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# TECHNOLOGY INNOVATIONS AND THE FINANCIAL SERVICES INDUSTRY

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***Abstract***

*Technology is re-defining the financial services industry. This article explores the future of the financial services industry in the context of new technologies. Technological innovations were reviewed and likely implications for the industry were highlighted. The article suggests that a symbiotic relationship among new and incumbent financial services providers will benefit the industry.*

## Introduction

Globally, the financial system has undergone transformation in the last couple of decades with the rise of the information age. Information Communication and Technology has been established as a defining factor for competitiveness and efficiency in today's financial market. ICT is increasingly harmonizing the extensive financial landscape into a single community of global financial system, by dismantling time and space barriers with global connectivity, thereby extending opportunities and creating greater value. With the benefit of financial system globalization, the indigenously owned conglomerate in Nigeria can attract investment across the Atlantic, loans are negotiated across boundaries, deals criss-cross various markets, returns are optimized, investors' value is maximized and global growth and development is facilitated. The impact of ICT on the financial world cannot be overemphasized.

The increasing quantum of investment in ICT by discerning financial institutions across the world is therefore not surprising and it is expected that the trajectory may be sustained though with better efficiencies. Top management, boards of financial institutions and regulators, notwithstanding, the gains still have doubts as to the efficiency of investment in ICT. Therefore, greater demand is made on ICT professionals to justify the returns on investment. Some have projected the argument that ICT has become a huge sinkhole. As case is made by ICT departments for frequent replacement due to rapid technology obsolescence, executives and regulators alike, struggle to make sense of it even as the capital nature of ICT investment is fast transforming into operational cost.

Effective governance and management of ICT investments and assets demand adequate understanding by managers and regulators of financial institutions. Insightful management of ICT innovation on business, process, products and services in the financial system therefore becomes imperative and the continuous study of emerging technology trends is essential for business that seeks relevance and value in the information economy.

This paper therefore examines some of the innovative technologies transforming financial services. A review of recent literature on impact of technology on financial system follows this introductory section. The third section will examine new technologies and implications for financial services industry. The fourth section recommends approaches to technology innovations by institutions and regulators.

## 1.0 Literature Review on ICT and Financial Services

Information and

Communication Technology's impact on the financial system commenced with productivity gains from improvement in processes of financial institutions. The introduction of computers to banking around middle of the twentieth century resulted in improvements in banking processes with productivity gains. In a report by Ericsson, Godsiff et al (2014), it was noted that "computerized control of ledgers and transactions helped reduce human error and initially removed the possibility of fraud. As systems developed ICT increased in use, branches themselves adopted digital technologies, money became available 24 hours a day via Automated Teller Machines (ATM) and payment systems became digitalized after the introduction of chip and pin solutions. By the late 1990s, FS was a truly digitalized industry and even trading floors fell silent as fully electronic exchanges took over". Going by the report, the impact of technological advancement manifests in two dimensions in the financial services industry i.e. productivity improvements and industrial disruption. Productivity improvements are evident in recent times as enhancement of computing capacity has resulted in creation of various products through financial modeling, derivatives and other esoteric financial products. It has enhanced the turnaround time for services to customers, initially curtailed fraud, though in recent times cybercrime has become worrisome to the industry, but the speed of processing of billions of financial transactions and information exchange continues to deliver efficiency gains.

At the disruptive level, the financial services industry through technology has become more competitive as the retail sphere has witnessed influx of non-traditional providers of financial services into the industry. Usually such non-FIs are either technology companies or technology-enabled start-ups. Virtual accounts, mobile banking in form of payments and credit services, cryptocurrencies, among others, are changing the financial services landscape. In the Ericsson report, three key technology innovation were identified to be transforming financial services industry, namely; big data, crowdfunding and cryptocurrencies.

