations of a laptop can cost both time and expense.
- It's become much harder to have personal privacy in the digital world and that's on top of the dangers of your personal data being stolen or sold.
- There is less job security as technical advancement proceeds; car get automated and computers replace physical presence of workers and cause job cuts.[53]

[53] https://blog.cygilant.com/blog/the-difference-between-data-privacy-and-data-security
[54] https://www.mondaq.com/nigeria/data-protection/901494/data-protection-and-privacy-challenges-in-nigeria-legal-issues-
[55] https://turbofuture.com/misc/Disadvantages-of-Digital-Technology

2.9. DEFINITIONS AND CRITIQUE OF FINTECH, DIGITAL FINANCE AND DIGITAL FINANCIAL INCLUSION

Financial inclusion is believed to promote ignorance in the evidence that poverty is usually associated with bad habits and poor decision making thereby causing hindrance or setback to financial inclusion. Poor people or low income individuals tend to focus on the present at the cost of the future such as unhealthy eating which damages health in old age, taking high-interest loans which favors meeting an Immediate financial need as opposed to future needs (Sheehy-Skeffington and Rea, 2017)

It is proposed that some of the benefits of financial inclusion disappears after a few years. Also, Financial inclusion promotes digital money which is sometimes difficult to understand; digital money is difficult to understand; and that some financial inclusion efforts bear a resemblance to a campaign against having cash-in-hand.[54]

2.9.1. UNDERSTANDING FINANCIAL TECHNOLOGY[55]

Financial Technology (FinTech) used to refer to the technology employed at the back-end system of established financial institutions. However, over the years as technology and digitalisation increased, its definition has taken a more consumer-oriented approach and FinTech now includes different Sectors and Industries such as Education, Retail Banking, Fund-raising and Non- profit, and Investment Management, using new technology to improve and automate the delivery and use of financial services, from mobile payment Apps to cryptocurrency. It can take the form of a Software, a Service, or a Business that provides technologically advanced ways to make financial processes more efficient by disrupting traditional methods. Some examples of FinTech businesses are those that engage in quick check-cashing services, payday lending, online mortgages and related services. Using FinTech, Companies, Business owners and Consumers better manage their financial operations, processes, and lives

[56]https://www.researchgate.net/publication/340514723_Financial_Inclusion_A_Strong_Critique
https://blog.cygilant.com/blog/the-difference-between-data-privacy-and-data-security
https://www.mondaq.com/nigeria/data-protection/901494/data-protection-and-privacy-challenges-in-nigeria-legal-issues-
https://turbofuture.com/misc/Disadvantages-of-Digital-Technology
https://www.investopedia.com/terms/f/fintech.asp
[57]https://corporatefinanceinstitute.com/resources/knowledge/finance/fintech-financial-technology/

by utilizing specialized software and algorithms that are used on computers and, increasingly, smartphones.

A FinTech Provider as an extension of a FinTech, is on the other hand, defined as an individual or company that uses a technology platform, whether online or off-line, to provide new financial services or to improve the delivery of existing financial services in a more efficient and accessible way to its users.[56] However, debates continue concerning if some FinTech adopted by FinTech providers significantly reduce the hurdles customers go through receiving their requested financial service from traditional Banks.

FinTech providers in the financial services sector either compete with Banks or complement the functions of banks to their customers. Although some FinTech companies provide financial services at a higher costs than the Bank, but due to the lengthy process for obtaining Bank loans, people turn to non-Bank providers, as Customers that seeking a Bank loan on Monday are unlikely to receive it the same day as existing Banking regulatory practices such as internal risk management procedures require Banks to spend a considerable amount of time to assess each individual loan request. As a result, despite the high cost of obtaining financial services from Non -Bank providers, individuals and Companies with low and/or volatile income still prefer to use the services of non-bank providers.

Using FinTech Providers result in benefits such as:

- Quicker financial services with a seamless process, making it easier for low income individuals to manage their financial obligations.
- FinTech providers face fewer regulations, or will be unregulated in some countries, allowing them focus on improving their financial technology while reducing costs[57]
- FinTech providers can partner with Banks which can help them reduce operational costs, improve the quality of their intermediation activities, and become increasing sustainable.

[58]https://corporatefinanceinstitute.com/resources/knowledge/finance/fintech-financial-technology/
http://www.oliverwyman.com/content/dam/oliver-wyman/v2/publications/2017/jan/Accelerating-financial-inclusion-in-south-east-asia.pdf Accessed 14th Nov 2017

[59] https://corporatefinanceinstitute.com/resources/knowledge/finance/fintech-financial-technology/

- Easier access to instant emergency funds or loans in small amounts for individuals with low and poor incomes, and the needy.
- Increased financial convenience to users by access to services from any location where Consumers can access the internet.

2.9.2. DIGITAL FINANCE: CONCEPT AND BENEFITS

There are three key components of any digital financial service: a Digital transactional platform, Retail agents, and the Device[58] to be used by customers and agents to transact via the digital platform.[59] Furthermore, the Digital Financial Services (DFS) user will have an existing Bank account or access to one; available funds to make cash payments.

A McKinsey Report defined Digital Finance as Financial services delivered via mobile phones, the internet or cards. As an umbrella word, it encompasses a magnitude of new financial products, financial businesses, finance-related software, and novel forms of customer communication and interaction delivered by FinTech companies and innovative financial service providers. While there is no standard definition of Digital Finance, there is some consensus that it encompasses all products, services, technology and/or infrastructure that enable individuals and companies to have access to payments, savings, and credit facilities via the internet (online) without the need to visit a bank branch or without dealing directly with the financial service provider.

In Europe, the internet has emerged as a widely recognised distribution channel for the banking industry, and all traditional banks as well as new players, are discovering its effectiveness compared with other channels.

With the ultimate goal of Digital Financial Services being to contribute to poverty reduction and financial inclusion in developing countries, it has the following benefits:

- Improved Financial Inclusion, expansion of financial services to non-financial sectors, and the expansion of basic services to individuals.
- Provision of affordable, convenient and secure banking service to poor individuals in developing countries, thereby helping millions of

[60] Most commonly a mobile phone.

[61] https://www.mckinsey.com/~/media/mckinsey/featured%20insights/Employment%20and%20Growth/How%20digital%20finance%20could%20boost%20growth%20in%20emerging%20economies/MGI-Digital-Finance-For-All-Executive-summary-September-2016.ashx

poor customers move from cash-based transactions to formal digital financial transactions on secured digital platforms.[60]

- Potential to boost the GDP of digitalised economies by providing convenient access to diverse range of financial products and services for individuals as well as Small Micro Medium Enterprises (SMMEs) which can boost aggregate expenditure thereby improving GDP levels.
- Long-term positive effects for banking performance. Scott, Van Reenen, and Zachariadis (2017) examined 6848 banks in 29 countries in Europe and the U.S. following the adoption of SWIFT and noted the profitability in the long-term was greater for small Banks/FinTech than for large Banks.
- Facilitates increase in aggregate expenditure which leads to higher tax revenue arising from increase in financial transactions.
- Significant reduction of the circulation of bad quality or fake money.
- Greater Customer control of personal finance, quick financial decision making, and easy access to and receipt of payment.

2.9.3. DIGITAL FINANCIAL INCLUSION: CONCEPT AND BENEFITS

While Digital Finance is defined as Financial services delivered via mobile phones, the internet or cards, Digital Financial Inclusion on the other hand is defined as "digital access to, and the use of, formal financial services by the excluded and underserved population[61]". Innovative Digital Financial Services via mobile phones and similar devices have been launched in at least 80 countries to encourage millions of poor customers to exclusively use digital financial services rather than cash-based transactions. However, that Digital Financial Services exist, does not mean the excluded and unserved populations have access to it. It is only through policies and positive actions of private players and Government that the available Digital Finance can result in Digital Financial Inclusion.

However, the process of Digital Financial Inclusion is not so simple, because it already presupposes that the excluded and/or underserved

[62]https://corporatefinanceinstitute.com/resources/knowledge/finance/fintech-financial-technology/
https://www.techuk.org/insights/news/item/7636-are-you-be-a-big-data-hero
[63] https://www.mckinsey.com/industries/financial-services/our-insights/monetizing-data-a-new-source-of-value-in-payments#
https://www.techuk.org/insights/news/item/7636-are-you-be-a-big-data-hero
https://www.adb.org/publications/financial-inclusion-south-east-asia-digital-finance

population have some sort of formal bank accounts and need digital access to enable them to carry out basic financial transactions remotely. This is very often not the case as most of the rural Communities remain unbanked. If the potential benefits of Digital Financial Inclusion are clearly articulated to them, and provided at a sustainable cost to both providers and customers, it would result in increased Digital Financial Inclusion indices.

