Financial technology revolution and banks' information and communication technology investment: evidence from an emerging economy

Adam Konto Kyari*

Department of Accounting,
College of Business Administration,
Imam Abdulrahman Bin Faisal University,
Dammam, Saudi Arabia
Email: akkyari@iau.edu.sa
*Corresponding author

Bukar Zanna Waziri and Musa Garba Gulani

Department of Accounting,
Faculty of Management Sciences,
University of Maiduguri, Nigeria
Email: bukarwaziri@gmail.com
Email: musagln1@gmail.com

Abstract: The main objective of this study is to investigate banks' perception of Fintech growth in Nigeria and how such growth affects their ICT investment decisions. Fintech has brought to the forefront the significance of ICT by providing traditional banking services, which were hitherto the exclusive rights of incumbent banks. This has made banks to increase their ICT expenditure by investing heavily in digital banking and on accelerators, alliances and innovation laboratories. Guided by the Sense and Respond theory, an in-depth interview was conducted and later transcribed manually without the use of any software. The analysis of the findings revealed that Fintechs are both threat and opportunity to Nigerian banks and are impacting positively on their ICT investment decisions. Finally, this study recommends further research on the effectiveness of banks' ICT investments decisions in containing the growth of Fintech in Nigeria.

Keywords: fintech, bank; information and communication technology; ICT; threat, opportunity; decisions; response; payment.

Reference to this paper should be made as follows: Kyari, A.K., Waziri, B.Z. and Gulani, M.G. (2021) 'Financial technology revolution and banks' information and communication technology investment: evidence from an emerging economy', *Int. J. Technological Learning, Innovation and Development*, Vol. 13, No. 3, pp.283–303.

Biographical notes: Adam Konto Kyari received his PhD degree in Accounting from the Robert Gordon University, Aberdeen. He is a Fellow of the Institute of Chartered Accountants of Nigeria (ICAN) and a member of the Association of Chartered Certified Accountants (ACCA), UK. He has a good number of publications in books and journals on financial, management and

petroleum accounting issues and is a co-author of 'Sustainable energy policy option: strategies for the utilisation of renewable energy for Nigeria' (*Journal of Management Studies*, 2017). His current research interest is on issues relating to information disclosure in financial statements.

Bukar Zanna Waziri holds a PhD in Accounting with specialty in energy and environmental accounting from the famous Dundee Business School, Abertay University, UK. He has over ten years' cognate experience in teaching, research, and capacity building. Currently, he is a Senior Lecturer in the Department of Accounting, University of Maiduguri, Nigeria. He pioneered lectures in oil and gas accounting and has published and delivered several journal articles and papers respectively. He is a reviewer to *International Journal of Energy Sector Management* and served as a panellist in the Petroleum Technology Development Fund Overseas Scholarship Scheme. He is a Certified National Accountant and happily married with children.

Musa Garba Gulani is a Senior Lecturer at the University of Maiduguri, Nigeria. He received his PhD in Accounting from the University of Maiduguri in 2016. He holds the following professional designations in Nigeria: Associate Chartered Stockbroker (ACS), Certified Financial Analyst (CFA), and Certified Public Accountant (CPA). In 2009, he joined Yobe State Agency for Community and Social Development (World Bank assisted project) and has been there until 2013 when he joined the University of Maiduguri. He has published more than 20 research articles in leading journals in Nigeria and internationally. His current research interest is on public financial management, corporate governance and ethical issues in accounting and finance.

1 Introduction

The rapid development in information and communication technology (ICT) over the past few years has created opportunities for entrepreneurs to venture into the provision of financial services. In particular, the emergence and growth of Financial Technology (Fintech) has brought to fore the significance of ICT towards the delivery of financial services. Fintech companies make use of software and modern technology to provide financial services of all kinds across all financial subsectors. In the banking sector, Fintech compete actively by providing all the traditional retail banking services, which were hitherto the exclusive rights of the incumbent banks, in a simplified and unconceivable customer satisfaction manner (Chishti and Barberis, 2016). These services, which are offered by Fintech in the form of products, applications, business processes and business models have now made banking more user friendly, cheaper, efficient and digital (Dorfleitner et al, 2017).

Interestingly, customer expectations for speed, convenience, and costs are rapidly changing. Majority of customers require entirely computer-generated support for banking services (Accenture, 2017). The threat here is that incumbent banks do not have the necessary technology that is as good as that of Fintech companies to meet these needs (Navaretti et al, 2017). As a result, Fintechs are now becoming more acceptable, especially among the millennials (Baker et al, 2017), for not only proving faster and more user-friendly services than conventional banks (Dorfleitner et al, 2017) but also for their ability to offer numerous financial products in one place (Wisniewski, 2016). More

concerning for the banks is the ability of Fintech companies to acquire information relating to bank-customer relationship, and uses it to erode the relationship between the bank and its customer and win the customer's confidence (Vives, 2017). Similarly, the ability of Fintech companies to enter into a single and almost unregulated segment of the financial market enables them to operate at no cost and burdens of banking regulation and compliance (Navaretti et al, 2017). The threat here is that these segments may be the most profitable ones for the banks such as the provision of payment services and financial advice. Thus. the participation of Fintech companies in the provision of banking services is seen as threat to incumbent banks.

Disturbed by the threats above and the growing popularity of Fintech companies (EY, 2017), especially among the millennials (Baker et al, 2017), and the effects this has on their performance, banks increased their total ICT expenditure by first investing heavily in digital banking and now on accelerators, alliances and innovation laboratories (Webster and Pizzala, 2015). As a result, many banks across the globe, Webster and Pizzala (2015) noted, have either a start-up program to raise Fintech companies, putting up venture capital to fund Fintech companies, or are partnering, acquiring or launching their own Fintech companies. This has led to a phenomenal growth in Fintech investment with Nigeria recording a growth of more than $200 Million in 2018 (Kuyoro and Olanrewaju, 2020).

This study employs the sensing and responding theories as a theoretical basis. Sensing implies the ability of an organisation to obtain enough knowledge about forces of environmental changes and how this knowledge influences decisions within the organisation (Roberts and Grover, 2012). It is a mental process that enables faster observation and development of meaning when faced with a rapidly changing environment (Kiesler and Sproull, 1982). On the other hand, responding implies an organisation's ability and desire to take action towards environmental changes (Roberts and Grover, 2012) which could be either through a complex move, simple move or no move (Ferrer et al, 1999). The appropriateness of these theories to this study hinges on the premise that changes in technology bring about competition and destroy monopoly by rendering products and services obsolete and creating new industries (Day and Schoemaker, 2000) which is consistent with the changes brought about by the Fintech revolution in the banking industry.

Literature on the impact of Fintech on banks' ICT investment decision is massive and mixed (e.g., Chishti and Barberis, 2016; Bunea et al, 2016). On one hand, some studies revealed Fintech as threat to incumbent banks. For example, in a study conducted by Bunea et al (2016) on the United States, banks have acknowledged that the emergence and growth of Fintech have posed a threat to their business. Similarly, Feher and Varga (2017) have found, in a study on Hungarian banks, that Fintech's provision of generic banking services that meet the needs of small customers' segment as the major challenge faced by incumbent banks. On the other hand, quit a number of studies have revealed Fintech as opportunity to incumbent banks. For example, Haddad and Hornuf (2016) assert that banks see Fintech as opportunity and are investing heavily on digitalisation to meet up with the ever-increasing banking demands and experience of their customers. In this way, banks across the globe have established online banking platforms that are capable of P2P mobile payments, mobile photo bill pays, and fee-free overdraft protection, among others.

