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Disruptive Technologies in Zimbabwe

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Abstract

Our thrust in this study is to speak to disruptive innovations in the face of cyber fraudsters who are on the prowl. The goal of this study is therefore, to show how Zimbabwe's financial services sector is embracing disruptive technology and the preliminary benefits realized. The study argues that, banks, as part of the financial services industry, have the pivotal roles in the growth and economic development of a nation; hence the necessity to protect these institutions from the antics of fraudsters. The study further argues that Zimbabwean government's approach to innovation should be focused on large market changes rather than on existing infrastructure. The study results acknowledge that cyber-attacks are inevitable; however, there are various advantages to embracing disruptive technologies for the financial industry as identified. There is need therefore, to fully comprehend disruptive technology and make its use more consummate. Apart from protecting

information systems, computers, devices, programs, data and networks from internal or external threats, harm, damage, attacks or unauthorized access, - disruptive technologies identified in this study such as Cloud computing, Artificial Intelligence, Block chain technology, Cyber security, and Big Data; have other tangible benefits, ranging from serving more customers, expanding market share, to increasing revenue at a lower cost. The study proposes a couple of recommendations; that the financial service sector in Zimbabwe could adopt to acknowledge of the importance of digital change and move from conservatism. That Regulators and the Government should soften banking laws and regulation to allow quick adoption to new disruptive technologies and that the financial service sector must invest in financial and human resources to enable swift uptake of technological innovations.

Keywords: Artificial Intelligence, Block Chain Technology, Big Data, Cloud Computing, Cyber Security, Disruptive Technologies, Economies

Introduction

According to Christensen (1997), disruptive technologies are innovations that disrupt and shift the prevailing paradigm of expected competitiveness in a given market segment toward new dimensions of innovation performance. It is perplexing that established businesses, particularly banking, are only now realizing the importance of digital change. Cloud computing, Artificial Intelligence, Blockchain technology, Cybersecurity, and Big Data, to mention a few, have been around for decades, albeit with critics, particularly in the financial services sector. Business in the banking sector has been excellent for a long time, profitability has been high, and competition has been stifled by a series of government rules. Banks, such as enterprises in every sector, face the same survival struggle in these uncertain and disruptive times (Edgar 2018).

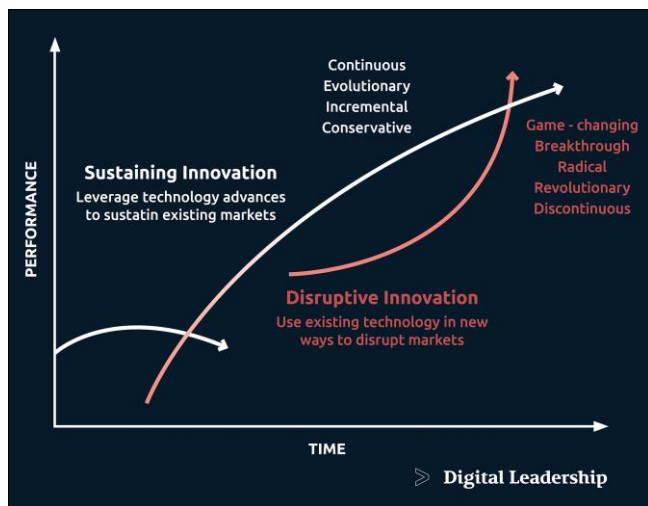
While technological innovation is ever-present in our societies and economies, technologies that fundamentally disrupt the existing economic order and shape the future emerge on a regular basis (International Finance Corporation, March 2019). As a result, banks, as part of the financial services industry, must adapt their business models to change how they interact with customers, manage their middle and back-office operations, remain competitive, and be future-ready (Cziesla, 2014)^[4].

Big Data is the process of managing large volumes of data obtained from several heterogeneous data types such as, internal, external, structured and unstructured that can be used for collecting and analysing enterprise data (Kabanda, 2020). A Blockchain is a data structure, which stores transactional records in the form of a block chained and stored in several databases, and is fundamentally a digital ledger of transactions (DLT) that upon duplication is distributed on the Blockchain throughout the entire computer network. Blockchain is a type of DLT where a hash is used to record the transactions with an immutable cryptographic signature (Kabanda, 2021). A Blockchain is essentially a trust less, peer-to-peer and continuously growing database (or ledger) of records, including distributed applications (or smart contracts), that have been executed and shared among the participating entities. It enables applications and systems to operate in a fully decentralized fashion without the need for any third party or trust authority (Hamida *et al* 2017).