Some of the benefits of Digital Financial Inclusion include:

- Banks have lower operating and capital costs by reducing bank queues, paperwork and maintaining fewer bank branches.
- Provision of improved services to avoid Customer loss to rival Banks.
- Reduced cash in circulation leading to reduced inflation levels.
- 24 hour access to Bank accounts from anywhere and at any time.

Notwithstanding the above, the true benefits of digital financial inclusion are only fully realised when the cost of the use of digital platforms and devices such as mobile phones, and the cost of internet are affordable by the poor.

2.9.4. FINANCIAL INCLUSION: CONCEPT AND BENEFITS

According to a United Nations Report, Financial Inclusion is the sustainable provision of affordable financial services that bring the poor into the formal economy. Financial inclusion may also be defined as the use of formal financial services by the poor. Financial inclusion involves increasing the number of (mostly poor) individuals that have access to formal financial services mainly through having formal bank accounts, which contributes to poverty reduction and economic growth. With greater financial inclusion, individuals who were previously financially excluded will be able to invest in education, save and launch businesses, and this contributes to poverty reduction and economic growth.[62]

Some of the benefits of Financial Inclusion include:

- It enables low income earners save for the future, build savings, and make investments and access credit.

[64]https://www.adb.org/publications/financial-inclusion-south-east-asia-digital-finance

- It enables low income earners handle income shocks over unforeseen emergencies such as illness or loss of employment.[63]
- It reduces pro-cyclicality risk- A substantial increase in the number of small savers from greater financial inclusion would increase both the size and stability of the deposit base of Banks which would reduce Banks' dependence on "non-core" financing, thus improving banking system stability. Also, as low-income Groups are relatively immune to fluctuation in economic cycles, including them in the financial sector will improve the stability of the deposit and loan bases of Banks, because statistics indicate that financial institutions catering to the lower end individuals tend to survive through macro-crises well and help sustain local economic activity.
- Greater levels of financial inclusion can facilitate increased participation by different sectors of the economy in the formal financial system.

2.9.5. TWO-WAY CAUSALITY BETWEEN FINANCIAL INCLUSION AND DIGITAL FINANCE

There is a two-way causality between financial inclusion and digital finance, with no clarity on if increase in digital finance lead to greater (or lower) financial inclusion or vice versa.

The assumption underpinning the relationship between digital finance and financial inclusion is the premise that a large amount of the excluded population owns or have access to a mobile phone, and that the great supply of financial services via mobile phones and related devices can improve access to finance for the excluded, leading to financial inclusion. This assumption therefore implies that there exists a positive correlation between the use of digital finance and access to formal financial services. For example, greater digital finance, when applied to the lives of the poor can improve their access to basic services, thereby leading to greater financial inclusion in rural areas. Also, greater digital financial services channelled to rural and poor communities improves access to finance for Bank customers in rural and poor communities who cannot easier access

[65] https://www.centerforfinancialinclusion.org/why-financial-inclusion-matters
https://www.worldbank.org/en/topic/financialinclusion/overview
https://www.tandfonline.com/doi/abs/10.1080/15228916.2017.1416214
https://www.researchgate.net/publication/322100618_Impact_of_Digital_Finance_on_Financial_Inclusion_and_Stability

their Banks. It also leads to reduced overheads for Banks who now maintain fewer branches, and increased profitability.[64]

Additional, the use of digital finance provides convenience in basic financial transactions such as payments for electricity, water supply, money transfer, and banking. If these digital finance platforms are easy-to-use, user uptake will increase, use of digital finance will increase, leading to greater financial inclusion. Its impact is nonetheless uncertain amongst lower income earners who might refuse to use digital finance services due to (i) superstitious and religious beliefs surrounding the use of technological devices; (ii) unaffordable fees charged by digital financial services providers; (iii) financial illiteracy, etc.

On one hand, greater digital finance can lead to greater financial inclusion if higher income users of digital financial services can persuade their contacts in poor communities and in the informal sector to open a Bank account and to use digital finance. Individuals in the informal sector and in poor communities often do not trust Bankers or Bank marketers who come to their homes to persuade them to use digital finance services, rather they are more likely to trust the recommendations they receive from their friends and family members who already use these platforms. When this is the case, greater digital finance will lead to greater financial inclusion.[65]

On the other hand, financial inclusion can lead to greater digital finance usage, because greater financial inclusion would increase a Bank account holder's awareness of new and existing digital finance platforms. Additionally, owing an Account makes it easier for Banks to persuade Account Holders about available digital finance products and services.

Notwithstanding the above, increase in digital finance services will not lead to financial inclusion due to capitalist' focus of Business. Providers of digital finance services exist to make profit. They use digital finance to maximise their profitability or the profitability of businesses affiliated with

[66] https://www.tandfonline.com/doi/abs/10.1080/15228916.2017.1416214
https://www.researchgate.net/publication/322100618_Impact_of_Digital_Finance_on_Financial_Inclusion_and_Stability
[67] https://www.matec conferences.org/articles/matecconf/pdf/2018/87/matecconf_cas2018_05012.pdf
https://hal.archives-ouvertes.fr/hal-02294648/document
http://www.oecd.org/daf/fin/financial-education/advancing-the-digital-financial-inclusion-of-youth.pdf

them, namely Banks and other financial and non-financial Institutions. Digital Finance services providers might aggressively market digital services/infrastructure to higher income earners, and less so to lower earners, if they believe the latter cannot afford the associated fees, thereby leading to lower financial inclusion for lower income earners.[66]

Additionally, there might exist geographical bias in the provision of digital finances as Digital Finance providers, based on their internal risk assessment may choose to discontinue or not commence the provision of specific digital finance services to high-risk rural areas or communities lacking the requisite supporting ICT infrastructure[67], thereby leading to lower financial inclusion.

Finally, educational bias can be introduced in the provision of digital financial services. Cognisant of the lower financial returns in rural areas, Digital Finance Providers may restrict service provision to poor and uneducated communities that mostly lack education and basic financial literacy.

2.9.6. DIFFERENCE BETWEEN FINANCIAL DATA INCLUSION AND FINANCIAL INCLUSION

Financial Data Inclusion involves merging the entire population's biometric information to their Bank accounts. Financial Inclusion on the other hand involves increasing the number individuals that have access to formal financial services mainly via having formal bank accounts. Financial Data Inclusion is easier to achieve than Financial Inclusion, from a policy perspective and achieves two objectives: it permits financial transactions via digital channels that can be verified and traced to individuals or firms, and it can help to monitor the income and demographic characteristics of users of digital financial services.

Financial Inclusion is one strategy to eliminate or reduce poverty, but it is not the only strategy. Other strategies to tackle poverty include support by either the Public Sector or the Private Sector such as direct Government

[68] https://corporatefinanceinstitute.com/resources/knowledge/finance/fintech-financial-technology/ conferences.org/articles/matecconf/pdf/2018/87/matecconf_cas2018_05012.pdf
[69] https://www.cgap.org/blog/10-useful-data-sources-measuring-financial-inclusion
https://www.devex.com/news/devexplains-fintech-versus-financial-inclusion-what-s-the-difference-91622
https://corporatefinanceinstitute.com/resources/knowledge/finance/fintech-financial-technology/

intervention through the provision of welfare benefits and unemployment benefits; or through direct or indirect intervention by foreign Governments, generous aids by Philanthropists and Charity organizations, amongst others.