Bacso, et al (June 2015) inferred that the retail banking segment which contributed about fifty-two (52) per cent of the total industry revenues globally is an attraction to new technology based entrants. It was noted that start-ups "are using peer-to-peer solutions, social technologies, and advanced data analytics to develop products, manage risk, and improve service". It was therefore suggested that, financial institutions should monitor innovations from five types of players, namely: business model disruptors, process innovators, technology start-ups outside the financial sector, digital banks and platform attackers from other industries such as e-tailing. It is interesting to note that, Nigerian banks are increasingly positioning themselves to manage competition in e-tailing. According to Investopedia, e-tailing refers to the "sale of goods and services through the internet". It is otherwise known as electronic retailing. A number of Nigerian banks have already created e-commerce portals to position them in the market e.g. Access Bank Online Market Place and GTBank SME MarketHub.

The pressure on financial institutions to maintain their place even as technology companies extend the frontier of financial services, stimulates the competitive environment and creates more innovation. According to PwC FS Viewpoint (April 2014), "financial institutions must move beyond traditional means of growth and pursue breakthrough innovation to regain and sustain the profit margins of the past". Examples of Google acquisitions/financing including LendingClub and CircleUp both crowdfunding firms as well as TxVia and Jambool, both payments technology start-ups firms, are indications that terrain of the traditional financial services providers are targets of ICT giants. Similarly, Google is financing consumer credit and SME lending firms such as LendUp and OnDeck. Technology start-ups with access to financing by established technology companies bring on low-cost competitive advantage in terms of lower interest rates and more flexible terms to customers than the traditional

financial institutions. A cursory review of the environment in Nigeria however suggests that, the banks are not easily letting up on their forte as they have been mostly proactive with innovation.

It is instructive that innovation in technology will continue to shape the financial services industry. It aids financial inclusion; enhances competition, and give customers greater choices. Technology firms are becoming more comfortable in the financial services sector, thereby making the sector more competitive. Payments services, consumer credit, SME financing are key targets of technology innovators.

A broader framework on understanding the impact of technology innovation on financial services was espoused by the Report of the World Economic Forum's Project on *The Future of Financial Services* (June 2015). The report identified eleven clusters of innovation categorized under five financial services functions as follows:

| S/N | Financial Service Functions | Innovation Clusters | Disruptive Trends |
|---|---|---|---|
| 1 | Payments | Cashless World | Mobile Payments, Streamlined Payments, Integrated Billing, Next Generation Security |
| | | Emerging Payment Rails | Cryptographic protocols, P2P transfers, mobile money |
| 2 | Insurance | Insurance Disaggregation | Disaggregated distribution, sharing economy, self-driving cars, 3rd party capital |
| | | Connected Insurance | Smarter/cheaper sensors, Wearables, Internet -of-Things, Standardised Platforms |
| 3 | Deposits & Lending | Alternative Lending | P2P, Lean Automated Processes, Alternative Adjudication |
| | | Shifting Customer Preferences | Virtual Banking 2.0, Banking as Platform (API), Evolution of Mobile Banking |
| 4 | Capital Raising | Crowd Funding | Empowered Angel Investors, Alternative Adjudication |
| 5 | Investment Management | Empowered Investors | Social Trading, Automated Advice and Wealth Management, Retail Algorithmic Trading |
| | | Process Externalisation | Process-as-a-Service, Natural Language, Capability sharing, Advanced Analytics |
| 6 | Market Provisioning | Smarter, Faster Machines | Machine Accessible Data, Artificial Intelligence/Machine Learning, Big Data |
| | | New Market Platforms | Fixed Income, Funds of Funds, Private Equity/Venture Capital Shares, Private Company Shares, Commodities & Derivative Contracts |

Going by various authorities, the financial services industry is fast changing and competition will increasingly become heightened as services become commoditized. Though, payments system, consumer lending and SME services appears most impacted yet by technological innovation, the vastness of applicability of technology solutions to various functional areas in the financial services industry portends extensive opportunities for disruptive innovations.

