EXPLORING THE ADOPTION OF ARTIFICIAL INTELLIGENCE IN THE ZIMBABWE BANKING SECTOR

Leonard Shambira[i]
Lecturer,
Department of Mathematics and Computer Science,
Great Zimbabwe University,
Zimbabwe

Abstract:

This study examines how far the Zimbabwe banking sector has progressed in adopting AI (Artificial Intelligence) technology in their banking processes. According to PwC's AI impact index which looks at 300 AI use cases around the globe the technology will contribute US$15.7 trillion to the global economy by 2030 boosting the GDP of individual countries by up to 26%. AI technology enables computers to mimic human intelligence so that they can learn, sense, think and act in order to achieve automation and gain analytic insights. The study revealed that the drivers for adopting AI in the banking sector are customer satisfaction, cost reduction and the need to better manage risk and the barriers to adoption of AI are lack of AI knowledge, lack of resources including AI talent and establishing governance for ethical AI, data privacy and other security issues. The primary data was collected using survey as a research strategy, the data was collected from 120 bank employees across ten banks. The study also revealed that the banking sector in Zimbabwe has adopted AI embedded in their banking software to enhance bank processes and also to enhance security and risk control and only 16% of the surveyed banks had adopted some form of AI to enhance customer interaction and experience in the form of chatbots.

Keywords: artificial intelligence, banking sector, adoption, employees

1. Introduction

Artificial Intelligence is the theory and development of computer systems which are able to perform tasks that normally require human intelligence, such as visual perception, speech recognition, decision-making, and translation between languages. Jewandah (2018) SAS, Accenture Applied Intelligence and Intel with Forbes Insights define AI as the science of training systems to emulate human tasks through learning and automation.

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[i] Correspondence: email lshambira@gzu.ac.zw, lshambira@gmail.com

With AI, machines can learn from experience, adjust to new inputs and accomplish specific tasks without manual intervention.

According to a 2018 report published by the World Economic Forum, in collaboration with Deloitte, 76 per cent of Chief Executive Officers in the banking industry agree that AI is a top priority because it is critical for differentiation. Successful AI applications in banking means putting to good use the massive amounts of data collected, no matter which channel it comes through, even if it's via ATMs (Automated Teller Machines), web channels, digital wallets, point of sale activity or mobile devices. It allows for personalization; digitally transforming a mass service into an individualized and customized one, based on a customer's unique behavior, preferences, and requirements. This is what also gives banks a competitive differentiation in order to improve compliance, increase customer engagement, and optimize the overall operational efficiency. By tapping into customer profiles and preferences, banks can package products and services based on personalized needs (Antonella Comes, 2018).

Banks in Zimbabwe have embraced digital banking in the form of mobile banking, Internet banking and ATM banking but the use of AI in the banking sector is unknown.

2. Aim of the Study

To analyze the adoption and application of Artificial Intelligence in the Zimbabwe banking industry so as to unlock opportunities associated with the application of Artificial Intelligence in the banking sector.

3. Literature Review

Artificial Intelligence systems can be classified into two systems which are the weak and strong systems. Weak systems only emulate the data initially input in them while strong AI systems attempt to "learn" from existing data through deep learning and forming neural networks (Nordheim, 2018). In this research Artificial Intelligence is reviewed from an aspect of strong systems.

The banking sector in Zimbabwe is composed of the commercial banks, building societies, and a savings bank. In total there are 19 operating banks as of October 2019. The Banking sector is governed under the Banking Act and falls under the direct supervision of the Reserve Bank of Zimbabwe (www.baz.org.zw).

According to RBZ's press statement on the availability and allocation of foreign exchange, KYC (Know Your Customer) and CDD (Customer Due Diligence) requirements, use of plastic money and submission of information by producers supported by Statutory Instrument 64 of 2016, the success of fintech in Zimbabwe has become so pronounced that over 70 percent of retail payments in Zimbabwe are made through digital payment platforms. In order to keep up with the rapidly changing financial landscape, banks in Zimbabwe have partnered with fintech companies to offer digitalized payment services and solutions. These services may include AI technologies.