Private sector players such as FinTech and financial services companies can offer digital finance products and services to the poor and excluded population, to encourage them to participate in the formal financial sector via digital channels on their mobile phones. If these ones have digital banking credentials (such as online banking login password and other forms of digital access credentials), they can link their Bank accounts to digital payment channels to perform basic financial transactions, especially if the cost is affordable, thereby having positive effects for financial inclusion.[68]

Figure 1 shows the important role that the Government, FinTech, and Banks play in financial inclusion and poverty reduction. The idea underlying the differentiation of financial data inclusion and financial inclusion in Fig. 1 is that full-scale financial data inclusion is needed for digital finance to achieve its full potential to achieve financial inclusion.[69]

[70] https://www.devex.com/news/devexplains-fintech-versus-financial-inclusion-what-s-the-difference-91622
https://www.cgap.org/blog/10-useful-data-sources-measuring-financial-inclusion
[71]https://corporatefinanceinstitute.com/resources/knowledge/finance/fintech-financial-technology/
https://corporatefinanceinstitute.com/resources/knowledge/finance/fintech-financial-technology/
https://medium.com/@SustainableDFS/financial-inclusion-is-not-just-about-financial-access-but-behaviour-change-c96dc2230c15
https://www.techuk.org/insights/news/item/7636-are-you-be-a-big-data-hero
https://corporatefinanceinstitute.com/resources/knowledge/finance/fintech-financial-technology/
https://spd.group/machine-learning/fraud-detection-with-machine-learning/

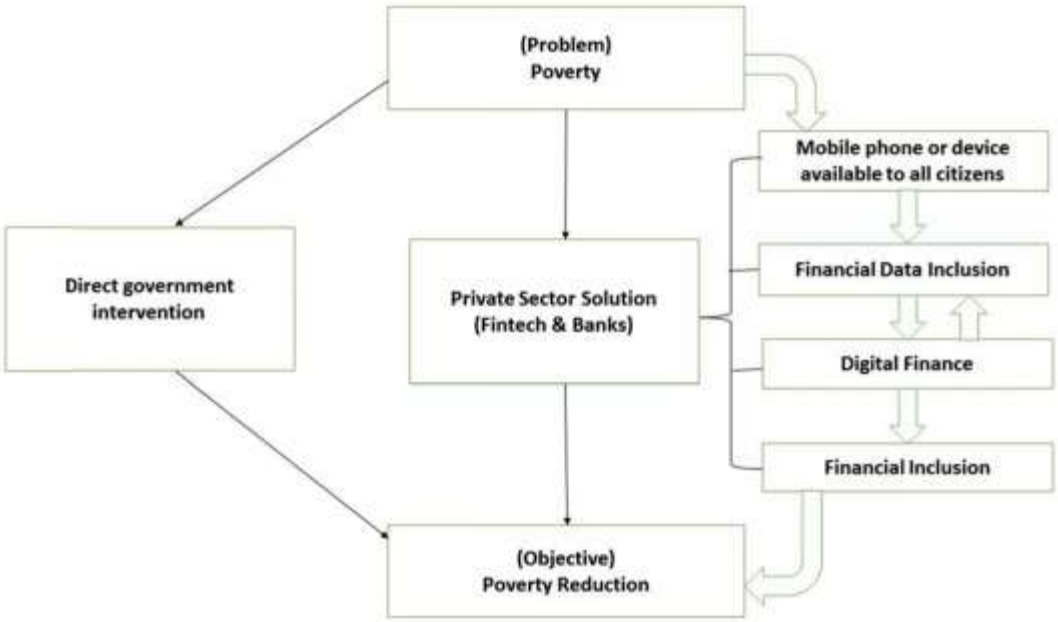


Fig. 1. Framework to illustrate the role of government, FinTech, and banks in digital finance and financial inclusion.

Although some hold the view that greater use of digital finance contributes to greater financial inclusion, others have stated that although greater use of digital finance may lead to greater financial data inclusion which involves merging people's biometrics to their bank accounts for safe traceable banking, it is not necessarily leading to financial inclusion which means an increase in the number of unbanked now having Bank accounts.[70]

Despite the benefits of digital financial services, many countries in the developing world still face considerable challenges in attaining merchant acceptance of digital payments. Small businesses in urban and rural areas in the developing world do not readily accept digital payments due to high bank fees, high set-up costs, poor internet connectivity and consequently, individuals with digital banking credentials are still not able to make digital payments for services. In these situations, the increase in financial data inclusion does not improve financial inclusion.

[72]https://medium.com/@SustainableDFS/financial-inclusion-is-not-just-about-financial-access-but-behaviour-change-c96dc2230c15
https://www.accdocket.com/articles/artificial-intelligence-and-regulatory-compliance.cfm
https://www.simplilearn.com/what-is-big-data-analytics-article
https://corporatefinanceinstitute.com/resources/knowledge/finance/fintech-financial-technology/

Additionally, although consumers may have digital banking credentials, due to lack of trust in digital finance channels especially where Governments lack citizenry data and strong consumer protection institutions, having greater financial data inclusion does not necessarily lead to increased digital financial inclusion.[71]

Furthermore, low levels of financial literacy and awareness of digital finance channels can reduce customers' patronage of digital financial channels. The implication is that individuals with low income and those who are worried about the state of their personal finance will have little incentive to use digital channels which (i) they do not understand, (ii) do not have the financial literacy to understand how it works, (iii) and if they are unaware of existing digital finance infrastructure.[72]

Overall, an unintended consequence of a digital-finance-led financial inclusion program is that it can lead to greater financial data inclusion but not increase financial inclusion. In summary, the willingness of the population to participate in the digital space is essential for digital finance to achieve greater financial inclusion.

2.9.7. TECHNOLOGIES THAT CONTRIBUTE TO THE GROWTH OF FINTECH

2.9.7.1. ARTIFICIAL INTELLIGENCE (AI) AND MACHINE LEARNING (ML)

Artificial Intelligence (AI) and Machine Learning (ML) are some of the most used technologies in FinTech, offering the potential to play an even bigger role in the finance industry as developments continue. Some of the FinTech. Applications of AI and ML include credit scoring, fraud detection, regulatory compliance, and wealth management, among others.

2.9.7.2. BIG DATA AND DATA ANALYTICS

Big Data refers to a massive amount of data sets that cannot be stored, processed, or analysed using traditional tools. These data have various formats and sources; the common being the social media platforms and

[73] https://www.techuk.org/insights/news/item/7636-are-you-be-a-big-data-hero

[74]https://www.mckinsey.com/industries/financial-services/our-insights/monetizing-data new-source-of-value-in-payments#

networks.[73] Data from customers and markets is of high value to FinTech companies. Through large datasets, information about consumer preferences, spending habits, and investment behaviour can be extracted and used to develop predictive analytics. Predictive analytics refers to predicting how Consumers are likely to behave using past information and a mathematical algorithms. The collected data also helps in formulating marketing strategies and fraud detection algorithms.

2.9.7.3. ROBOTIC PROCESS AUTOMATION (RPA)

Robotic Process Automation (RPA) refers to the process of assigning manual, repetitive tasks to robotics instead of humans in order to streamline workflows in financial institutions.[74] The most widespread applications of RPA in finance are Statistics and data collection, Regulatory compliance management, Communication and marketing through e-mails and chat boats, Transaction management.

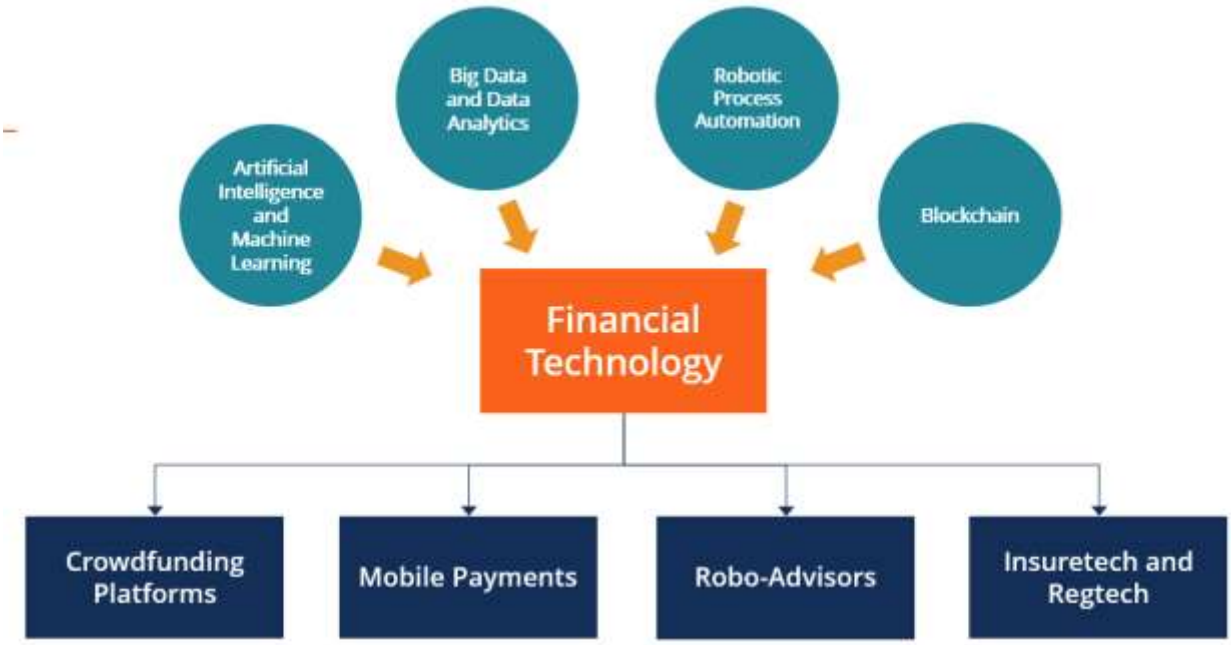
2.9.7.4. BLOCKCHAIN

Technology is being adopted at a large scale in the financial industry, primarily due to its capability to securely store transaction records and other sensitive data. Each transaction is encrypted, and the chances of successful cyber-attacks are relatively low when blockchain technology is employed. Blockchain technology is also the backbone of many cryptocurrencies.