## 1.0 Innovation and the Future of Financial Services

The trends in technology are varied and multidimensional in application. Innovation such as Cloud Computing, Big Data, Internet-of-Things (IoT), Block-Chain technology/ Cryptocurrency, Crowd-funding, etc. are being translated by various sectors into disruptive solutions and leveraged for efficiency enhancement. The five innovations identified will be

.considered in greater details while reviewing their potential impact on the financial services industry.

### 1.1 Cloud Computing

The National Institute of Standards and Technology of the U.S. Department of Commerce defined cloud computing as a "model for enabling ubiquitous, convenient, on-demand network access to a shared pool of configurable computing resources (e.g. networks, servers, storage, applications, and services) that can be rapidly provisioned and released with minimal management effort or service provider interaction". Simply put by a report by the Financial Services Club (2009), cloud computing is a general term for anything that involves hosted services over the internet. It is characterised by the provisioning of computing resources as demanded by the client. This gives the client, the ability to deploy resources at minimal cost thereby reducing entry cost to start-ups requiring computing resources. These resources can be accessed using a range of platforms including smartphones, laptops etc. Cloud computing provides optimization of resources through metering of usage thereby providing scalability and transparency. It is also elastic as the clients can extend quantum of resources and services as demanded by its business.

Financial services are being impacted by this innovation as it provides opportunity for both traditional institutions and new entrants to reduce cost of service provisioning. New entrants are particularly advantaged in view of the various models that make software, platforms and infrastructure readily accessible through various models of cloud services, including Software-as-a Service (SaaS), Platform-as-a-Service (PaaS), and Infrastructure-as-a-Service (IaaS).

This technology accelerates the financial inclusion drive as it brings down the cost of services. It promotes competition in the financial services market as newer entrants comes to the market with lean cost profile and reflects this in the pricing of their services. The time-to-market for new services is also greatly improved and system security investment and expertise requirements have become less challenging to innovative financial services providers. Microfinance institutions, mobile money providers, e-money and e-lenders can leverage applications through SaaS without the expensive licensing rights to applications. To a great extent cloud computing is transforming ICT capital expenditure to operational expenses.

However, cross-border jurisdictional issue is both business and regulatory concern. Cloud computing providers are not necessarily located in the country of their clients. Oversight of the cloud service providers must therefore be approached collaboratively among regulators. There may also be need for protocols for managing cloud services among countries as well as their financial system regulators, to ensure that conflicts are resolved without negatively affecting financial services. Furthermore privacy issues, system security concerns and compliance requirements are risks that must be managed by the cloud computing clients.

### 1.2 Big Data

Social media, e-commerce, growing internet inclusion and internet-of-things are creating vast data from new sources on real time basis. These data, through specialized databases and data mining capabilities have turned data of all kinds (which hitherto may not mean much to businesses) into even greater assets. According to searchcloudcomputing.techtarget.com, "Big data is an evolving term that describes any voluminous amount of structured, semi-structured and unstructured data that has the potential to be mined for information. Big data can be characterized by 3Vs; the extreme volume of data, the wide variety of types of data and the velocity at which the data must be must be processed." Companies such as google, facebook, twitter, ebay, etc. generates such massive volume of variegated data at extreme velocity. The last picture updated on any social media of your dinner at a restaurant as well as your last tweet of the picture of a book you purchased on amazon.com form part of the piece that creates value for organisations.

This otherwise meaningless gamut of data is being translated into high yielding information assets using data mining, artificial intelligence and machine learning technologies to "uncover predictive insights on market movement based on correlations mapping and; update and access insights in real time through cloud-based analytics" thereby aiding organisations in planning and strategy, proactive responsiveness to market, enhanced trading strategies, etc. (WEF, 2015).

For the financial services industry, big data portends greater insight into designing services based on discovered trends in online customer behaviour. Insurance companies for example, may evolve new products that may not have been considered .e.g. coverage for online scamming or reputational damage for celebrities which may affect the projected streams of income, such contracts can be customised based on observed trends. Similarly, increased traffic on social media from a previously internet-excluded locations, correlating with inward remittances to the location could suggest need to design social media-enabled financial services to such area. The opportunities in big data for financial services industry will further be strengthened by the concept of Internet-of-Things. However, taking advantage of big data may also bring on complexities in compliance as well as initial investment in data mining, artificial intelligence and machine learning technology.