The focus of this study on Nigeria is for two main reasons. First, studies on Fintech are mainly conducted on developed countries (e.g., Dickerson et al., 2015; Chishti and

Barberis, 2016; Bunea et al, 2016, Haddad and Hornuf, 2016, Manthorpe, 2017, Oshodin et al, 2017). There are very few studies on developing countries and despite the remarkable growth of Fintech investment in Nigeria of more than $200 Million in 2018 (Kuyoro and Olanrewaju, 2020), there is still dearth of studies on Fintech in Nigeria. Second, most of the studies on Fintech are limited to the destructive ability of Fintech (Bunea et al, 2016) with arguably no study linking Fintech's revolution to banks' investment decisions particularly in Nigeria.

The sample of this study consist of seven respondents drawn judgementally across seven banks. This sampling method seems appropriate because it enables the researcher to strategically select the most relevant respondents from the population (Bryman and Bell, 2011). Since the banks selected are arguably the top most technologically comprehensive banks in Nigeria with highly knowledgeable ICT experts, the choice of purposive sampling is appropriate. A number of findings are documented in this study. First, the study revealed that Nigerian banks are fully aware of the Fintech phenomenon and in particular are putting in place measure, including the maintenance of ICT department, to contain their increasing threats. Second, consistent with KPMG (2016), this study revealed that Fintech industry in Nigeria is rapidly growing at a speed that put it as one of the top three recipient of Fintech investments in Africa alongside Egypt and South Africa.

This study contributes to knowledge in so many ways. First, it contributes to the growing interest on study on the relationship between Fintech revolution and banks' ICT investments. As most studies on Fintech are on developed countries, this study could help to bridge the gap in what we know about Fintech about developing countries. Second, the qualitative methodology adopted in this study contributes to the literature on the Fintech revolution in Nigeria. Instead of accessing secondary data for gauging the impact of Fintech growth on banks' investment decision, this study employ in-depth in interview which helped in meeting the study's objective of collecting first- hand information on Fintech development in Nigeria from the industry's actors. Third, the study contributes to knowledge in helping as a guide for policy debates relating to the link between Fintech and banks' ICT investment.

The rest of the paper is divided into eight sections. The section that follows presents a review of the Fintech companies. Section three discusses the theoretical framework that underpins the study while section four gives the methodology employed. The interview results are presented in section five and a discussion of same is followed in section six. Section seven concludes the study and section eight gives suggestions for further study.

2 Literature review

The term Fintech stands for financial technology companies that make use of software and modern technology to provide financial services of all kind. Fintech, Dorfleitner et al, 2017 explain, is a technology-based financial innovation that gives rise to new business models, applications, processes and products which could have a substantial effect on the financial markets and the provision of financial services. In relation to the banking sector, Fintech's operation can be seen in three main areas, namely; financing, asset management, and payments.

In the finance segment, Fintech provides finance to both individuals and corporate bodies mainly in the form of crowdfunding and crowdlending, with the former

facilitating person-to person lending and the later connecting capital-seeking companies with investors who are willing to lend directly to businesses. The benefit of using these platforms is that online fundraising can be set up easily to market products quickly and also simultaneously receive feedback on the product (Augustine, 2015). In the same vein, crowdfunding(lending) help to eliminate the cost which users are to incur if they were to hire support companies to market their products (Conrad, 2012).

In terms of asset management, Fintech offers services in the form of social trading, robo-advice and personal financial management (PFM). Social trading, according to Liu et al (2014), is a type of investment in which the investors can observe, discuss, and copy the investment portfolios or plans of participants in a social network. This enables individual members of a network to benefit from the knowledge of large group members. The robo-advice, on the other hand, is the application of robotics and digital systems to build and manage collections of exchanged-traded funds and other instruments for investors (Accenture, 2015). It is based on algorithm and at times makes investment decisions (ESA, 2015). Robo-advice is an attempt to manage investment with lower dependence on people and at relatively much lower cost. Providers of robo-advice usually charge fees from investors commensurate to the value of their investment. The PFM platform includes Fintech companies that provide financial planning, mainly in the form of administration and presentation of financial data, to private individuals using software or application-based services. This service enables customers to have both the assets deposited and loans borrowed from different financial institutions and lenders in one place. PFMs achieve this integration by interfacing with the portals of different financial institutions using application programming interface (Nienaber, 2016).

Payment is another segment that Fintech companies are reshaping. Several Fintech companies are offering digital payments alternatives that not only make payment within the established payment system of banks but also outside such system. These payment methods include, among others, 'e-wallets' which store payment card information in a secured platform that can be used to make real-time bank transfers (Roubini and Mihm, 2010), 'mobile payment' which employs the use of mobile phone to make payment or banks transfer (Merritt, 2010), and 'cryptocurrency' which is a type of electronic money that is used to carry out payment and transfer of money via computers between users without the use of cash (Maese, 2014).

2.1 Empirical confirmation of fintech threats and banks response

Literature on the impact of Fintech companies is numerous (Dickerson et al., 2015; Chishti and Barberis, 2016; Bunea et al, 2016). In a study to determine whether Fintech companies are threat to the USA banks, Bunea et al (2016) found that banks in the US have acknowledged being threatened by Fintech companies. However, while majority of the bankers privately acknowledge the seriousness of the threat from Fintech companies, only 14 mainly large banks did mention the threat from Fintech in their annual reports. These banks that formally expressed their disquiet about Fintech companies, Bunea et al (2016) noted, seem to be better prepared to weather it out.

Similarly, Feher and Varga (2017) conducted a study on the challenges Faced by customers when transacting with Hungarian banks, they found that the major challenge for Hungarian banks is how to offer a generic service that can meet the needs of up to 20-30 different customer segments they have. While the researchers appreciate that the

sampled banks differ in strategies, they inferred that bank with generic strategy is more likely to be dominated by Fintech companies with the application of digital solution.

On whether Fintech is a disruption or a new ecosystem in Australia, Oshodin et al (2017) found that Australian banks, in realisation of the threats pose by Fintech companies, are developing steps to ensure that proper knowledge about Fintech is obtained from external sources via customer engagement, crowdsourcing and channelling of inbound knowledge. Equally, the banks have initiated ways to gain ideas from their personnel on how to contain the rapid transformation that is linked with Fintech companies.

Larsson (2018) carried out a study to determine the most important challenge pose by Fintech to the Swedish banks in terms of securing customer loyalty through the use of digital channels. The result revealed convenience as the most important challenge for a number of reasons. Some of the respondents viewed the website as substandard, which impliedly suggests customer access problem. Others perceived information asymmetric as the main reason for conflict between the banks and the customer. Some others perceived that the Swedish bank regulation and legal system have placed the incumbent banks at disadvantage relative to the Fintech companies in terms of customer relation. All these, led the customers feel obstructed in their digitalisation endeavours by incumbent banks in a way the Fintech companies are not.

In an investigation into how participants in the financial service industry perceive the effect of digital disruption and strategies adopted by incumbents (banks inclusive) in the face of likely threats from Fintech, Zalan and Toufaily (2017) found that Fintech innovations in emerging markets are likely to be disruptive in some segments of the industry such as small and medium enterprises (SMEs) and some financial products such as wealth management and advisory. This finding further confirms that Fintech disruption is not only confined to the developed world.