Cybersecurity refers to a combination of technologies, processes and operations that are framed to protect information systems, computers, devices, programs, data and networks from internal or external threats, harm, damage, attacks or unauthorized access (Kabanda, 2020). According to Srinvas *et al* (2018) [18], cyber security refers to the protection of Internet-connected systems, such as hardware, software as well as data (information) from cyber-attacks (adversaries).

Cloud Computing is expected to be one of the fastest-growing technologies in the coming years. Business applications will be the largest market for cloud services spending, with a gradual transition from on premise to Cloud-based services, especially for general business applications like customer relationship management (CRM) and enterprise resource planning (ERP). Before moving to the cloud, banks as participants in the financial service sector must consider issues around data confidentiality, security, regulatory compliance, interoperability of standards, and quality of services (Sriram, 2011).

The Disruptive Innovation Model



The composition of the banking sector is as shown in Table 1 below.

Table 1: Architecture of the Banking Sector	
Type of Institution	Number
Commercial Banks	13
Building Societies	5
Savings Bank (POSB)	1
Total Banking Institutions	19
Other Operational Institutions Under the Supervision of Reserve Bank	
Credit-only-MFIs	168
Deposit-taking MFIs	8
Development Financial Institutions (SMEDCO, IDBZ, & AFC Land & Development Bank)	3
Total Other Institutions	179

Source: RBZ

Disruptive Technologies in the Zimbabwe Financial Sector

Over several decades, banks have continually adopted the latest technology innovations to redefine how customers interact with them. In Zimbabwe the first visible form of electronic innovation was in the early 1990s when Standard Chartered Bank and Central Africa Building Society (CABS) installed Automated Teller Machines (ATM)s. Due

to the cash-crisis the adoption of 24/7 online/internet banking, followed by the spread of mobile-based “banking on the go”.

The banking industry has been experiencing an impeccable transformation in technology over the past few years, resulting in an evolution of digitization focusing on a better customer experience and maintaining customer-relationship with optimal resource management to a more considerable extent (Vedapradha and Arockia, 2018) [7]. Artificial intelligence (AI) will focus on cognitive application in functional areas of business with the financial services industry’s investment and compliance sectors (Tuya, 2017) [6].

The ongoing transition to digital channels creates an opportunity for banks to serve more customers, expand market share, and increase revenue at a lower cost. Crucially, banks that pursue this opportunity also can access the bigger, richer data sets required to fuel Advanced-Analytics (AA) and machine-learning (ML) decision engines. Deployed at scale, these decision-making capabilities powered by artificial intelligence (AI) can give the bank a decisive competitive edge by generating significant incremental value for customers, partners, and the bank.

Blockchain Technology

Blockchain technology is attractive to multiple industries, including the manufacturing industry, because it offers real-time transparency and reduced firm costs (Mougayar, 2016). Blockchain (BC) technology can curb almost 70% of the operating cost in investment banks back-end operations by creating a cryptographic distributed ledger between the counterparties to execute the transactions (Shchukina and Tarasova, 2019) [9]. Investment banks are vulnerable to criminal activities such as money laundering, fraud, intermediaries exploiting investors, false client information, risks, limited transparency, tracking the error-prone process, counterparty fails trades, etcetera. Such activities hamper their asset management the quality of services rendered (Wamba-Taguimdje *et al.*, 2020) [10]. Hence the merger of AI and BC can create an edge by enhancing scalability, security, efficiency and privacy.

According to the 2020 Zimbabwe Fintech Ecosystem Study, Zimbabwe's financial volatility presents a rare potential use case for crypto currencies built on the blockchain to create a more reliable digital money than currently available. The role of so-called "stable coins" is a hot topic of discussion. Cryptocurrencies play a role in the remittance business, as well as other applications. In the market, three bitcoin companies were identified: Golix, which began operations in 2014 and was shut down by the RBZ in 2017; BitMari, which began operations in 2015; and Vic Falls Coin, which issued its first coin in July of 2018. BitMari are the only Bitcoin-based company to receive a money transfer license from the RBZ and had a strategic partnership with Agribank to perform remittances for their customers using Bitcoin.

Just like bitcoin and all the other cryptocurrencies in the world, ZIMBOCASH is a decentralized digital currency made by Zimbabweans. According to co-founder Philip Haslam, the purpose of ZIMBOCASH is to have a network of ordinary Zimbabweans who can trade and transact using this coin on a daily basis. They have about 4,5million ZASH tokens in their system.