### 1.3 Internet-of-Things

The **Internet of Things** (IoT) is the network of physical objects or "**things**" embedded with electronics, software, sensors, and network connectivity, which enables these objects to collect and exchange data. (Wikipedia).

IoT is about intelligent objects amongst which we live our daily lives communicating amongst themselves, with us and with businesses. Smart devices are on the increase and virtually any object we see around can be internet connected. In essence, these smart devices generate data which can be leveraged to improve existing services or design new products. Internet of things will actually create more big data challenge along with its opportunities.

The impact of this technology may be better appreciated considering the following projections:

- McKinsey Global Institute expects the Internet of Things will deliver $6.2 trillion of revenue by 2025
- GE reports that as of 2013, the Internet of Everything had the potential to add up to $15 trillion to the global GDP over the next twenty (20) years
- Research from IDC estimates that by 2020 more than 40% of all data worldwide will be comprised of data gleaned from digital devices communicating with one another (Capgemini 2015)

The technology will provide further data about our daily lives and actions taken and give strategists better capacity to dimension lifestyle data to evolve products and services. This innovation comes with challenges of privacy and security while offering opportunities of personalization in services. The application of IoT can be in the dynamic pricing of insurance products such as healthcare and life insurance. As data from IoT devices around the insured gives better insight on health status and lifestyle, more customized products are designed, premium reflects lifestyle, customer experience improves and competition in the insurance market deepens.

IoT solutions also have applications in consumer lending. Information obtained on the status of IoT- enabled white goods (electrical goods used domestically, e.g washing machines, television, etc), can aid a lender in personalizing consumer credit product as required by a specific customer or class of customers, thereby delivering competitive edge. The same information could be used to determine the customer consumption/spending patterns and used in developing secondary products e.g wealth management services.

### 1.4 Block Chain Technology-Cryptocurrencies

The block chain technology is finding applications in different areas including real asset

registry as well as new money form known as cryptocurrencies. This phenomenon has made it possible to have money forms issued without a central issuing body such as a Central Bank. Based on the block chain technology, digital money is "mined" (created) through the deployment of computing resources to solve mathematical problems with its creation and/or usage replicated on a distributed ledger system that is updated and synchronized across all instances for every transaction. This technology impacts directly on the foundation of financial services - the creation of money. Cryptocurrency further provides anonymity probably beyond cash and limits regulation. It is currently used as a means of exchange acceptable to some formal businesses. It is convertible to fiat money and payment instruments have been built around it e.g. Bit-Pay, Textcoin, BTCPak, Bitbills, etc. Regulators across the world have different dispositions with some recognizing it as currency (with regulations), others consider it a commodity product, while it is outrightly banned by others. The challenges it presents include; money laundering risks, notoriety as currency for the underworld, instability as a currency, etc.

### 1.5 Crowdfunding

This innovation has greatly improved access to equity and debt financing from angel investors and other participants. Crowdfunding platforms (CFPs) have expanded opportunities to retail investors making them part of start-ups with great potential. It is impacting on businesses of banks and private equity firms and other formal arrangement for investment. It is described by Ericsson report as a "peer-to-peer funding systems which allow users to bypass established financial service players, instead providing direct links between entrepreneurs and individual funders who could contribute individually as in p2p networks, or in aggregation as crowdfunding." It is also referred to as "democratic finance". Financial Conduct Authority, UK, defines it as "a way in which people, organisations and businesses, including business start-ups, can raise money through online portals (called crowdfunding platforms) to finance or re-finance their activities".