Realising that the strengths of Fintech companies lie on technological competence and innovative skills, banks have been responding in a number of ways to Fintech threats. One of such approaches, as noted by Webster and Pizzala (2015), is the setting up of innovation labs and research and development units. These labs, according to Oshodin et al (2017), are used by banks to develop and test technology and solution such as blockchain and also foster innovation through investment or partnership with other players in the ecosystem. Many banks across the world have established innovation labs. For example, the Deutsche Bank has established the DB Global Technology in Silicon Valley in collaboration with the University of North Carolina (Sposito, 2013). Similarly, the CapitalOne has set up three innovation labs in New York, Washington D.C. and San Francisco in the USA (Brandel, 2013).

As access to new technology is what is driving Fintech formation and development (Haddad and Hornuf, 2016), banks are investing heavily on digitalisation to meet up with the ever-increasing banking demands and experience of their customers. As a result, many customers can now use their smartphones or tablets to carry out all their banking transactions without setting a foot in a physical branch. Digitalisation can be limited to products and services. For example, DBS bank of Singapore has introduced a full straight through process (STP) for approving personal loans for existing customers while in Australia, over 40% of Westpac's credit cards are online originated and sold. Alternatively, instead of subjecting the entire organisation to the challenging process of digital transformation, some bank set up a digital bank separate from the main bank. For example, in the USA, Customers Bank established the Bank Mobile which is an online

platform capable of P2P mobile payments, mobile photo bill pays, and fee-free overdraft protection, among others. Similarly, in India, DBS bank has Digibank with notable features of mobile payments, e- Wallets, mobile investments, among others.

Venture capital funds were also set up by banks to curtail the threats from Fintech companies. In Japan, for example, Sumitomo Mitsui Asset Management, a member of Sumitomo Mitsui Financial Group has raised over JPY 70 billion yen and established Global AI Fund to invest in Fintech companies developing artificial intelligence (AI) technology for financial applications across the world (Kodama, 2016). Similarly, Kodama (2016) noted that Mizuho Securities, a member of Mizuho Financial Group, has, plan to raise JPY 2 billion and put up into Singapore- based fund working to find promising Fintech ventures in Asia.

Acquisition is another way bank respond to Fintech threats. For example, in the United States, according to Fintech Futures (2018), the year 2017 has recorded more acquisition of Fintech by banks than any other year in the United States. A total of six acquisitions were made with JPMorgan, BNP Paribas, Credit Suisse and TD Bank each making their first purchase of the period 2013–2018 in 2017. While acquisition is an option, many banks opt for collaboration and cooperation with Fintech because they realised that they have complementary strengths with Fintech. While Fintech excels in technology and innovation, banks have customer base and infrastructure to build technology upon. For example, the provision of application programme interface (API) by banks allows third parties to access the account information of customers and build applications and services around the bank. This cooperative effort of the bank has resulted in the emergence of what is called 'Open Banking' in the UK (see Manthorpe, 2017).

3 Theoretical frameworks

The emergence and growth of Fintech companies have fundamentally rewritten the competitive atmosphere in the financial industry especially as it relates to the banking industry. The competition in the banking industry is so extraordinary that banks are doing everything possible to edge out the Fintech companies in their drive to meet the changing needs of their customers. However, in a hypercompetitive environment it will be very difficult, if not impossible, for organisations to achieve their sustained competitive advantage. Instead, organisations often resort to a series of temporary advantages (D'Aveni, 1994) which require distinct organisational competences and resources to develop. Thus, for an organisation to succeed in a hypercompetitive environment, it is suggested that such organisation must have the ability to sense and response readily to changes within the environment it operates (Zaheer and Zaheer, 1997).

Sensing entails the ability of an organisation to obtain enough knowledge about forces of environmental changes such as competitor's actions, changes in consumer's preference and technological advancements, and how this knowledge might influence decisions within the organisation (Roberts and Grover, 2012). According to Kiesler and Sproull (1982), sensing is a mental process that enables faster observation and development of meaning when challenged with a rapidly changing environment. The more appropriate the mental process, the more suitable the response mechanism will be (Kiesler and Sproull, 1982),

Responding, on the other hand, refers to an organisation's ability and desire to take action towards environmental change (Roberts and Grover, 2012). An organisation can respond to a change in the environment in a complex move, simple move or no move (Ferrer et al, 1999). Complex move is a type of response in which an organisation embarks on a new venture such as launching a new product or service, investing in a new customer segment, or adding a new channel of distribution. A move is simple where an organisation makes an amendment to existing venture such as change in price and change in the features of an existing product. The third option, which is no move, entails doing nothing. This can only be considered a response as long as the nonresponse is deliberate and not merely a failure to sense a change.

There are several other theories such as alertness and responsiveness (Zaheer and Zaheer, 1997), technological opportunism (Srinivasan et al, 2002), and co-opetition (Bradenburger and Nalebuff, 1996). These theories underpin the argument that organisation's understanding of its changing environment is a necessary condition for the action it might take. However, this study is guided by the theory of sensing and responding, as discussed above, for a number of reasons. First, changes in technology bring about competition and destroy monopoly by rendering products and services obsolete and creating new industries (Day and Schoemaker, 2000). This is consistent with the changes brought about by the Fintech revolution in the banking industry. Banking products and services are redesigned, entry barriers broken and customer's loyalty influenced. All these have put pressure on banks and banks are appropriately responding. Second, technologies might change rapidly making it difficult for go-it-alone firms that rely on in-house technology to succeed (Pisano, 1990). Currently, the changes in technology are so rapid that banks are finding it difficult to match the technological feat of the Fintech companies (Navaretti et al, 2017). As a result, banks, as evidenced by the review above, are now responding by cooperating and collaborating with the Fintech companies.

4 Methodology

The emphasis in this study is on the use of qualitative research method because it is based on the perception of stakeholders on how Fintech impact on ICT investment decisions of Nigerian banks. Similarly, as the finding of the study may not be generalised across all countries due to the fact that each country has its own characteristics which may differ from the other, the emphasis on qualitative method whose underpinning principle is non-generalisation of findings seems appropriate. In the same vein, since the data collected are non-numerical, the choice of qualitative method is appropriate (Saunder et al, 2012).

A purposive sampling was used to select seven respondents in seven different banks. The choice of purposive sampling, being most common type of non-probability sampling (Guest et al, 2006), is seem appropriate because it enables the researcher to strategically select the most relevant respondents from the population (Bryman and Bell, 2011). Since the banks selected are arguably the top most technologically comprehensive banks in Nigeria with highly knowledgeable ICT experts, the choice of purposive sampling is appropriate. Similarly, in order to be satisfied that the selected respondents have the appropriate knowledge of the Fintech operations, effort was made to get assurance, based on the input provided that there are reasonable grounds to support the view that the experts have the requisite knowledge.

Given the nature of Nigerian banks, the study employed an in-depth interview to collect data from the respondents. This technique seems appropriate given the study's desire to ask open-ended questions from few actors in the industry (Guion et al, 2011). Care was taken to ensure that the questions were unambiguous and understood by the respondents. The interview was semi- structured with a topic guide organised around three categories, namely. awareness of Fintech companies, how banks are perceiving Fintechs in the light of their ICT investment decisions and how are banks are coping with Fintechs

The topic was organised in such a way that it allowed the collection of data with high degree of flexibility by not only accommodating the researcher's interests but also the interests of the respondents and any other themes that crop up during the interview. Thus, while some questions were asked across all respondents, some were customised according to the interview situation and the knowledge of the respondents. The interview guide was discussed with the respondents prior to the interview. This is very important as it enabled the researcher to explain the purpose of the study, how the interview is going to be conducted, and how the information collected would be used and stored. The researcher also highlighted that the respondents were at liberty not to answer any of the questions. All of these, as noted by Bryman and Bell (2011), strengthen the reliability of the interview. Not only that, as noted by Rabionet (2011), this process has built a good relationship between the researcher and the respondents and created an atmosphere where the respondents were encouraged to provide the right information.