2.9.7.5. USES OF POPULAR FINTECH APPLICATIONS

Some popular FinTech applications in use today are in the areas of Crowd funding, Mobile Payments, amongst others and are discussed below:

[75] https://www.simplilearn.com/what-is-big-data-analytics-article
[76] https://en.wikipedia.org/wiki/Data
https://www.investopedia.com/terms/f/fintech.asp
https://corporatefinanceinstitute.com/resources/knowledge/finance/fintech-financial-technology/
https://www.thestreet.com/technology/what-is-fintech-14885154
Available at https://newsroom.interac.ca/2018-an-award-winning-year-at-interac/
Available at https://www.investopedia.com/terms/r/roboadvisor-roboadviser.asp



- **Crowd funding Platforms**

Crowd funding platforms like Kick-starter, GoFundMe, and Patreon are the result of FinTech development efforts. These platforms allow entrepreneurs and early-stage businesses to raise funds from all over the world, bypassing geographical boundaries and reaching international markets and investors.[75]

- **Mobile Payments**

Mobile payment applications and gateways are amongst the most prevalent uses of FinTech because they allow users carry out banking activities without physically visiting a Bank. For example, FinTechs like Venmo and Interac allow customers to send and receive money through Smartphones at minimal transaction. Interac was even named the FinTech Company of the Year at the Canadian FinTech & AI Awards[76].

- **Robo-Advisors[77]**

Robo-Advisors are online Investment Management Services that provide digital financial advice based on mathematical rules or algorithms online with moderate to minimal human intervention, to optimally allocate assets and generate portfolios for customers. They allow users of all age groups to engage in investment activities at low fees with minimal manual effort.

[77] https://www.thestreet.com/technology/what-is-fintech-14885154
[78] Available at https://newsroom.interac.ca/2018-an-award-winning-year-at-interac/
[79] Available at https://www.investopedia.com/terms/r/roboadvisor-roboadviser.asp

- **Insure-tech**[78]

These are Insurance firms that have embraced technology as an integral part of their business, allowing them provide tailored insurance services, data security, streamline the insurance process through online claims filing, digital payment processing software, Claims processing Apps and customer communications.

- **Reg-tech**[79]

Reg-tech (Regulatory technology) consists of a group of companies that use cloud computing technology through software-as-a-service (SaaS) to help businesses comply with regulations efficiently and less expensively. It focuses on the automation of compliance processes for financial institutions and offers fast and cost-effective management of large amounts of data, including transaction records and compliance documents, such as corporate tax returns.

2.9.8. CHALLENGES OF FINTECH AND DIGITAL FINANCIAL INCLUSION AND ITS IMPACT ON THE DRIVE TOWARDS A DATA DRIVEN NIGERIA

A key problem associated with FinTech platforms is that they often attract 'high-risk customers who are unable to fulfil the credit score and credit risk assessment criteria set by conventional Banks, which then makes FinTech providers their alternative provider of choice. Over time, excessive patronage of FinTech providers by large number of risky customers can threaten the stability of the financial intermediation process if massive defaults arise from such risky lending.

A second issue is that although FinTech providers can help reduce the cost of financial intermediation, there are still costs incurred. This is because FinTech providers will normally incur some costs which may include the cost of adopting new technology, the cost of improving existing financial technologies, the cost of online security, as well as, regulatory costs in the country where the FinTech operate in, if they are regulated. These costs can affect the profitability of FinTech providers.

Another problem is that FinTech providers may not have a sustainable revenue base because they typically provide their service free of charge or

[80]Available at https://www.oneinc.com/blog/insurtech-and-fintech
[81]https://www.investopedia.com/terms/r/regtech.asp#:~:text=Regtech%2C%20or%20RegTech%2C%20consists%20of,also%20known%20as%20regulatory%20technology.

for a negligible amount to attract new customers and to retain existing users; therefore, the sustainability of FinTech firms in the long run is an important concern for digital finance. To be sustainable, should FinTech providers merge with other FinTech providers? Or, should they merge with deposit-taking financial institutions? The latter is possible but could result in FinTech providers being heavily regulated due to their affiliation with regulated banking institutions.[80]

Another important issue is that FinTech became prominent just after the 2008 financial crisis which indicates that they have not being in operation long enough to see whether they can withstand adverse shocks that could adversely affect the delivery of their services. Stress tests have not been applied to them which suggests that their ability to survive a recession, high interest rates, financial crises, capital crunch, credit freeze, massive and unexpected loan defaults due to high unemployment, is almost unknown.[81]

Another issue is that most FinTech providers operate through an online platform which requires access to the internet to use financial services, and this has become the mainstream business model for most FinTech providers. However, access to the internet is not universal, and factors such as income, age, education, politics and geographical differences can influence the ability of individuals to access the internet.

Another issue is that the use of FinTech platforms does not necessarily eliminate the problem of discriminatory lending which is common among conventional lending institutions. Discriminatory lending occurs where lenders (or banks) are more likely to favourably grant loans to some group of individuals compared to other groups because they are from a privileged income group, credit quality, educational status or social status. Banks and other lending institutions continue to face criticism for engaging in discriminatory lending. We expect FinTech providers to incorporate machine learning into their online platforms to eliminate racial, political and other demographic bias in lending. While this is a good idea, it remains unclear how FinTech providers can successfully eliminate discriminatory lending practices if a user's demographic information is required as inputs for access to use their online platforms to engage in financial transactions.

---

[82]https://medium.com/@SustainableDFS/financial-inclusion-is-not-just-about-financial-access-but-behaviour-change-c96dc2230c15
https://finovate.com/three-fintechs-driving-financial-inclusion-in-nigeria/
[83]https://techpoint.africa/2020/05/12/pandemic-banking-fintechs-nigeria/

There seem to be some implied confusion between greater 'digital financial inclusion' and 'digital finance'. To address this, we first need to understand that if digital finance is accessible to all and without bias, digital finance would improve the welfare of individuals that have formal bank accounts who wish to carry out basic financial services on their accounts via personal digital devices. But the availability of digital finance services is erroneously often equated to access to digital finance services, in developing countries.[82]

Because banks in developing countries have online banking services does not necessarily mean that access to digital banking services is cheap for poor and low-income individuals. With the high cost of access and limited internet coverage in rural areas, people in poorer communities often find it cheaper to go to physical Banks than undertake transactions on digital finance platforms. This means that the availability of digital finance to the poor and low-earners does not mean they have convenient access to it.

Furthermore, even if accessibility is guaranteed, digital financial inclusion would only occur if users find it affordable to use. This does not imply that FinTech and/or digital finance providers should not charge a fee for their services. Rather, efficiency in the provision and use of digital financial services should be suited to customers' needs and delivered responsibly at a cost that is affordable to digital finance users (customers) and sustainable for digital finance providers.[83]

[84]https://techpoint.africa/2020/05/12/pandemic-banking-fintechs-nigeria/

[85]https://tnp.com.ng/insights/challenges-facing-the-fintech-e-commerce-industries-in-nigeria https://techcabal.com/2018/08/03/the-challenges-nigerian-fintech-startups-want-out-of-their-way/
https://www.efina.org.ng/wp-content/uploads/2019/04/Understanding-the-Value-Propositon-for-FinTech-in-Nigeria-_KPMG.pdf
https://www.efina.org.ng/wp-content/uploads/2019/04/EFInA-FinTech-Report-Global-and-Nigeria-Landscape.pdf

CHAPTER 3: RESEARCH METHODOLOGY

3.1. RESEARCH DESIGN

This Research study is descriptive in nature and gives a picture of what is happening in the society in terms of Emerging role of data and FinTech in the development of digital economy. The research design is of a mono-method qualitative study which involves a single data collection method and corresponding analysis procedures, which in this study is analytical deduction.

3.2. RESEARCH APPROACH

This Research adopts an interdisciplinary desk-research methodology using the following methods: analysis of synthesis, introduction, deduction, investigation of literature. This Research will also address a gap in the literature by conducting a systematic literature review research on current knowledge of Data and FinTech within the context of the development of digital economy consideration in its regulation.