According to Pitchfork, the banking sector has been a pioneer in the adoption of new technologies and resulting innovations but their ability to realize the full potential of data has been limited so far. AI is data-hungry and the banks now generate an extraordinary volume of data. According to the Australian Government Productivity Commission's report, "*the amount of digital data generated globally in 2002 (five terabytes) is now generated every two days, with 90% of the world's information generated in just the past two years.*" (Latimore D. 2018) cites that AI can help banks become more efficient and effective by reducing costs, mitigating risk, and increasing revenues by applying newly capable technology in analytics, bots, RPA (Robotic Process Automation), and report generation.

According to the European Banking Federation there are three categories of AI use cases, highlighting the potential areas of opportunities for the banking sector as shown in Figure 1. These three use cases are the ones used in this research.

- Enhancing customer interaction and experience: e.g., chatbots, voice banking, robo-advice, customer service improvement, biometric authentication and authorization, customer segmentation (e.g., by customized website to ensure that most relevant offer is presented), targeted customer offers;
- Enhancing the efficiency of banking processes: e.g., process automation/optimization, reporting, predictive maintenance in IT, complaints management, document classification, automated data extraction, KYC (Know-Your Customer) document processing, credit scoring, etc;
- Enhancing security and risk control: e.g., enhanced risk control, compliance monitoring, any kind of anomaly detection, AML (Anti-Money Laundering) detection and monitoring, system capacity limit prediction, support of data quality assurance, fraud prevention, payment transaction monitoring, cyber risk prevention.

Figure 1: AI in the banking sector: use cases
(Source: European Banking Federation)

Celent takes a pragmatic approach that defines AI in banking as technology that makes inferences and decisions that used to require direct human involvement.

Figure 2 lays out the basic AI relationships between the foundational technologies and banking applications; all depend on massive amounts of data, the lifeblood of AI.
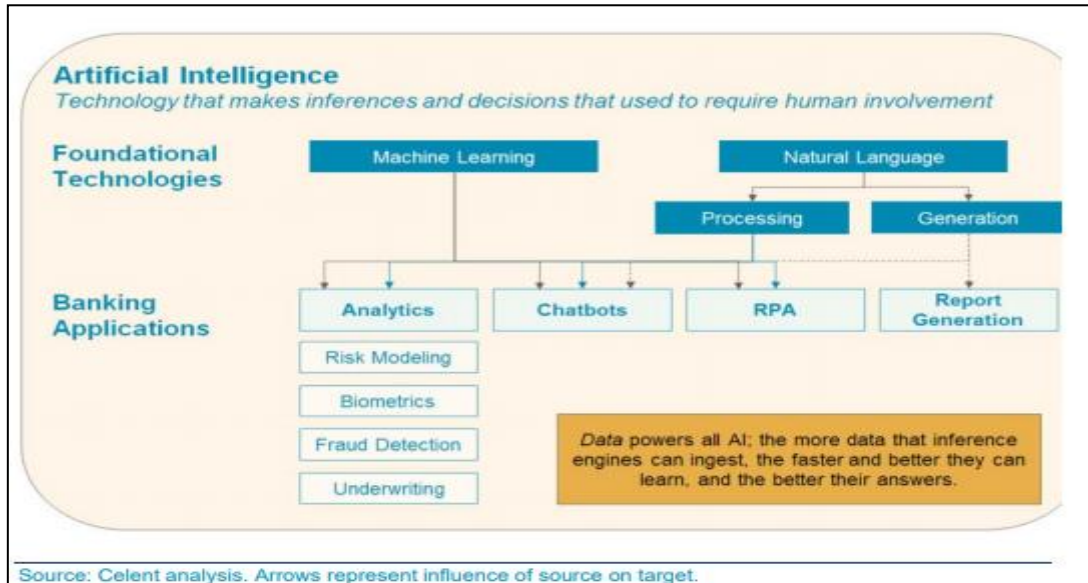
Figure 2: The basic AI relationships between
the foundational technologies and banking applications

3.1.1 Machine Learning

According to Latimore D. (2018), machine learning is a centrepiece technology of true AI. Machine learning occurs when computers change their parameters/algorithms on exposure to new data without humans having to reprogram them. The biggest benefit of machine learning is that, by processing more data than a human ever could, and then using that data to teach itself by spotting patterns that, again, would be hard for humans to identify, it will be able to draw insights that previously would have remained undiscovered. Many machine learning and artificial intelligence systems may provide wrong or inappropriate answers if used in a context different from their training environment.