Invitations for face-to-face interview were sent to the respondents via their telephone and email addresses and all of them have accepted. While some of the interviews took more than 40 minutes, on average most of the interviews took 35 minutes. While clear differences in answers to the same were recorded, there were also instances where answers from the same question from some respondents support that of others. This answer pattern is considered useful to the study because comparing the diverse views of the respondents, which Bryman and Bell (2011) referred to as triangulation, enabled the researcher to enhance the quality of the study. Finally, the interviews were later transcribed without the use of any software and the identities of all the respondents are kept anonymous.

5 Interview findings

The respondents displayed great awareness of the Fintech phenomenon. They have significant knowledge of the operations and number of Fintech companies in Nigeria. Most of them were able to mention the names of most of the major Fintech companies in Nigeria including Interswitch, Paystack, Paga, Aella Credit and Flutterwave. In the same vein, the respondents have also demonstrated a great deal of understanding of all traditional banking services offered by Fintech companies with all of them agreeing that the Fintech industry in Nigeria is growing. The growth of the Nigerian Fintech industry, according to one of the respondents, has taken everybody by surprise. In his words:

> "Considering the size of the Nigerian financial market vis-à-vis that of the Western world, the growth of the Fintech industry in Nigeria has beaten the imagination of everybody. Industry analysts wonder how Nigerian banks can cope with the situation in few years to come"

While some of the respondents were of the view that the development of the Nigerian Fintech industry is at phase with what is obtained in the rest of the world, others believed that this is not so. One of the respondents who believed that the Fintech industry in Nigeria is moving at phase with the rest of the world explained as thus:

> "Technology has made the world a global village and since these companies are internet- based companies with no physical presence, it does not matter in which country they are established"

Corroborating the statement above, another respondent, citing PayPal and Amazon as example, argued that:

> "The supposed country of a Fintech is where it is established but its actual country is where there is internet".

Although these arguments sound valid, those respondents who hold the view that the Fintech industry in Nigeria is not moving at phase with other parts of the world, particularly Europe, sited factors such as lack of stable power supply and poor internet connectivity as the main reasons. In this regard, a respondent state as follow:

> "It is not enough for us to conclude that the development of Fintech in Nigeria is moving at phase with what is obtained in the rest of the world, especially the western world, when the two ingredients of steady power supply and internet connectivity essential for effective functioning of Fintech Company are grossly inadequate in Nigeria"

In addition to the problems of power and internet connectivity, another respondent argued that Fintech companies in Nigeria mainly concentrate on payment segment of the traditional banking function with little or no presence in both the finance and asset management segments. In his words:

> "In order to conclude that that Fintech companies in Nigeria are moving at phase with the rest of the world they must be actively engaged in all the traditional banking functions that Fintechs are involved. However, this is not the case at the movement as majority of the Fintech companies in Nigeria only operate in the payment function"

Responding to how banks perceived Fintechs in Nigeria, the respondents were of the view that Fintech companies are both threat and opportunity to Nigerian banks. As threat, t was generally agreed by all the respondents that Fintech is a threat to banks in Nigeria and in few years' time the Fintech industry will be well rooted in Nigeria. One of the reasons advanced by a respondent to support this perception is the massive growth of mobile phone users across all age brackets.

> "Most Nigerians have access to mobile phones and many of them use their phones to transact via the mobile banking windows provided by their banks. However, the increase in the number of Fintechs in Nigeria means that Nigerians will be provided with many payment options that are faster and more user-friendly than the ones provided by the incumbent banks in few years to come"

Some respondents viewed the threat from the perspective of the increasing population of Nigerian youth. According to these respondents, Nigerian youth are very enthusiastic of the Fintech phenomenon for not only providing faster services but for its ability of providing numerous financial products in one place. A respondent put thus:

> "It is a common knowledge that Fintech is globally acceptable to the youth. Thus, with the population of youth in Nigeria nearing half the population of the country, there is every reason to believe that banks are not comfortable with the increasing number of Fintech companies in Nigeria"

Similarly, the respondents see Fintech as a threat from the perspective of regulations. Banks are subject to more regulations than Fintechs in the provision of financial services, which makes it difficult for them to change their business models as any attempt to do so might lead to sanctions from the regulators. The respondents were of the view that regulations moderating the activities of Fintech in Nigeria are grossly inadequate relative to that of banks and for this reason one of the respondents' states thus:

> "Fintechs are free from tough regulation and legacy technology systems while banks are not. As a result, banks in Nigeria are likely to remain at disadvantage relative to Fintechs for years to come"

Although the respondents were unanimous on Fintechs being threat to banks in Nigeria, they were however divided when asked in what way or ways the threats impact on the current investment decisions of banks in Nigeria. Some of the respondents viewed that the threat is irrelevant on banks' current investment decisions. Supporting this argument, one of the respondent's comments as thus:

> "Majority of bank customers in Nigeria are either unaware or skeptical of the Fintech phenomenon". Despite Fintechs' speed of service delivery and ease of accessibility, Nigerian banks are still finding it difficult to cope with queues in their banking halls. Customers prepare to engage directly with their bank as the physical presence of the banks gives them certain level of confidence".

Corroborating this argument, another respondent argued that:

> "Fintech is not known to vast majority of Nigerian bank customers and the banks are aware of that. As such, banks' ICT investment decisions cannot be entirely linked to the growth of Fintech in Nigeria"

Furthermore, the respondents argued that the current ICT investment decisions of banks are not propelled by the challenges pose by Fintech but instead by the competition from within. One of them argued thus:

> "Fundamentally, all banks in Nigeria are investing heavily on ICT. This is particularly the case with some of the first generation banks whose customers are being wooed by the more aggressive new generation banks. For now, the investment decisions of banks are defined by the desire to provide products and services for competitive advantage over their colleagues".

Concurring with the view above, yet another respondent said: "ICT investment in banks is not a desire but a necessity. When asked to expatiate on why he thinks it is a necessity not a proactive approach against Fintech threats, he answered:

> "It is apparent that the development in the Nigerian Fintech industry is a threat to banks in the country but one thing that is clear is that technology is the main driver of banking service delivery today. Unlike banks of yesterday that are physically and operationally distinct, technology has made today's banks operationally inseparable such that any bank that does not invest in technology will be out of market".

On the other hand, those respondents who viewed that there is a positive relationship between development of Fintech and banks' ICT investment decisions in Nigeria see

investment in ICT by banks as all-encompassing. The purpose of ICT investment, according to them, is not limited to intra-bank competition but also to competition from outside the banking industry as rightly put by one of them.

> "Nigerian banks are global and so their ICT investments. It is, therefore, too simplistic to suggest that their ICT investment decisions is not influenced by Fintechs' threats"

These respondents also argued that since the adoption of technology in banks in Nigeria, Nigerian banks have always been competitive in the provision of electronic banking products and services of international standard. Banks in Nigeria, according to the respondents, maintain ICT department that monitors developments in technology and how such developments are affecting the delivery of banking services and products.