3.3. RESEARCH STRATEGY

Research strategies may be used for descriptive, explanatory and exploratory research and no research strategy is superior or inferior to any other. The research purpose of this study is exploratory as it aims to explore the emerging role of data and FinTech in the development of digital economy. The most important thing to consider when choosing a research strategy is if it will enable you to answer your research questions and objectives (Saunders, Lewis and Thornhill, 2007).

3.4. INSTRUMENT OF DATA COLLECTION

The data used in this Research was collected through extensive desktop Research. Desktop research entails the collection of relevant data from the following pre-existing sources:[84]

- Online journals, magazines and books
- Government Published data

[86] Saunders, M., Lewis, P. and Thornhill, A. (2007). Research methods for business students. Harlow, England: Financial Times/Prentice Hall.

3.5. RESEARCH OBJECTIVES

This Research paper aims to dissect emerging role of data and FinTech in the development of digital economy.

3.6. RESEARCH QUESTIONS

This study will focus on and answer the following research questions:

1. What is the role of FinTech in the development of Digital Economy in Nigeria?
2. What is the role of Data in the development of Digital Economy in Nigeria?
3. What the challenges to the achievement of Digital Financial Inclusion are as needed for a Digital Economy in Nigeria?

3.7. LIMITATIONS

This topical field of this study is new and understudied hence there is limited information. Emerging role of data and FinTech in the development of digital economy. The scope of the study cannot encompass all the various fields due to time and resource constraints, hence it is limited to general interdisciplinary survey of literature.

3.8. RESEARCH SIGNIFICANCE

The use of data and the emergence of FinTech remains in its infancy in Nigeria. Therefore, this study will provide a baseline study on the causality between data and FinTech in the drive towards the development of a Digital Economy in Nigeria. This Study will therefore provide Governmental Agencies and Policy Makers with an understanding of the current status for better directed policy making.[85]

[87]https://www.researchgate.net/publication/330760964_Research_Methods_for_Business_Students_Chapter_4_Understanding_research_philosophy_and_approaches_to_theory_development

CHAPTER 4: RESULT AND FINDINGS

4.1 RESEARCH QUESTION 1: What is the Role of FinTech in the Development of Digital Economy in Nigeria?

The Africa FinTech industry is on the high rise, especially in Nigeria, where the youthful population are deploying their creativity to create massive employment and prosperity, developing home grown solutions to solve unique challenges in various ways and indeed exporting and deploying some of the solutions beyond the shores of Africa.[86]

It is well noted that the African continent in general has already proven its readiness for FinTech and its digital innovations since it has one of the highest mobile phone penetration levels in the world, and currently experiencing a boom in mobile financial services and payment technologies. Currently, the FinTech revolution in Africa is primarily fuelled by the continent's three main hubs of South Africa, Kenya and Nigeria. These areas boast relatively more advanced FinTech ecosystems compared to the rest of the continent.

FinTech can create impact in three broad dimensions: through stimulating economic activity, by creating a multiplier effect, and by driving progress towards development goals. Economic impact will primarily come from expanding revenue pools and attracting foreign direct investment to the country. The sector can unlock economic benefit by driving increased productivity, capital, and labour hours through digitization of financial services.[87]

Fintech collect financial data. Financial data provides a clear picture of a person's financial status, their spending preferences, their credit worthiness, and their general habits. A person's spending also reveals a lot about their health status. All these available data leads to the development of appropriate innovative Apps to address Nigerian tastes and needs. It also provides positive data for Government policy decisions. For example, if a particular State or geopolitical region of Nigeria rarely carries

[88]https://www.proshareng.com/news/Fintech/The-Role-of-Fintechs-in-Africa-Digital-Economy---Aina/47901
https://www.proshareng.com/news/fintech/FinTechs-in-Sub-Saharan-Africa--A-Landscape-of-Opportunities/47898
https://finezza.in/blog/the-impact-of-fintech-on-todays-e-commerce-sector/
[89] https://www.mckinsey.com/featured-insights/middle-east-and-africa/harnessing-nigerias-fintech-potential

out online services as culled from available data, it presupposes that a mix of lack of digital skills, lack of introduction of digital technology to the area, and lack of finances to partake in digital services is the reason. These lead to positive regulatory and policy decision making on the role of the CBN on mobile payment market penetration to that area, the role of the Nigerian Communications Commission on improved roll out of 3G and 4G services to the area as well as efforts for local manufacturing of telecom devices.

FinTech can efficiently raise loans for SMEs or individuals with no credit history and technology (AI and ML) that supports alternative data for decision making based on the need of the applicant. This creates ample room which allows small and medium sized businesses to grow faster and expand further.[88]

Furthermore, with gathered data by FinTechs, Data mining techniques comes into picture. Nowadays several financial decision-making methods are based on Machine Learning techniques. The analysis of data attributes like Customer ID, limited balance, gender, education, marital status, age, etc. all now come into play in determining customers crediting worthiness.

Applicants with good credit have great possibility to repay financial obligation. With the remarkable increase of banking transactions, it is impossible to score the customers into default and non-default statistically. Hence, the need for Artificial Intelligence (AI) based Data analysis.

The aim of any business is its aspiration to make it big and have considerable impact in the world of e-commerce. However, they lack or have no easy access to the right kind of financial assistance required to set up a business, buy inventory, etc. This is further worsened by the hesitation of traditional banks from sanctioning or approving loans for start-ups or SMEs due to lack of credit scores.

Banking in Nigeria remains an attractive sector, with over $9 billion in value pools, but despite high levels of competition, the vast majority of consumers are underserved. Lack of access to services, especially in rural

[90] https://finezza.in/blog/the-impact-of-fintech-on-todays-e-commerce-sector/
https://www.pwc.com/ng/en/assets/pdf/perspective-on-fintech-influence-fs-industry.pdf
https://invoice.ng/blog/fintech-impact-nigeria/

areas, issues of affordability, and poor user experience all contribute to the frustration consumers experience right across the customer spectrum.

This has created an opening that FinTech have been quick to take advantage of, with many stepping up to develop enhanced propositions across the value chain to address pain points in affordable payments, quick loans, and flexible savings and investments, among others.

Despite the increased activity in the FinTech sector in Nigeria and the positive multiplier effect in the economy, there is significant potential for further growth. FinTech accounted for only around 1.25 percent of retail banking revenues in 2019 and while FinTech investments in Nigeria grew to approximately $460 million in 2019, the majority of which was from external investors, this was only a small fraction of the $36 billion invested in FinTech globally.

4.2. RESEARCH QUESTION 2: What is the role of Data in the development of Digital Economy in Nigeria?

An undeniable aspect of the digital economy in Nigeria as a country and the global world, is the aggregation of large amounts of data in the cloud. Through Digitalization data flows from all corners of industry and society are allowed. Not only from sensors built into production lines, but also electric meters, security cameras, customer service call logs, and much more.

It has been realised that the rapid evolution of big data and leveraging on its potential through policy instrument can serve as a critical raw material or infrastructure for Nigeria's digital economy and a tool for accelerating multi-sector development[89]

To accelerate growth and modernize the Nigerian economy, Nigeria is developing a digital-led growth strategy for the Nigerian economy: "The Smart Nigeria Digital Economy Project", as well as the National Digital Economy Policy and Strategy Document 2020-2030. The objective of these project is to solve efficiency problems and create leap frog opportunities in the economy, improve competitiveness and foster technology development and innovation more generally.[90]

[93] https://www.vanguardngr.com/2020/11/were-leveraging-big-data-to-drive-digital-economy-fg/
[94] http://www.notn.gov.ng/post_action/39

This has made access to and analyses of data to become a crucial part required for the competitiveness and expansion of companies across sectors. Manufacturers and exporters increasingly depend on data analytics, not only because they have digitized their operations, but also because they use support services that require access to data, such as shipping and logistics, retail distribution and finance.[91]

4.3. RESEARCH QUESTION 3: What are the challenges to the achievement of digital financial inclusion as needed for a Digital Economy in Nigeria?

From a regulatory and supervisory perspective, a first set of challenges concerns trust and consumer confidence.

Striking the right balance between leveraging opportunities and safeguarding against risks is critical to reaping the benefits of digital finance. Unfortunately, regulatory and supervisory capacity has generally not kept pace with changing market dynamics. Trust in digital financial services is under threat by a number of challenges including agent fraud, system failure, weak data security and privacy, and questionable safety of customer funds, particularly where non-bank players are involved. Technological advances carry with them significant compliance issues, including Know Your Customer and Anti-Money Laundering v. CFT-Combating Financing of Terrorism (AML-CFT) procedures, especially in countries with ineffective identification. These advances also create challenges in terms of maintaining a level playing field for service providers.