Big Data Analytics

Monetary transactions in the banking, finance, service, and insurance sectors generate a massive amount of data in a short period of time from various digital devices using various data formats. With the widespread use of social media through, analyzing this massive amount of data and providing a better consumer experience through better data management has resulted in the birth of Big Data Analytics. Today's financial institutions are under pressure to deploy analytics and data-driven capabilities in order to boost growth and profitability, reduce costs and improve efficiencies, drive digital transformation, and support risk and regulatory compliance priorities.

With the combination of service history and customer profiles made available by big data analytics, bank culture is changing. Profiling has an invasive ring to it, but it is really just an online version of what bankers are already doing. Online banking has made it possible for customers to transfer money, deposit checks and pay bills all from their mobile devices. The human interaction that has been traditionally used to analyze customer behavior and create solutions for pain points has gone digital. Banks can increase customer satisfaction and retention due to profiling. Big data analytics allows banks to create a more complete picture of what each of their customers is like, not just a generic view of them. It tracks their actual online banking behaviors and tailors its services to their preferences, as a friendly teller would, with the same customer at their local branch.

Banks in Zimbabwe use Big Data and Data Integration in a variety of ways, one of which is the fine-tuning of their client segmentation. They can detect which consumers require specific investment products, insurance coverage, types of checking and savings accounts, types of mortgages, and other banking products based on data from prior purchases and actions, depending on the service being supplied.

Before banks had customers and they had products. They tried to cross-sell their products to their existing customers and market these products to new customers. With data integration and analytics, they can now identify which customers are most likely to invest in what products. They can also identify new markets for their existing products and cleverly segment their customers to know exactly what products, offers, special deals, and incentives are most successful with a particular segment.

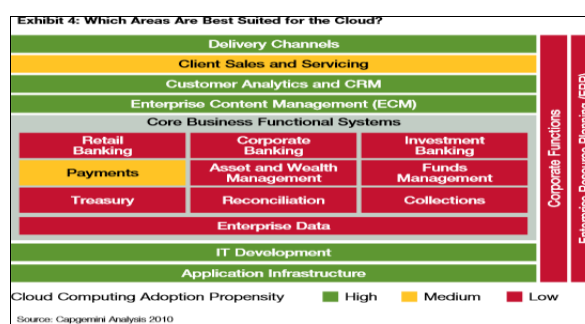
Cloud Computing

Capgemini (2017) noted that banks are expected to enter the cloud computing arena cautiously, with no single cloud services delivery model being a silver bullet for best meeting their demanding business needs. Cloud computing can offer financial institutions a number of advantages, including cost savings, usage-based billing, business continuity, business agility, green IT. But before moving to the cloud, banks must consider issues around data confidentiality, security, regulatory compliance, interoperability of standards, and quality of service.

CABS Limited selected AWS as its preferred cloud provider and will migrate its digital customer platforms, core insurance applications, and product administration systems to the cloud. With the help of AWS's expert professional services organization, the company will migrate over 1,000 applications to AWS, shutting down its data centres by early

2022.

CABS is integrating AWS's analytics and machine learning (ML) services into its business processes to drive greater insights to help the company build more personalized customer facing applications and experiences. CABS is building a data lake on AWS, called the Information Fabric, which will provide a single, consistent view of a customer's information across the entire business. Historically, it was challenging for customers to access their financial portfolio because their information was distributed across multiple data sources. Using Information Fabric, CABS is in the process of refining it is My CABS customer portal, giving customers a view of their entire financial portfolio in one place at any time. Using Amazon Lex, a service for building conversational interfaces into any application using voice and text, CABS has developed a chatbot for its website that provides instant responses to customers, through the customer's preferred channel-voice, e-mail, web, or text-24 hours a day.



Cloud service models offer financial institutions the option to move from a capital-intensive approach to a more flexible business model that lowers operational costs. The key to success lies in selecting the right cloud services model to match business needs, security and regulatory and compliance issues.

NMB Zimbabwe is using on-prem and cloud applications that are being used by the 500 NMB Bank Zimbabwe employees from the public (Press Releases, Customer References, Testimonials, Case Studies and Success Stories) and proprietary sources. NMB Bank Zimbabwe has purchased the following applications: Temenos T24 for Core Banking in 2012, Freshdesk Messaging (Formerly Freshchat) for Chatbots and Conversational AI in 2017, Fastly for Content Delivery Network in 2021 and the related IT decision-makers and key stakeholders.