3.1.2 Natural Language

According to Liddy, E. D. (2001), Natural Language Processing is a theoretically motivated range of computational techniques for analysing and representing naturally occurring texts at one or more levels of linguistic analysis for the purpose of achieving human-like language processing for a range of tasks or applications. Natural language processing is the ability for technology to use human communication, naturally spoken or written, as an input that prompts computer activity. It is critical to artificial intelligence because it gives people an intuitive way to communicate their intent to a program. The human's unstructured words are parsed and converted into machine understandable instructions.

3.1.3 Natural Language Generation

Natural language generation is the ability of technology to produce human-quality prose based on a wide variety of inputs. Natural language generation can be either written or spoken, although if spoken, the voice quality doesn't necessarily have to be indistinguishable from humans. Natural language generation does not rely on a limited number of predefined responses or fetching a single piece of data for a customer, but instead sorts through large amounts of available data to produce a human-sounding response.

3.1.4 Analytics

An area of intense banking focus for the last several years, analytics has benefited from technological improvements. AI-driven analytics test vast quantities of data to search for patterns, groupings, and correlations by employing a wide variety of techniques, including data mining and hypothesis testing. Moving from merely descriptive to predictive, near real-time analysis is a key component of some analytics.

3.1.5 Chatbots

A chatbot is a technology service powered by algorithms that interacts with a customer in a natural (human-like) manner, either by voice or text. Chatbots are software programs which can interact with human users via written or spoken communication channels using natural language (Shawar and Atwell, 2007). Chatbots are a smart way of providing efficient customer service. It helps customers know their transaction details and also additional services that they are eligible to receive. Through the use of chatbots, banks are able to understand each customer's requirements and give them the right offers or even reward them.

3.1.6 Robotic Process Automation

Robotic process automation uses a number of techniques to mimic routine human activities automatically, repeatedly, faster, and more accurately. According to AT Kearney, Robotic Process Automation (RPA) makes operations 20 times faster than the average humans and includes benefits of 25 percent to 50 percent cost savings for those who adopt. Data processing can be automated at almost all stages of the customer relationship. Establishing standard verification steps can speed up account opening and account changes, and credit decisions for certain segments can be triggered by well-structured, tested scoring models.

3.1.7 Report Generation

Natural language generation vendors tout the use cases of writing reports or synopses that synthesize large amounts of structured data and put them into a prose narrative that highlights the key points. An example might be constructing a spending report for a retail banking client, someone who to date has never had any kind of prose analysis from their bank. Many clients will prefer prose summaries, rather than a set of numbers, tables, and graphs that takes time, and some degree of expertise, to decipher.
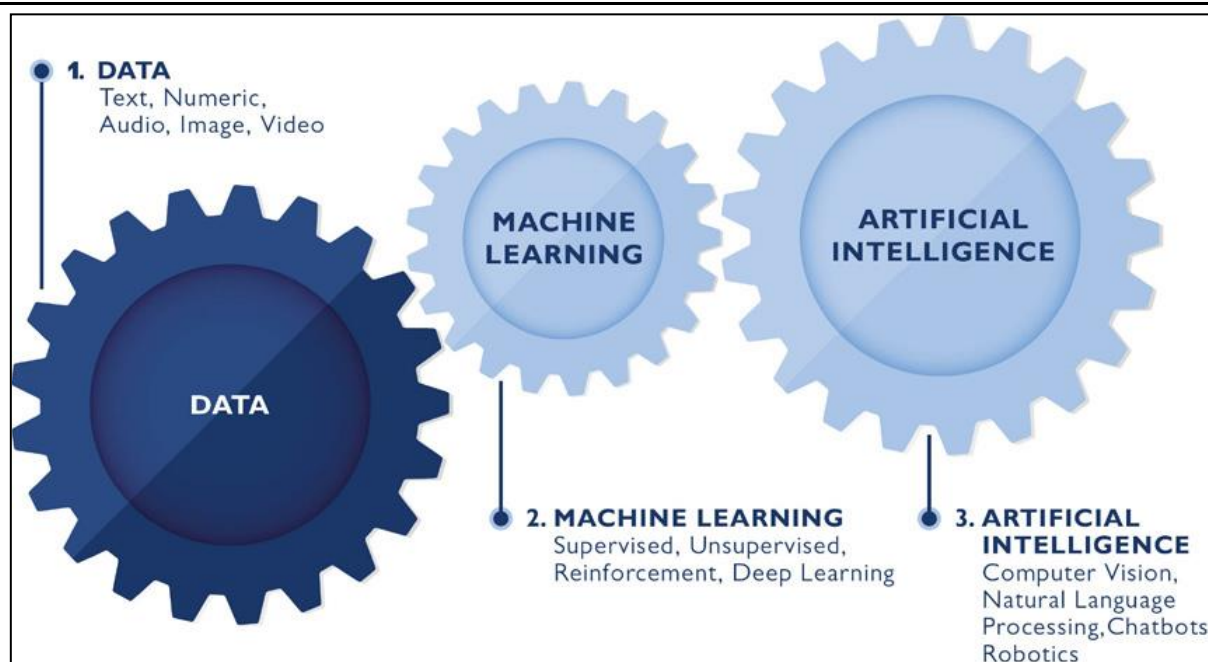
Figure 3: Relationship of AI, ML and data
(Source: https://www.usaid.gov/sites/default/files/documents/15396/AI-ML-in-Development.pdf)