Consumer data protection, privacy and insolvency risks need to be addressed, especially given the vulnerability of customers and the common lack of financial education and awareness. Consumers need to gain trust as this is new technology for most of them and they need to understand what will happen to their funds in the event of insolvency.

For instance, in the case of a non-bank financial intermediary with funds sitting in a trust account, what happens with the funds in case the Telco

[95]https://unctad.org/system/files/non-official-document/tdb_ede3_2019_p01_Ssirimanne_en.pdf

runs into insolvency issues? Further, the integration of Telcos and non-banks in the financial system raises the question of the ownership of the data created by mobile banking. Where regulation of market conduct is ineffective, digital financial service agents may abuse the process or have a negative customer relationship. This can have negative effects on the ecosystem and on future adoption of similar services or products.[92]

Supervising the agent-principal relationship is also a challenge, considering the importance of market behaviour and consumer protection. Generally, in the agent-principal relationship, monitoring and penalties are supposed to be provided by the principal. As agents are managed by the principal, the latter should therefore be liable in the event of any misconduct committed by the agent. However, the wider the network of agents, the more challenging the monitoring of agent behaviour becomes and the higher the odds of abusive practice affecting end-users.

In response, regulators and supervisors have innovated and started sampling agents, penalising those that get caught, and creating reporting mechanisms through which consumers can lodge a complaint. There are good examples of Memoranda of Understanding (MoU) between the Central Bank of Nigeria, which regulates financial intermediaries, and the MNO regulator, the NCC, which regulate the digital side of the product. In most countries, the court system may not provide an efficient mechanism to resolve commercial or consumer-related disputes. Alternative dispute resolution mechanisms codified in the regulation can offer solutions to these inefficiencies.

The second set of challenges has to do with inclusion. Distribution outlets can be insufficiently accessible and acceptance by target populations low. Banks have been slow to engage with Telcos to develop more inclusive services and products. A third of all mobile money accounts are inactive, meaning that they have not seen any transactions for 3 months. This raises the question as to whether inclusion should be defined as having a

[96] http://documents1.worldbank.org/curated/en/387871574812599817/pdf/Nigeria-Digital-Economy-Diagnostic-Report.pdf
https://www.researchgate.net/publication/342551407_ict_and_financial_inclusion_in_nigeria_an_overview_of_current_challenges_and_policy_options
https://www.cbn.gov.ng/out/2014/rsd/occasional%20paper%20no.%2045%20issues%20and%20challenges.pdf

point of access or, rather, services that customers actually use, be they savings, credit or insurance services.

Trust in digital financial services can be enhanced by paying attention to financial risks and the take-up of digital financial services at the bottom of the pyramid, boosted by ensuring that regulation safeguards the interests and rights of the poorest end-users. Biometrics can address many of the issues associated with the lack or unreliability of identity mechanisms while digital footprints can be used as a source of credit referencing.

As a corollary, regulators need to ensure that digital identities are not abused. Regulatory supervision for data management, i.e. the collection, storage and protection of data, must be provided. The issues of identity protection and cybersecurity are critical.[93]

Financial inclusion is increasingly becoming part of the mandate of Central Banks. Transparency is important: the public needs to be able to know what the Central Bank is doing for financial inclusion. This ensures certainty and consistency, a prerequisite for private sector confidence and investment.[94]

Central Banks are mandated to promote and protect financial stability, but they need to balance this mandate with the need to foster financial inclusion. An enabling environment needs to be proportional and risk based so that the cost of compliance is not excessive.

A third set of challenges has to do with interoperability, and how to connect the various market players to allow for seamless transactions. The

---

[97]http://dx.doi.org/10.1787/9789264276284-en
https://www.boj.or.jp/en/announcements/press/koen_2016/data/ko161118a.pdf

Howard Goldstein [https://www.business.com/articles/fintech-startup-ai-adoption/]

OECD (2017), OECD Digital Economy Outlook 2017, OECD Publishing, Paris.
http://dx.doi.org/10.1787/9789264276284-en
https://www.usaid.gov/sites/default/files/documents/1860/Enabling_Market_Conditions_for_Pay-As-You-Go_Solar_Executive_Summary.pdf
https://www.geopoll.com/blog/challenges-financial-inclusion-nigeria/
https://www.bis.org/ifc/publ/ifcb47k.pdf
https://www.thisdaylive.com/index.php/2018/06/10/addressing-the-challenge-of-financial-inclusion-in-nigeria/

key is to consider the value proposition for both the private and the public sectors, including in terms of interoperability. When a regulatory framework does not take into consideration the different value propositions, conflicts can arise within the market about whether the service should be offered through a banked model or a non-bank model. In some markets, there is competition between several players while in others there is a single dominant player. In some countries, the lion's share of growth in financial transactions has taken the form of Over-the-Counter (OTC) activity, where a mobile money agent performs transactions on behalf of customers.

As a country's mobile money market develops, attention should shift from facilitating investments to ensuring appropriate competition, aligning competition between banks and non-banks to enhance financial inclusion and making the regulatory frameworks of both sectors compatible. In a world of connected products, systems and people, it is necessary to make connected solutions for financial inclusion.

FinTechs encompass a wide array of business processes, including payments, investments, lending, insurance, wealth management, digital currency and big-data analysis in the form of B2C, B2B, C2C that may complement, overlap, compete, or disrupt banking operations. As a result, Banks are concerned that non-banking institutions have an advantage over them while some non-banks are currently complaining that banks are presenting obstacles for them to interact with clients through banking operations. [95]

Therefore, regulators should be pro-technology but remain technologically neutral. Technology neutrality means that regulation designed to ensure consumer protection and financial stability should describe the result to be achieved, but should allow market players to adopt whatever technology is most appropriate to achieve the result.

---

[99]https://www.semanticscholar.org/paper/Financial-Inclusion-In-Nigeria%3A-Issues-And-Kama-Adigun/9bdf2c3bd844dad5435ce9c876cb8611175ca93e
https://businessday.ng/columnist/article/the-many-challenges-of-financial-inclusion-in-nigeria/
https://www.lbs.edu.ng/lbsinsight/financial-inclusion-in-rural-nigeria-challenges-facing-agent-business-viability/
https://www.linkedin.com/pulse/challenges-financial-inclusion-nigeria-oluwatosin-dokunmu-aat-aca

The same regulatory principles should apply to all types of market player and regulators should refrain from using regulations as a means to push the market towards a particular structure. Some financial inclusion products may look cost-effective at a low scale and yet lock domestic end-users into out-of-date and localised payment systems, preventing them from benefiting from innovation.[96]

4.4. ROLE OF NCC IN THE GROWTH OF FINTECH AND DIGITALISED ECONOMY

The Central Bank of Nigeria has issued the following Guidelines which impact FinTech companies in Nigeria:

1. Guidelines on Mobile Money Services in Nigeria
2. Guidelines on Operations of Electronic Payment Channels in Nigeria
3. Regulatory Framework for the Use of Unstructured Supplementary Service Data (USSD) for Financial Services in Nigeria.
4. Guidelines on International Money Transfer Services
5. Guidelines on International Mobile Money Remittance Service
6. Exposure Draft of New CBN Licensing Regime for Payment Service Providers
7. Regulation for Direct Debit Scheme in Nigeria
8. In addition to the above, the National Information Technology Development Agency (NITDA) recently issued the Nigerian Data Protection Regulation which impacts the use, transfer, and processing of data of Nigerian citizens. The Central Bank of Nigeria has also issued the Risk-Based Cyber-Security Framework and Guidelines for Deposit Money Banks and Payment Service Providers, which will be of importance to FinTech companies operating in Nigeria.[97]

---

[101]https://www.ncc.gov.ng/media-centre/news-headlines/413-evc-ceo-ncc-delivers-a-speech-at-the-vanguard-financial-technology-conference-2018

https://guardian.ng/technology/digital-economy-ncc-has-huge-roles-to-play/

[101]https://technext.ng/2020/07/08/ncc-creates-new-department-to-accelerate-fgs-digital-economy-agenda/

The CBN Guidelines on Mobile Money Services identifies the various participants in the mobile money industry to include Banks, licensed corporate organizations, infrastructure providers, Mobile Network Operators (MNOs), and consumers. Mobile Money Operators (MMOs) are required amongst other conditions for licensing by the CBN, to be Issued unique short codes by the NCC to ensure that all telecommunications equipment are type approved by the NCC, and to Register users of its scheme based on the technology standards and requirements of the Guidelines.

In addition, in its Regulatory Framework for the Use of USSD for financial services in Nigeria, mandate that only MNOs and CBN licensed entities with a letter of no objection or letter of introduction from the CBN, are eligible for the issuance of USSD short codes by the NCC.