NMB Zimbabwe database provides customer insight and contextual information on which enterprise applications and software systems NMB Bank Zimbabwe is running and its propensity to invest more and deepen its relationship with Temenos, Freshworks, Fastly or identify new suppliers as part of their overall Digital and IT transformation projects to stay competitive, fend off threats from disruptive forces, or comply with internal mandates to improve overall enterprise efficiency. NMB Bank Zimbabwe revenues, which have grown to \$75.0 million in 2021, plus its IT budget and roadmap, cloud software purchases, aggregating massive amounts of data points.

Liquid Intelligent Technologies (Liquid) Exchange server migration helped improve a financial institution's security and cash flow challenges, ultimately enabling them to serve their customers better. Zimbabwean-based Steward bank was facing a combination of Exchange Server challenges

coupled with security concerns that needed to be addressed. It is the first bank in the country to have convergence with telecommunications and focuses on providing banking solutions using technology. The adoption of Cloud technology from Liquid has helped Steward Bank reduce the cost of doing business and ensured growth despite the impact of the pandemic. For the first time, employees could work effectively from remote locations and seamlessly collaborate between departments. They have also seen improved customer service and a continuous trend in revenue growth. Liquid's comprehensive experience in managing service migrations proved to be especially useful due to the sheer magnitude of the project. As a result, the bank was able to rely on Liquid's vast technical experience to ensure this project was completed without a hitch.

Cyber Security

While Zimbabwe's financial institutions grapple with global technological advancements, cyber fraudsters are on the prowl. E-banking fraud is a global problem that continues to cost both banks and customers money (Usman *et al.*, 2013). According to Kabanda (2012) ^[13], referenced by Dzomira, (2014), cyber-crime in Zimbabwe is on the rise and needs to be quantified through research.

The current liquidity crisis in Zimbabwe has led to an increase in the use of facilities such as payment cards and Real Time Gross Settlement System (RTGS) (Mugari, 2016). These alternative payment systems have increased exposure of financial institutions to risks such as fraudulent RTGS payments and electronic card fraud (Mugari, 2016). The prevalence of cyber-criminals is a worrying development as Zimbabwe grows more reliant on ICTs. Due to the pivotal roles of banks in the growth and economic development of any nation, it has become very necessary to protect these institutions from the antics of fraudsters (Ikechi and Okay, 2013).

Moyo (2012) adds that, people cannot redefine fraud because it has been committed through cyberspace and further mentions that due to the fact that most victims of cybercrime are high-profile bank customers, they were reluctant to announce or admit in public that they have been successfully defrauded by some cyber-criminal. According to Kabanda (2020), the main principles of cyber security are confidentiality, integrity, availability, accountability and auditability.

Internet of Things

The Internet of Things (IoT) is the obvious next step in Blockchain development. The Internet of Things (IoT) has millions of uses and many security risks, and as the number of IoT gadgets grows, hackers will have more opportunities to steal an institution's data from everything, from an Amazon Alexa to a smart thermostat. Blockchain-infused IoT provides a layer of security to prevent data breaches by leveraging the technology's transparency and virtual incorruptibility to keep things "smart." With its decentralized credential solutions, CABS mitigates cybersecurity concerns in IoT devices. The start-up makes IoT devices almost unhackable by removing passwords from a centralized server and replacing them with biometric and password-free solutions for some systems.

Machine Learning and Artificial Intelligence

Banks in the Zimbabwean financial service sector has adopted online banking. Advanced machine learning accurately pulls information from documents uploaded online and on mobile apps. This technology is the reason why people can conveniently deposit checks from their smartphones.

The advent of AI and machine learning has allowed financial institutions such as CABS to adopt digital lending solutions for their personal customers. The CABS digital Lending capability allow eligible personal customers to apply for personal loans through their mobile phones. This paperless technology come with automation of the personal loan process from origination to disbursement and elimination of human intervention end to end. Loan processing turnaround time significantly reduced from an industry average of 3 days to just 15 minutes. The mobile digital lending offering also come with functionality that allows customers to review credit limit on their own, view loan balance or loan statement at any given time, apply for a loan top up. All these processes can be done without physically visiting the traditional brick and mortar branch. This has all been enabled by capitalizing on emerging technologies AI and machine learning. CABS uses the churn prediction model to detect personal customers who are likely to close a transactional or savings account. By predicting in advance which customers are likely to leave the financial institution, CABS reduces customer retention efforts through tailor made interventions directed at this high-risk customer segment. For example, targeted marketing campaigns. By and large the church model has helped CABS to reduce customer attrition to an average of about 5 000 per year out of a customer portfolio of 450 000 customers. CABS uses the cross-sell prediction model to predict whether a person customer would be interested in taking up complimentary products and services such as motor insurance, internet banking, life insurance, etc. This enables CABS to come up with a targeted communication plan, for example sending sms messages to potential customers only and optimise its business model and revenue.