As opportunity, the respondents explained that the growth of Fintech in Nigeria is crucial as banks are looking for ways of deploying Fintech across their organisations. This, the respondents believed, is based on banks' focus on the application of Fintech especially in the payments segment of the financial market. In this regard, a respondent asserted that:

> "Any bank that integrates Fintech into its business at this early stage of the Fintech industry in Nigeria is likely to get a competitive advantage over its colleagues"

Similarly, the respondents saw the growth of Fintechs in Nigeria as good opportunity for banks to tap, through collaborations, the innovative abilities of Fintechs in solving complex customers' problems. This collaboration, according to a respondent, is a win-win game:

> "Although Fintechs have rich innovative capacity to solve complex customer problems, they however lack the needed reputation and customer trust which traditional banks have. Thus, with collaboration the two can strengthen each other and work as partners"

Furthermore, all the respondents agreed that most of the banks in Nigeria might be more than willing to acquire established technology from outside than taking the risk of developing them internally. This might not be unconnected with the fact that technology is evolving overtime as rightly put by one of the respondents:

> "Change in technology overtime is putting serious pressure on the resources of banks and this has made banks in many parts of the world to engage in acquiring than developing technology themselves. Therefore, the growth of Fintech market in Nigeria is surely a welcome development for Nigerian banks"

On a general note, all the respondents were of the view that Fintech is an opportunity to banks in Nigeria and if well grabbed at this early stage of its development, Fintech will be a complement rather than a competitor in the provision of retail banking products and services.

On banks' response to the development of Fintech in Nigeria, the respondents affirmed that banks in Nigeria are making attempts to develop their Fintech products and services in-house. One of the successes in this regard is the use of mobile phone to provide banking services to millions of Nigerians who own mobile phone. This service, as noted by the respondents, does not require the use of the internet to perform basis banking transactions. One of the respondents' states thus.

> "The use of mobile phone by banks to provide banking services has attracted millions of Nigerians who do not have access to the internet. These Nigerians, who were hitherto excluded from the financial sector, can now transfer money, purchase airtime and check their account balances easily by simply dialing a code applicable to their banks."

Similarly, the respondents explained that banks are collaborating with Fintech in many ways in Nigeria. First, banks grant permission to Fintech to use their application programming interface (API). This, according to the respondents, is to raise more revenue for the banks, expand their reach and hasten innovation. Second, banks engage in partnership with Fintechs. Such partnership, according to the respondents, is a 'win-win' alliance as one respondent explained.

> "In order to subdue the threats coming from Fintech companies, Nigerian banks are now partnering with Fintech companies. This is a welcome development as both the banks and the Fintechs' stand to benefit from such alliance. For example, while the banks make funds available for the Fintechs, the Fintechs help the banks to be rich in technical know-how"

When asked whether banks are acquiring Fintech companies in Nigeria, the respondents were negative in their response. However, they were optimism that acquisition is likely in the next few years. One of the respondents said as thus.

> "There is no evidence of banks acquiring Fintech in Nigeria now. But with over sixty or more Fintech companies actively participating in the market, there is every possibility that in the next five years some of these Fintechs would be real threats to banks and would probably be acquired by banks."

6. Discussion of finding

6.1 Fintech awareness

This study revealed that Nigerian banks are fully aware of the Fintech phenomenon and in particular are putting in place measure, including the maintenance of ICT department, to manage the developments in the Fintech industry. This is consistent with the concerns expressed by banks and banks chief executive officers (CEOs) across the globe. For example, Vij (2016) reported that James Dimon, the CEO of JP Morgan, was once quoted to have said:

> "When I go to Silicon Valley, they all want to eat our lunch, every single one of them is going to try and a lot of them will succeed".

Similarly, the views expressed by the respondents that the Fintech industry in Nigeria is rapidly growing tallies with the KPMG (2016) study on Fintech in Nigeria which revealed that in just two years (i.e., between 2014 and 2015) numerous Fintech companies, with a total investment of over $200 million, were registered for business in Nigeria. This giant stride, KPMG (2016) further noted, put Nigeria, alongside Egypt and South Africa, as the three top recipients of Fintech investments in Africa.

On whether Nigeria's Fintech industry is moving at phase with the rest of the world, this study revealed that the respondents were divided. On one hand, some respondents believe that the Fintech industry in Nigeria is at phase with the rest of the world which goes contrary to the findings of many studies including KPMG (2016) and PwC (2017a).

These studies, while confirming the emergence and potentials of Fintech in Nigeria, concluded that the growth wave of the Fintech industry in Nigeria is far behind its global counterparts. On the other hand, those respondents who argued that the Nigeria's Fintech industry is lagging behind hinged their argument on factors such as poor internet connectivity and unstable power supply, among others. These infrastructural deficits are major impediments to the use of Fintech services as Demirguc-Kunt et al (2018) write:

> "Mobile phones and the Internet can drive financial inclusion only if they are underpinned by the necessary infrastructure. Physical infrastructure – such as reliable electricity and mobile networks – is key. People will be less inclined to use digital payments if network outages or other technical problems undermine their dependability."

Similarly, this group of respondents argued that Fintech companies in Nigeria are mainly present at the payment side of the traditional banking functions. This view confirms the finding that retail banking and payments are the two most likely sectors to be disrupted by Fintech in Nigeria (PwC, 2017b) which, in turn, might not be unconnected with Nigeria being one of the countries that home nearly half of the world's unbanked population (Demirguc-Kunt et al, 2018).

6.2 Banks' perception of fintech

Consistent with Feher and Varga (2017), Larsson (2018) and Zalan and Toufaily (2017), this study found that Fintech is a threat to banks in Nigeria. One of the reasons given by the respondents to support this perception is the growth in the use of mobile phone in Nigeria. Recent statistic by the NCC (2017) revealed that the number of active mobile phones in Nigeria has reached over 144 million as at December 2017. This has destructive effect on the incumbent banks as evidences have shown that countries with more mobile lines have witness more Fintech start-up formation (Haddad and Hornuf, 2016).

The respondents also viewed Fintech as a threat from the perspective of the growing population of youth in Nigeria. More than half of Nigeria's estimated 182 populations are youth (Mbachu and Alake, 2016). As Fintechs are now becoming more acceptable to the youth, especially among the millennials (Baker et al, 2017), there is the likelihood that banks younger customers might switch to Fintechs sooner or later. Already research has shown that the use of Fintech products and services is higher among youth customers of age between 25–34-year-old (see EY, 2017). This age group of youth, EY (2017) noted, is not only well-informed in the use of modern technology but is also at age where financial services are greatly required. In some cases, they only have minimal relationship with incumbent banks and willing to opt for non-traditional services providers (EY, 2017).

The study also revealed that Fintech is a threat to banks because of legacy technology systems and regulatory restrictions. The respondents were of the view that because banks are constrained by tough regulations and legacy technology systems, it will be difficult for them to match the innovative developments of Fintechs that are free from such constrains. Legacy technology systems cannot be modified to meet changing business requirements and their failure can have a devastating impact on the business (Brodie and Stonebraker, 1995). As a result, most banks are put under enormous pressure and are considering collaboration with Fintech as a way forward.