It is noteworthy that several of the initiatives commenced by the CBN include reference to the role of the NCC in their actualisation. This is in due in no small part to the centrality of the telecommunications sector in the growth of data, digital economy and national socio-economic revolution and regeneration.

The Nigerian Communications Commission (NCC), being the nation's central and premier communications regulatory agency under the Federal Ministry of Communications is saddled with the mandate of ensuring a secure and reliable cyberspace for operators and consumers to ensure a secure cyberspace that is safe for the operators and consumers of communications services and infrastructure in Nigeria.

Sequel to the severity and seriousness of cybercrime activities, the Commission undertakes modern strategies, projects and activities to ensure a secure cyberspace for all such as:

- The National Cyber Security awareness Month (NCSAM) which as an annual event focused on raising Cyber Security awareness through sensitization and awareness campaigns on the availability of online and offline impacts and measures to the public to better safeguard themselves.
- The Nigerian Communications commission in its dedication and commitment to combat and curb cybercrime has made available online resources to this effect such as:

- Nigeria Computer Emergency Response Team (ngCERT) whose mission is to create and achieve a safe, secure and resilient cyberspace in the country and protect it from attacks and predictable problems or events.
- Forums of Incidence Response and Security Team (FIRST). This brings together a variety of skilled computer professionals from the government, commercial and educational organizations for cooperation and coordination in incident prevention, simulation of rapid reactions and promote information sharing.[98]
- Computer security Incidence response Team (CSIRT), provides services and support which hover over the prevention and Management of potential cyber security related emergencies to regain control and minimize damages, implement recovery and prevention of security incidents.

In order for the war against cybercrime to make any head way, all parties who are involved in one way or another have to actively be on deck and fully committed to the cause. As such FinTech organizations are expected to put in place measures such as metrics and monitoring processes. This is to ensure strict compliance and provide feedback on the effectiveness of controls and the basis of appropriate management decisions.

Regulation of FinTech in Nigeria is overseen by the Central bank. As a measure of risk management, the CBN places a financial barrier of a minimum of $275,000 on entry into the FinTech market to help secure funds and credibility of operators.

In addition, the Nigerian Communications Commission (NCC) also regulates FinTech companies. FinTech companies offering services that involve the use of mobile networks or mobile phones are subject to the NCC's regulatory purview and must obtain requisite operating licenses

[102]ITU Embracing FinTech https://news.itu.int/embracing-fintech-examples-from-nigeria-and-singapore/
https://www.nigeriacommunicationsweek.com.ng/ncc-committed-to-the-growth-of-digital-economy-ojobo/

https://www.ncc.gov.ng/media-centre/news-headlines/413-evc-ceo-ncc-delivers-a-speech-at-the-vanguard-financial-technology-conference-2018

from the Commission. For instance, companies that operate mobile payments must be licensed by the NCC pursuant to the License Framework for Value Added Service (VAS). The NCC VAS regulation defines a VAS provider as a person or organization engaged in the provision of value-added mobile/fixed services.[99]

[103]https://www.ncc.gov.ng/media-centre/news-headlines/413-evc-ceo-ncc-delivers-a-speech-at-the-vanguard-financial-technology-conference-2018

CHAPTER 5: CONCLUSION AND RECOMMENDATIONS

5.1. CONCLUSION

It is expedient to elaborate that there an urgent call for corporate entities, both Government owned and private in the financial services space to make it a top priority to engage the process of realignment of their business and service strategies to enable them recognize the sweeping technological trends and changes in the business environment.

Financial service players are not excluded from the need of recognizing the changes brought upon the sector as a result of the recent dreaded coronavirus pandemic. The playing field should be levelled for both FinTech institutions and Banks to create a favourable environment for healthy competition and efficient collaboration.

Globally, there is a huge information gap in the ecosystem, Chief Information Security Officers (CISOs) need to share information on emerging and existing threats so as to brainstorm and develop potent responses to these threats which are primarily hanging on the nature and availability and analysis of Big Data. Big Data analysis is basically characterized by use of real time information and very large sets of information from disparate sources.

The banking and financial institutions in Nigeria still has a lot of work to do in its ability to leverage on building trust with FinTech firms. Only through this alongside tight security policies and regulations can there be free flow and analysis of data to and fro which is the necessary for the development of a Digital Economy for Nigeria.

5.2 RECOMMENDATIONS FOR THE NIGERIAN COMMUNICATIONS COMMISSIONS (NCC)

The emergence and growth of FinTech has played a huge role in the growth, development and transformation of the economy of any country. Regulators have an obligation to brave new regulatory frontiers to drive the benefits unleashed by new and emerging technology.

In order for the Nigerian Communications Commissions to drive for a safe and enabling environment for FinTech to maximize its potentials while curtailing its negative effects, the following recommendations are emphasized:

1. The Commission should drive collaboration toward informed and effecting regulation with relevant stakeholders such as Ministry of Communications & Digital Economy, CBN, NITDA and NOTAP. Constant collaboration would establish information sharing and boost stakeholder involvement.

2. The Commission should consistently engage with the ITU on FinTech standardization efforts for replication at the National level.

3. Collaborate and partner with Academia and Research Institutions and Start-ups to drive constant and intensive research in the field of Emerging Technologies such as FinTech. This partnership would also foster sensitization and educational reform of Nigerian school curriculums to include ICT and digital skills for retool and reskill of Nigerians for this new era of emerging technology.

4. The Commission should encourage investment in local FinTech start-ups.

5. The Commission and CBN should assist FinTechs and Banks, on strengthening their digital infrastructure platforms and systems.

6. Financial service players should be encouraged to provide enhanced digital products, as well as personalized services (digital and non-digital) that could provide significant return on investment.

7. With the advent of COVID-19 its far-reaching impact on the country's business landscape, Commission and financial service players need to make tough decisions regarding operational efficiencies.
8. The Commission should strengthen and tighten internal governance frameworks and strategies on cybercrime mitigation.

9. The Commission should drive Public- Private Partnerships (PPP) via a roundtable with captains of the ICT Industry in the field of Emerging Technologies to encapsulate information sharing and foster inclusive collaboration in policy formulation.

10. Engage in stakeholder engagement and capacity deployment programmes with SMEs, micro-business, employers, employees, trade groups, among other stakeholders, to enlighten them on the benefits of utilizing digital platforms as a channel for financial transactions and commerce, and as a bridge builder for a digitalised Nigeria.

CHAPTER 6: REFERENCES

REFERENCES

1) https://www.techopedia.com/definition/29059/data-ownership
2) https://www.mckinsey.com/industries/financial-services/our-insights/monetizing-data-a-new-source-of-value-in-payments#
3) https://www.sisense.com/data-monetization/
4) https://en.wikipedia.org/wiki/Data_monetization
5) KPMG report (The Pulse of FinTech 2018)
6) https://www.Usaid.gov/div/grandchallenge
7) https://knowledge.insead.edu/career/the-worlds-most-talent-ready-countries-2015_4467
8) https://www.techuk.org/insights/news/item/7636-are-you-be-a-big-data-hero
9) https://www.cfone.com/2019/06/18/benefits-financial-technology/
10) *Data skill for the future "positioning the UK for for success in a data driven world"*. Dr George Windsor, Pearson and Accenture with partners from the Data Skills Taskforce.
11) Feed the future "innovation for data-driven agriculture" Key Findings Report | April 27-28, 2017 | Boulder, CO
12) "The impact of Fin-Tech start-ups on incumbent retail banks' share price" Yinqiao Li, Renee Spigt, Lauren Swinkels (2017).
13) "*Fin-tech and banking: what do we know*?" Anjan V. Thakor, Washington University in St. Louis (2019).
14) "*Financial Technology-Fintech*" Julia Kagani (2019)
15) ADB Accelerating financial inclusion in south-east Asia with digital finance Technical report
16) Asian Development Bank (2016)
17) http://www.oliverwyman.com/content/dam/oliver-wyman/v2/publications/2017/jan/Accelerating-financial-inclusion-in-south-east-asia.pdf
18) Accessed 14th Nov 2017
19) F. Allen, A. Demirguc-Kunt, L. Klapper, M.S.M. Peria The foundations of financial inclusion: Understanding ownership and use of formal accounts

20) Journal of Financial Intermediation, 27 (2016), pp. 1-30

21) Article Download PDF View Record in Scopus Google Scholar

22) P. Barbesino, R. Camerani, A. Gaudino Digital finance in Europe: Competitive dynamics and online behaviour