Steward Bank also provides lending for personal purposes using fintech. Steward launched a USSD code for accounting opening in 2018. Subscribers to Econet can open a Steward bank account by dialing *236# and this account is automatically linked to individual's EcoCash Wallet. Individuals can access personal loans by dialing the same USSD code. The loan amounts up to a maximum of ZWL100. A handling fee of 5% of the loan is deducted from the principal amount and the loan is repayable within 30 days and it is "interest free".

Nothing will ever beat the customer service one can receive in a conversation with a real human being. But human resources are limited by many physical factors that artificial intelligence (AI) can make up for. Where customer service agents may not be able to respond in a timely manner to customer inquiries depending on demand, AI can step in. Banks in Zimbabwe have adopted artificial intelligence through the use of Chatbots which enables customers to receive immediate answers to their questions. Their AI technology uses customer profile information and

behavioral patterns to give personalized responses to inquiries. They can even recognize emotions to respond sensitively depending on the customers' needs.

Implementation: Challenges and Problems

Low, (2020) identifies three key reasons why banks have been so slow to harness disruption. First, the digital economy demands a level of agility which banks just don't have they're sprawling, unwieldy, traditionally conservative institutions where the culture is very much against rocking the boat. Many lack a clear digital transformation strategy, and banking talent remains motivated by profit and earnings, not innovation and entrepreneurship. Secondly, banks are saddled with decades-old legacy systems, which make it difficult to adopt new technology fast enough to meet new competitive pressures and the demands of young, tech-savvy customers. And third, in Asia specifically, banks have been even slower to harness disruptive technology than their counterparts in Europe and the US where the business environment is more receptive to ideas and friendlier to the brave hearts who are willing to push and test the limit of their ideas (Siau and Yang, 2017) ^[23].

Many banks have struggled to move from experimentation to select use cases to scaling AI technologies across the organization. Reasons include the lack of a clear strategy for AI, an inflexible and investment-starved technology core, fragmented data assets, and outmoded operating models that hamper collaboration between business and technology teams.

Regulatory Challenges

The Zimbabwean government's approach to innovation is focused on existing infrastructure rather than large market changes. The RBZ's May 2018 circular to banking institutions on virtual currencies reflected this narrow view of innovation, effectively shutting down crypto currency exchanges such as Golix and BitMari and serving as a strong disincentive for others to work in the virtual currency space. This choice represented a broad preference for stability over innovation, which is understandable in many ways but may limit Fintech firms' capacity to achieve their full potential. According to the RBZ, they are always open to new ideas and will always do a cost-benefit analysis before regulating new developments. They have confirmed that it is hard to keep pace with innovation in the financial sector, and that their approach is based on three sequential stages i.e. observation, tailoring and regulating. While this "test and learn" approach FinMark Trust, (2012) ^[13] may be appropriate for many of the changes seen to date in the financial sector, it may need to be accelerated if it is to work effectively for Fintech, as innovations increase in speed and complexity and Fintech require regulatory clarity to appease investors. RBZ would likely benefit from support to get ahead of the curve and taking a more proactive approach to Fintech regulation. They have stated that they lack capacity in certain areas and would be open to an institution providing such assistance.

Conclusion

The goal of this study was to show how Zimbabwe's financial services sector is embracing disruptive technology and the preliminary benefits, one of the country's largest financial institutions. Cloud computing, big data analytics, artificial intelligence, and block chain technology are

examples of disruptive technologies that increase customer service, convenience, fraud detection and control, as well as productivity and corporate value. Data management and other back-office operations are becoming more efficient and well-integrated, lowering the number of procedures and the need for human labor. There are various advantages to embracing disruptive technologies for the financial industry, and there is a need to fully comprehend disruptive technology and make its use more consummate. A more holistic approach to applications of disruptive technology is creating a competitive advantage in most institutions and failure to adopt to the trends will make some businesses irrelevant in the long run.

Recommendations

1. The financial service sector in Zimbabwe should adapt to disruptive technologies and move from conservatism.
2. Regulators and the government should soften banking laws and regulation to allow quick adoption to new disruptive technologies.
3. The financial service sector must invest in financial and human resources to enable swift uptake of technological innovations.

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