The financial intermediation role of the financial system is short circuited by crowdfunding, while delivering easily accessible and cheap funds to start-ups and greater value to investors in the long-run. It therefore demands that, incumbent financial service providers become more efficient and/or embed itself within the new intermediation system. As succinctly put by Raymond Michaels in its article on the International Banker, "In the wake of crowdfunding's rapid emergence over the last few years, the banking sector is coming to terms with the new reality that many customers expect a simpler, more transparent form of financing that can utilise the benefits of social media and Web 2.0. Thus, banks have been deciding whether this revolutionary industry should be regarded as friend or foe, and as a result, have had to choose between collaborating or competing with CFPs". (http://internationalbanker.com/banking/how-crowdfunding-is-challenging-the-banking-sector/)

However, concerns of money laundering, investor protection and anti-competition have increased regulatory focus on CFPs and new regulations on their activity were made between 2014 and 2015. Financial conduct authority released its Regulatory Approach to Crowdfunding over the Internet and the Promotion of Non-readily Realizable Securities by Other Media in 2014, the US SEC final rules on crowdfunding becomes effective in January 2016. The International Organization of Securities Commission (IOSCO) identified the following inherent risks in crowdfunding in a press statement on regulation of crowdfunding issued in December 2015, but was short of advocating for an international approach in the oversight of the CFPs in view of its infancy:

- *Heightened financial risks*: High risk of default or failure is often associated with start-up businesses.
- *Fraud, money laundering/terrorist financing:* The risk of fraud may be higher in the case of online private offering.
- *Platform failure:* There is risk

of platform failure or closure for crowdfunding portals.

- *Illiquidity:* In most cases there is no secondary market for crowdfunding securities, which may limit investors' ability to sell or liquidate these securities.
- *Suitability/information asymmetry:* A crowdfunding offering may not be suitable for all investors, as many lack experience with these types of offerings and may not be able to carry out sufficient due diligence due to a lack of appropriate skills and/or the significant information asymmetry between the entrepreneur and the investor.

It however highlighted measures being taken by regulators to address the risks as including:

- customizing entry, registration, or licensing requirements for funding portals;
- setting disclosure requirements for issuers and funding portals;
- limiting the services that may be provided by crowdfunding platforms;
- requiring investor education and/or statements signed by investors acknowledging their understanding of risks;
- limiting the size of the investments made by an individual in each offering and in a given time-frame; and
- requiring the appointment of a third party custodian to hold investor assets.

## 2.0 Recommendation and Conclusion

There are several other innovations impacting financial services industry. Many of such innovations are customer-empowering and should be encouraged. However, they introduce new risks, accentuate existing ones and in other instances aid the management of risks. Regulators are usually late in appreciating these innovations and their implications of the financial services industry. Recent experience indicates that overlooking innovations in the financial services industry may portend grave consequences resulting to financial crises and instability of the financial system. These are mostly pronounced when such innovation impact on money creation and financial intermediation.

The World Economic Forum's research project, The Future of Financial Services (June 2015) highlighted the following key findings:

1. Innovation in financial services is **deliberate and predictable**; incumbent players are most likely to be attacked where the **greatest sources of customer friction** meet the **largest profit pools**

2. Innovations are having the **greatest impact** where they employ business models that are **platform based, data intensive,** and **capital light**

3. The most **imminent** effects of disruption will be felt in the banking sector; however, the greatest **impact** of disruption is likely to be felt in the insurance sector

4. Incumbent institutions will employ **parallel strategies**; aggressively **competing with new entrants** while also leveraging legacy assets to provide those same new entrants with **infrastructure and access to services**

5. **Collaboration** between regulators, incumbents and new entrants will be required to understand how new innovations alter the **risk profile of the industry** – positively and negatively

6. Disruption will not be a one-time event, rather a **continuous pressure to innovate** that will shape customer behaviours, business models, and the **long-term structure of the financial services industry**

In view of these insights, it is expected that regulators, traditional providers and new entrants must align their activities in the interests of the financial system. Regulators must curtail anti-competition practices in form of inhibition of access to financial infrastructure, while also instilling market discipline especially among new entrants. Approaches that emphasize complementarity should be encouraged by regulators; with both incumbent and new entrants rewarded for the strengths contributed and jointly diffusing risks.

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