23) Journal of Financial Services Marketing, 9 (4) (2005), pp. 329-343

24) Cross Ref View Record in Scopus Google Scholar

Beck and Brown, 2011

25) T. Beck, M. Brown Use of banking services in emerging markets-household-level evidence. CEPR Discussion Papers 8475

26) CEPR Discussion Papers (2011)

27) Beck et al., 2007

28) T. Beck, A. Demirgüc-Kunt, R. Levine Finance, inequality and the poor

29) Journal of Economic Growth, 12 (1) (2007), pp. 27-49

30) Cross Ref View Record in Scopus Google Scholar BRC, 2017

31) BRC Debit cards overtake cash to become number one payment method in the UK. The British retail consortium's (BRC) annual payments survey (2017)

32) https://brc.org.uk/news/2017/debit-cards-overtake-cash-to-become-number-one-payment-method-in-the-uk,Accessed 10th Nov 2017

33) Bruhn and Love, 2014

34) M. Bruhn, I. Love The real impact of improved access to finance: Evidence from Mexico

35) The Journal of Finance, 69 (3) (2014), pp. 1347-1376

36) Cross Ref View Record in Scopus Google Scholar Caruana, 2016

37) J. Caruana Financial inclusion and the fintech revolution: Implications for supervision and oversight. Conference remarks at the third GPFI-FSI conference on standard-setting Bodies and innovative financial inclusion - "new frontiers in the supervision and oversight of digital financial services"

38) (2016) 26 October, Basel

39) Cecchetti and Kharroubi, 2012

40) S. Cecchetti, E. Kharroubi Reassessing the impact of finance on growth. BIS Working Paper 381. BIS, Basel (2012)

41) CGAP. Consultative Group to Assist the Poor. Available at: http://www.cgap.org/topics/digital-financial-services Accessed 9 November 2017.

42) CGAP, 2015

43) CGAP What is Digital Financial Inclusion and Why Does it Matter? 10 March 2015

44) (2015)

45) http://www.cgap.org/blog/what-digital-financial-inclusion-and-why-does-it-matter, Accessed 10th Nov 2017

46) Collins et al., 2009

47) D. Collins, J. Morduch, S. Rutherford, O. Ruthven Portfolios of the poor: How the world's poor live on $2 a day

48) Princeton University Press (2009)

49) Demirgüç-Kunt and Klapper, 2013

A. Demirgüç-Kunt, L. Klapper Measuring financial inclusion: Explaining variation in use of financial services across and within countries

50) Brookings Papers on Economic Activity, 2013 (1) (2013), pp. 279-340

51) S.M. Dev Financial inclusion: Issues and challenges

52) Economic and Political Weekly (2006), pp. 4310-4313

53) K. Eisen hard Agency theory: An assessment and review

54) Academy of Management Review, 14 (1) (1989), pp. 57-74

55) Cross Ref Ellis et al., 2010

56) K. Ellis, A. Lemma, J.P. Rud Financial inclusion, household investment and growth in Kenya and Tanzania

57) ODI Project Briefing No.43 Overseas Development Institute, London (2010)

58) G20 SummitG20 Leaders' Declaration. September, St Petersburg, Russia(2013)

59) http://www.g20.utoronto.ca/2013/2013-0906-declaration.html, Accessed 9th Nov 2017

60) P. Gomber, J.A. Koch, M. Siering Digital finance and FinTech: Current research and future research directions

61) Journal of Business Economics, 67 (5) (2017), pp. 537-580

62) Cross Ref View Record in Scopus Google Scholar

63) GPFIG20 Principles for innovative financial inclusion - executive brief (2010)

64) http://www.gpfi.org/publications/g20-principles-innovative-financial-inclusion-executive-brief, Accessed 21st Jul 2017

65) GPFIG20 High-level principles for digital financial inclusion (2016)

66) https://www.gpfi.org/sites/default/files/G20%20High%20Level%20Principles%20for%20Digital%20Financial%20Inclusion.pdf, Accessed 8th Nov 2017

67) GSMA2013 state of the industry report on mobile financial services for the unbanked (2014)

68) R. Han, M. Melecky Financial inclusion for financial stability: Access to bank deposits and the growth of deposits in the global financial crisis. World bank policy research working paper 6577

A. Hannig, S. Jansen Financial inclusion and financial stability: Current policy issues (2010)

69) IFC Digital financial services: challenges and opportunities for emerging market Banks. EM Compass Report, No 42, August

70) International Finance Corporation, World Bank (2017)

71) https://www.ifc.org/wps/wcm/connect/4e45d83f-e049-41d3-8378-2e388ffc1594/EMCompass+Note+42+DFS+Challenges+updated.pdf?MOD=AJPERES, Accessed 9th Nov 2017

72) ITU, 2016

73) ITU The Digital financial services ecosystem Technical Report

74) ITU Focus Group (2016) May.

75) https://www.itu.int/en/ITU-T/focusgroups/dfs/Documents/09_2016/FINAL%20ENDORSED%20ITU%20DFS%20Introduction%20Ecosystem%2028%20April%202016_formatted%20AM.pdf, Accessed 14th Nov 2017

76) J.A. Ketterer Digital finance: new times, new challenges, new opportunities(2017)

77) https://publications.iadb.org/handle/11319/8199, Accessed 14th Nov 2017

78) H.R. Khan Financial inclusion and financial stability: are they two sides of the same coin. Speech at BANCON. BIS Working Paper (2011)

79) http://www.bis.org/review/r111229f.pdf Malady, 2016

80) L. Malady Consumer protection issues for digital financial services in emerging markets

81) Banking & Finance Law Review, 31 (2) (2016), pp. 389-401

82) View Record in Scopus Google Scholar Manyika et al., 2016

83) J. Manyika, S. Lund, M. Singer, O. White, C. Berry Digital finance for all: Powering inclusive growth in emerging economies

84) McKinsey Global Institute, USA (2016) September

85) E.S. Prasad Financial sector regulation and reforms in emerging markets: An overview (No. w16428)

86) National Bureau of Economic Research (2010)

87) Research and Markets, 2016

88) Research and Markets U.S. Consumer payments outlook through 2020 (2016) May.

89) https://www.researchandmarkets.com/research/5dfd3s/u_s_consumer, Accessed 11th Nov 2017

90) S.V. Scott, J. Van Reenen, M. Zachariad is the long-term effect of digital innovation on bank performance: An empirical study of SWIFT adoption in financial services

91) Research Policy, 46 (5) (2017), pp. 984-1004

92) Article Download PDF View Record in Scopus Google Scholar

93) A.A. Shaikh, R. Glavee-Geo, H. Karjaluo to Exploring the nexus between financial sector reforms and the emergence of digital banking culture–Evidences from a developing country

94) Research in International Business and Finance, 42 (2017), pp. 1030-1039

95) Article Download PDF View Record in Scopus Google Scholar TSYS, 2016

96) TSYS2016 U.S. Consumer payment study (2016)

97) https://www.tsys.com/Assets/TSYS/downloads/rs_2016-us-consumer-payment-study.pdf, Accessed 11th Nov 2017

98) United Nations Digital financial inclusion. International telecommunication union (ITU), issue brief series, inter-agency task force on financing for development, July. United Nations (2016)

99) http://www.un.org/esa/ffd/wp-content/uploads/2016/01/Digital-Financial-Inclusion_ITU_IATF-Issue-Brief.pdf, Accessed 10th Nov 2017

100) World Bank, 2014World Bank Digital finance: Empowering the poor via new technologies, April 10 (2014)

101) http://www.worldbank.org/en/news/feature/2014/04/10/digital-finance-empowering-poor-new-technologies, Accessed 10th Nov 2017

102) https://www.first.org/

103) https://www.cert.gov.ng/

104) https://www.ncc.gov.ng/technical-regulation/cybersecurity#ncc-csirt

105) https://www.mondaq.com/nigeria/fin-tech/872530/cybersecurity-regulation-in-the-nigerian-fintech-industry

106) https://iclg.com/practice-areas/fintech-laws-and-regulations/nigeria

107) https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7456578/#bib27

108) https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7456578/#bib73

109) https://www.oecd-ilibrary.org/docserver/dcr-2017-6-en.pdf?expires=1605863069&id=id&accname=guest&checksum=EC7C684F4EC3EDF77E987064248E608F

110) http://www3.weforum.org/docs/GITR/2012/GITR_Chapter1.11_2012.pdf

111) https://itforchange.net/why_owning_their_national_data_is_impt

112) https://www.smartdata.how/wp content/uploads/2018/06/TheemergingroleofBigDatainkeydevelopmentissues-.pdf

113) https://www.devex.com/news/how-can-digitalization-be-an-enabler-for-development-95702

114) https://turbofuture.com/misc/Disadvantages-of-Digital-Technology