On whether Fintech is a threat to the current ICT investment decisions of banks in Nigeria, the study found conflicting results. On one hand, some of the respondents argued that the threat is irrelevant to the current ICT investments of banks in Nigeria citing customers' unawareness or scepticism of the Fintech phenomenon. For example, in a study conducted by Grazel (2017), it was found that incumbent banks maintained a trust rating of 37% against 24% of Fintech companies among bank customers. Specifically, Grazel (2017) found that banks were rated higher than Fintechs on fraud protection (45% to 15%), quality of service (37% to 24%) and transparency (36% to 25%). This explains why bank customers in Nigeria are engaging directly with their bank as the physical presence of the banks gives them certain level of confidence. As a result, Nigerian banks are still finding it difficult to cope with long queues in their banking halls.

Similarly, this study revealed that majority of Nigerian bank customers are unaware of Fintech and this lack of awareness is known to banks. As such, banks' ICT investment decisions cannot be entirely linked to the growth of Fintech in Nigeria. This finding contradicts the current developments in the Nigerian banking sector. For example, in recognition of the importance of Fintech, majority of the banks in Nigeria have introduced mobile payment technology that allows the use of mobile phone to make payment and transfer of fund. Prominent of these payment systems include: Guaranty Trust Bank's GTPay, First Bank's FirstPayLink, Zenith Bank's GlobalPay, and United Bank for Africa's U-Collect, among other. It can, therefore, be argued that the provision of this and other technological products and services by banks is a response toward satisfying the yearnings of their customers.

The study also revealed that ICT investment decisions of banks in Nigeria is propelled by competition from within and not by the challenges posed by Fintech. This is consistent with Stamoulis (2000) assertion that ICT investments in banks in Nigeria started when the deregulation of the Nigerian banking sector in 1986 led to fierce interbank completion amongst the increased number of banks. Since then, investments in ICT became the norms in banks as Oluwatolani et al. (2011, p.65) noted as follows:

> "…. deregulation brought far-reaching transformation through computerization and improved bank service delivery. Competition with new products became keen within the system while customer sophistication posed a challenge for them, hence the reengineering of processing techniques of business activities encourage the automation of financial services especially among new generation of commercial and merchant bank"

It is also found in this study that technology is a requirement but a necessity in banks today. This is consistent with Lumb et al (2016) assertion that technology has now become a fundamental element of business plan in financial services firms. Investments in ICT have offered banks unique opportunity to drive growth and profitability. Moreover, banking involves a whole lot of things including payment, lending and asset management, among others. In order to perform these functions effectively, banks must adjust to technological changes (Dalis et al, 2017) by wisely investing in ICT.

Furthermore, the study also revealed a positive relationship between development of Fintech and banks' ICT investment decisions in Nigeria. This was based on the premise that ICT investments in banks is not only for competitive advantages but also for competition from outside, which might not be unconnected with the developments in the financial services industry including the growth of the Fintech industry. Over the last few decades developments in Fintech has been disruptive to banks (Feher and Varga, 2017) and this has significantly affected the ICT investments in banks. Currently, Banks in

Nigeria, as discussed above, are investing in the formation of one Fintech or the other. This concurs with the argument that banks' investments in ICT are global. Similarly, the establishment of ICT department to monitor developments in technology is arguably a justification that banks' ICT investments do not ignore the Fintech market.

As an opportunity, this study reveals that Fintech impacts positively on ICT investments decisions of banks in Nigeria in many ways. Firstly, there is the desire by banks to integrate Fintech into all aspects of their businesses and this is evidenced in the effort's banks are making to actualise such desire. Majority of banks in Nigeria have set up their own Fintech. For example, the use of mobile phone to provide banking services for phone owners who do not have access to the internet, the launch of digital banking platforms such as Skye Bank's 'Sky experience', Sterling Bank's 'Temenos'T24', and Zenith Bank's 'Fusion banking' in response to Central Bank of Nigeria's year 2020 e-payment vision, and the provision of operating platform to most of the Fintech companies are some of the efforts so far made to integrate Fintech into their businesses.

Secondly, the growth of the Fintech industry has provided Nigerian banks the collaborative opportunity to tap the innovative abilities of Fintechs in solving complex customers' problems. Banks have reputation and customers' trust but lack innovative capacity for solving complex customers' problem which Fintechs have. Thus, Banks collaborate with Fintech in many ways including the provision of Application Programme Interface (API). With API, banks can find

Fintech partners and as a result offer new banking products and services. On the other hand, Fintechs benefit from working with the legacy systems of banks instead of developing new one. In recent years, this collaborative effort has resulted in the emergence of 'Open Banking' (Manthorpe, 2017) which requires incumbent banks investing heavily on new technology which, in turn, impact on their strategic investment decisions. Currently, little is known of collaboration between banks and Fintechs in Nigeria. However, efforts are being made by banking and financial experts in improving the banking experience in the country and one of such attempts was the unveiling of the 'Open Banking Nigeria Initiative' geared toward expansion of innovation within the Nigerian financial market.

Thirdly, Nigerian banks are willing to invest in acquiring Fintech than to develop them internally. This might not be unconnected with the fact that technology is rapidly changing and this change is putting serious pressure on the resources of banks. As a result, banks are making huge capital investments by acquiring Fintech in order to avoid internal costs of development. Numerous banks, according to Kerenyi et al (2018), have acquired Fintech companies and incorporated them into their operations. Notable among these acquisitions include BBVA acquisition of US Fintech venture Simple in 2014, BBVA acquisition of Finnish Fintech venture Holvi in 2016, and J.P Morgan and Chase acquisition of the USA Fintech WePay in 2017, among others.

6.3 Bank response to fintech

Banks in Nigeria, this study reveals, respond to Fintech developments in Nigeria either by developing their own Fintech internally or collaborating with Fintechs. First, successful attempts were made by banks, in the last few years, in developing their own Fintech in-house. As discussed above, several banks in Nigeria have developed mobile payment systems that provide mobile banking to millions of Nigerians that do not have access to internet. For example, Guaranty Trust Bank introduced 'GTPay', First Bank has

'FirstPayLink', Zenith Bank launched 'GlobalPay' while United Bank for Africa introduced 'U-Collect'. Mobile payment system is appealing to phone owners and as a result of this many banks across the globe have launched it. In Nigeria, almost all the banks have introduced one mobile payment system or the other. Second, it is also the finding of the study that banks collaborate with Fintechs in Nigeria. Banks provide Fintechs platforms to operate. For example, the United Bank for Africa provide savings platform for 'PiggyBank.ng', a Fintech company that helps one to save money. This company makes one save by automating the savings process such that an amount is deducted directly from one's account. It also allowed one to withdraw from his or her account free on certain dates and be penalised for withdrawals outside these dates.

Similarly, Sterling Bank provides platform to 'Social Lender', a lending solution based on the social reputation of a social media user. The company is designed to provide instant fund for people with restricted access to formal credit by borrowing from banks according to their social reputation.

Banks are also found to be partnering with Fintechs in this study. This finding concurred with the developments in the Nigerian financial sector as reported by KPMG (2016). For example, KPMG (2016) reported that the First Bank of Nigeria has collaborated with a number of local Fintech companies in designing and developing some of the current solutions used in the bank. Similarly, Access Bank collaborated with Fintech companies and launched 'PayWihCapture', an application that enables the transfer from any bank card.

On the contrary, this study found no evidence of banks acquiring Fintech companies in Nigeria. However, there were indications that in a few years' time acquisition might be likely. Fintech is a recent phenomenon in Nigeria and is at its early stage of development. Its presence is mainly felt on the payment segment of the financial market. However, considering the industry's rate of growth, Fintech is likely to be in all the three financial market segments of payment, lending and asset management in no distance future. At that time, they might be real threat to banks and would be possibly acquired by the banks. Second, acquisition might not be the best option in the light of development in the financial market.

7 Conclusions

The discussion of the findings in section 6 above has led to the emergence of several conclusions in this study. First and foremost, this study concludes that Nigerian banks are well aware of the Fintech phenomenon and in particular are putting in place measures to manage its development. Similarly, despite the conflicting findings regarding the phase at which the Fintech industry in Nigeria is moving compared to the rest of the world, it is the conclusion of this study that Fintechs have made their marks in the Nigerian financial industry and are growing at an extraordinary speed. Furthermore, the study concludes that Fintech is a threat to banks in Nigeria and in few years' time the threat is likely to be more visible when they would have been actively engaging in all banking segments. In addition, the study concludes that the ICT investment decisions of banks are a function of both inter-bank competitions for competitive advantage and the threat from the emergence and growth of Fintech companies. Moreover, the study determines Fintech, as an opportunity, is positively impacting on the ICT investments decisions of banks. Nigerian banks are global actors; as such their ICT investments decisions are all

encompassing. Finally, the study concludes that banks respond to Fintech development in Nigeria mainly by developing their own Fintech internally or collaborating with Fintech companies.

8. Further research

While the discussion of the findings in section 6 and the resultant conclusions in section 7 have met the objectives of the, they nevertheless provide some evidence calling for further research. First, in response to the impressive growth of the Nigerian Fintech industry as evidenced in this study, it is recommended that further research be undertaken to examine the possible impact of the ongoing Nigerian financial sector reforms on the future of Fintech in Nigeria. Second, the present study found that Fintech, both as a threat and as an opportunity, impacts on the ICT investments decisions of banks in Nigeria. While this has met the objective of this study, a further research may be needed to determine the effectiveness of such ICT investments decisions in achieving the yearnings of their loyal customers. Third, further research is recommended in the area of banks' respond to the emergence and growth of Fintech in Nigeria. The study found that banks in Nigeria respond to Fintech development by either developing their own Fintech internally or collaborating with Fintech companies. While this finding has met the purpose of this study, further research is recommended to determine the appropriateness of such response in addressing the challenges and opportunities provided by Fintech.

References

Accenture (2015) *The Rise of Robo-Advice: Changing the Concept of Wealth Management* [online] https://www.accenture.com/_acnmedia/PDF-2/Accenture-Wealth-Management-Rise-of-Robo-Advice.pdf (accessed 7 August 2018).

Accenture (2017) *Financial Providers: Transforming Distribution Models for the Evolving Consumer* [online] https://www.accenture.com (accessed 20 July 2018).

Augustine, A. (2015) *Fintech: Changing the Way We Save and Invest, US Economic Watc* [online]. https://www.bbvaresearch.com/wpcontent/uploads/2015/05/150521_US_EW_Fintech1.pdf (accessed on August 7, 2018).

Baker, H.K., Filbeck, G. and Ricciardi, V. (Eds.): (2017) *Financial Behavior: Players, Services, Products, and Markets*, Oxford University Press, Oxford.

Brandel, M. (2013) *How Enterprise IT Gets Creative* [online] https://www.computerworld.com/article/2497099/it-management/how-enterprise-it- getscreative.html (accessed 20 August 2018).

Brandenburger, A.M. and Nalebuff, B. J. (1996) *Co-opetition*, 1st ed., Doubleday, New York.

Brodie, M.L. and Stonebraker, M. (1995) *Migrating Legacy Systems: Gateways, Interfaces & The Incremental Approach*, Morgan Kaufmann Publishers Inc, San Francisco.

Bryman, B. and Bell, E. (2011) *Business Research Methods*, 3rd ed., Oxford University Press, Oxford.

Bunea, S., Kogan, B. and Stolin, D. (2016) 'Banks versus FinTech: at last, it's official', *Journal of Financial Transformation*, Vol. 44, No. 3, pp.122–131.

Chishti, S. and Barberis, J. (2016) *The FinTech Book: The Financial Technology Handbook for Investors*, Entrepreneurs and Visionaries. Chichester, Wiley, West Sussex.

Conrad, R. (2012) 'Crowdfunding', *Bee Culture*, Vol. 140, No. 11, pp.65–66.

D'Aveni, R.A. and Gunther, R. (2007) 'Hypercompetition. Managing the dynamics of strategic maneuvering', in *Das Summa Summarum des Management*, pp. 3–93, Gabler.

Dalis, D.T., Obumneke, E. and Progress, A. (2017) 'Effect of ICT Adoption on competitive performance of banks in an emerging economy: the Nigerian experience', *Journal of Humanities and Social Science*, Vol. 22, No. 8, pp.81–89.

Day, G.S. and Schoemaker, P. J.H. (2000) 'Avoiding the pitfalls of emerging technologies', *California Management Review*, Vol. 42, No. 2, pp.8–33.

Demirguç-Kunt, A., Klapper, L., Singer, D., Ansar, S. and Hess, J. (2017) *Measuring Financial Inclusion and the Fintech Revolution*, The Global Findex Database, World Bank Group [online] http://siteresources.worldbank.org/DEC/Resources/FinInclusionBrochure FINALWEB.pdf (accessed 27 October 2017)

Dickerson, J., Masood, S. and Skan, J. (2015) *The Future of Fintech and Banking: Digitally Disrupted or Reimagined?* [online] https://www.planet-fintech.com/downloads/The-Future-of-Fintech-and-Banking-Digitally-Disrupted-or-Reimagined-Accenture-mars-2015_t18791.html (accessed 3 September 2018).

Dorfleitner, G., Hornuf, L., Schmitt, M. and Weber, M. (2017) *FinTech in Germany*, Cham, Switzerland.

ESA (2015) *Joint Committee Discussion Paper on Automation in Financial Advice* [online] https://esas-joint committee.europa.eu/Publications/Discussion%20Paper/20151204_JC_2015_080_discussion _paper_on_Automation_in_Financial_Advice.pdf (accessed 15 August 2018).

EY (2017) *FinTech Adoption Index 2017 The Rapid Emergence of FinTech* [online] https://www.ey.com/Publication/vwLUAssets/ey-fintech-adoption-index-2017/$FILE/ey-fintech-adoption-index-2017.pdf (accessed 25 July 2018).

Fehér, P. and Varga, K., (2017) Using design thinking to identify banking digitization opportunities–snapshot of the Hungarian banking system. BLED'. in, *Proceedings of the 30th Bled eConference: Digital Transformation – From Connecting Things to Transforming Our Lives. Bled*, Slovenia: Bled, June 18–21, pp.151–168.

Ferrier, W.J., Smith, K.G. and Grimm, C.M. (1999) 'The role of competitive action in market share erosion and industry dethronement: a study of industry leaders and challengers', *Academy of Management Journal*, Vol. 42, No. 4, pp.372–388.

Grazel, J. (2017) *World Fintech Report 2017: The battle is about 'Trust' not 'Tech'* [online] https://business.linkedin.com/marketing-solutions/blog/marketing-for-financialservices/2016/world-fintech-report-2017--the-battle-is-about-trust-not-tech (accessed 16 November 2018).

Guest, G., Bunce, A. and Johnson, L. (2006) 'How many interviews are enough? An experiment with data saturation and variability', *Field Methods*, Vol. 18, pp.59–82

Guion, L.A., Diehl, D.C. and McDonald, D. (2011) *Conducting an In-Depth Interview. EDIS*, No. 8 [online] http://greenmedicine.ie/school/images/Library/Conducting%20An%20In%20Depth%20Inter view.pdf (accessed 24 September 2018).

Haddad, C. and Hornuf, L. (2019) The emergence of the global fintech market: economic and technological determinants', *Small Business Economics*, Vol. 53, No. 1, pp.81–105.

Kereny, A., Molnar, J. and Muller, J. (2018) 'Bank and Fintechs – healthy cooperation or dangerous liaisons?', *Economy and Finance*, Vol. 35, No. 1, pp.86–97

Kiesler, S. and Sproull, L. (1982) Managerial response to changing environments: perspectives on problem sensing from social cognition', *Administrative Science Quarterly*, Vol. 27, No. 4, pp.548–570.

Kodama, T. (2016) *Japan's Initiative for Fintech Innovation* [online] https://www.tillvaxtanalys.se/download/18.481c5d731591bb12a121513/1482235676210/Japans+initiative+for+fintech+innovation+final+version_NZK_TK+ML20161128.pdf (accessed 6 August 2018).

KPMG (2016) *FinTech in Nigeria Understanding the Value Proposition* [online] https://assets.kpmg.com/content/dam/kpmg/ng/pdf/ng-fintech-in-nigeria-understanding-thevalue- proposition.pdf (accessed 3 October 2018).

Kuyoro, E.K. and Olanrenwaju, T (2020) *Harnessing Nigeria's Fintech Potential*, McKinsey & Company [online] https://www.mckinsey.com/featured-insights/middle-eastand-africa/harnessing-nigerias-fintech-potential (accessed 12 January 2020).

Larsson, A. (2018) 'Responding to the FinTech challenge: a study of Swedish bank managers' perceptions of FinTech's effects on digitalization and customer e-loyalty', in *The Rise and Development of FinTech (Open Access)*, pp. 130–153, Routledge, London.

Liu, Y.Y., Nacher, J.C., Ochiai, T., Martino, M. and Altshuler, Y. (2014) 'Prospect theory for online financial trading', *PloS One*, Vol. 9, No. 10, p.e109458.

Lumb, R.; Macchi, M.; and Moreno, J.P (2016) *Bridging the Technology Gap in Financial Services Boardrooms* [online] https://www.accenture.com/t20160118T152822w/usen/_acnmedia/PDF-4/Accenture-Strategy-Financial-Services-Technology-Boardroom.pdf (accessed 18 September 2018).

Maese, V.A. (2014) 'Divining the regulatory future of illegitimate cryptocurrencies', *Wall Street Lawyer*, Vol. 18, No. 5, pp.7–10.

Manthorpe, R. (2017) *To Change How You Use Money, Open Banking Must Break Banks* [online] https://www.wired.co.uk/article/open-banking-cma-psd2-explained (accessed 16 September 2018).

Mbachu, D. and Alake, T. (2016) *Nigeria Population At 182 Million, With Widening Youth Bulge*, Bloomberg Businessweek [online] https://www.bloomberg.com/news/articles/2016- (accessed 21 November 2018).

Merritt, C. (2010) 'Mobile money transfer services: the next phase in the evolution in persontoperson payments', *Federal Reserve Bank of Atlanta, Retail Payments Risk Forum White Paper*, August

Navaretti, G.B., Calzolari, G., Mansilla-Fernandez, J.M. and Pozzolo, A.F. (2017) 'Fintech and banking. friends or foes? European economy', *Banks, Regulation, and the Real Sector*, Vol. 2, pp.9–39.

Nienaber, R. (2016) 'Banks need to think collaboration rather than competition', in Chishti, S. and Barberis, J. (Eds.): *The FinTech Book: The Financial Technology Handbook for Investors, Entrepreneurs and Visionaries*, pp.20–21, West Sussex: John Wiley & Sons.

Oluwatolani, O., Joshua, A. and Philip, A. (2011) 'The impact of information technology in nigeria's banking industry', *Journal of Computer Science and Engineering*, Vol. 7, No. 2, pp.63–67.

Oshodin, O., Molla, A., Karanasios, A. and Ong, C.E. (2017) 'Is FinTech a disruption or a new eco-system? an exploratory investigation of banks' response to FinTech in Australia', in, *Proceedings of Australasian Conference on Information Systems. Hobart*, Australia: Australasian, December Vol. 4, No. 6, pp.1–11.

Pisano, G.P. (1990) The R&D boundaries of the firm: an empirical analysis', *Administrative Science Quarterly*, Vol. 35, No. 1, pp.153–176.

PwC (2017a) *Nigeria FinTech Survey Report* [online] https://www.pwc.com/ng/en/pdf/nigeria-fintechreport 2017.pdf (accessed 2 November 2018).

PwC (2017b) *Disruption of Nigeria's Financial Service Sector by FinTechs is Underway* [online] https://www.pwc.com/ng/en/press-room/pwc-nigeria--disruption-of-nigerias-financialservice-sector-by-.html (accessed 18 November 2018).

Rabionet, S.E. (2011) 'How I learned to design and conduct semi-structured interviews: an ongoing and continuous journey', *Qualitative Report*, Vol. 16, No. 2, pp.563–566.

Roberts, N. and Grover, V. (2012) 'Leveraging information technology infrastructure to facilitate a firm's customer agility and competitive activity: An empirical investigation', *Journal of Management Information Systems*, Vol. 28, No. 4, pp.231–270.

Roubini, N. and Mihm, S. (2010) *Crisis Economics: A Crash Course in the Future of Finance*, The Penguin Press, London.

Saunders, M., Lewis, P. and Thornhill, A. (2012) *Research Methods for Business Students*, Pearson Education Ltd., Harlow.

Sposito, S. (2013) *Deep Within a Traditional Bank, Start-Up Culture Thrives* [online] https://www.americanbanker.com/news/deep-within-a-traditional-bank-start-up-culturethrives (accessed 3 September 2018)

Srinivasan, R. Lilien, G. L. and Rangaswamy, A. (2002) Technological opportunism and radical technology adoption: an application to e-business', *Journal of Marketing*, Vol. 66, No. 3, pp.47−60

Stamoulis, D. S. (2000) 'How banks fit in an internet commerce business activities model', *Journal of Internet Banking and Commerce*, Vol. 5, No. 1, pp.1–5.

Vij, A. (2016) *Fintech Revolution – The Silicon Valley Is Coming to Eat Our Lunch* [online] https://www.globalbankingandfinance.com/fintech-revolution-the-silicon-valley-is-comingto-eat-our-lunch/ (accessed 28 September 2018).

Vives, X. (2017) 'The impact of FinTech on banking', *European Economy*, No. 2, pp.97–105.

Webster, I. and Pizzala, J. (2015) *Fintech: are Banks Responding Appropriately?* [online] https://www.ey.com/Publication/vwLUAssets/EY-fintech-are-banks-respondingappropriately/$FILE/EY-fintech-are-banks-responding-appropriately.pdf (accessed 27 July 2018).

Wisniewski, M. (2016) *Fintechs Team Up to Become More Banklike, American Banker* [online] https://www.americanbanker.com/news/fintechs-team-up-to-become-more-banklike (accessed 22 July 2019).

Zaheer, A., and Zaheer, S. (xxxx) 'Catching the wave: alertness, responsiveness and market influence in global electronic networks', *Management Science*, Vol. 43, No. 11, pp.1493–1509.

Zalan, T. and Taufaily, E., (2017) 'The promise of fintech in emerging markets: not as disruptive', *Contemporary Economics*, Vol. 11, No. 4, pp.415-430.