The relationship between data, machine learning, and artificial intelligence applications is shown as a set of three interlocking gears. Data serve as the foundation of machine learning, artificial intelligence systems, and decisions about data affect the function of higher-level systems. Rather than working directly with data, artificial intelligence applications typically rely on a machine learning algorithm to translate data into usable predictions. Finally, artificial intelligence applications use those predictions to make, plan, or do something in the real world.

3.2 Applications of AI in the Banking Sector

Banks apply artificial intelligence technologies to serve customers efficiently and also make their everyday businesses run smoothly. These technologies have been applied in the back-offices, front offices and other platforms such as the mobile banking facilities.

3.2.1 Personalized Financial Services

Personalized connect will reach new heights as automated financial advisors and planners provide expertise in making financial decisions. They analyse market temperament against the user's financial goals and personal portfolio and offer recommendation regarding stocks and bonds.

3.2.2 Smart Wallets

Digital wallets are touted as the future of real-world payment technologies, with major players like Google, Apple, PayPal and others, jumping on the bandwagon and developing their own payment gateways. This decreases the dependence on physical cash, thereby expanding the reach of money to greater levels.

3.2.3 Underwriting

The insurance sector is also coming up with a storm as they are moving towards congruent automation. By utilizing AI systems that automate the underwriting process, the organizations come armed with more granular information to empower their decisions.

3.2.4 Voice Assisted Banking

Physical presence is slowly fading away as technology empowers customers to use banking services with voice commands and touch screens. The natural language technology can process queries to answer questions, find information, and connect users with various banking services. This reduces human error, systemizing the efficiency.

3.2.5 Data-driven AI Applications for Lending Decisions

Applications embedded in end-user devices, personal robots, and financial institution servers are capable of analysing a huge volume of data, providing customized financial advice, calculations and forecasts. These applications can also develop financial plans and strategies through research, regarding various customized investment opportunities, loans, rates, fees, etc. and track the progress.

3.2.6 Customer Support

As speech processing and natural language processing technologies mature, we are drawing closer to the day, when computers could handle most customer service queries. This would mark an end to waiting in line and hence result in happier customers.

3.2.7 Digitalization instead of Branch Lines

Banking is a lengthy process, with past records of long queues and sluggish response marring the productivity. Even opening a bank account was viewed in negative terms as harried consumers would run pillar to post, while getting the necessary documentation complete. Digitization of documentation eases that pain and creates a comprehensive platform, where the consumers and providers connect.

3.2.8 Blockchain Hastening Payments

The customer base that banks serve is going through a major shift in terms of buying behaviours and preferences, driven by the digital revolution, particularly social media and mobile. An increased demand for more choice and control in how they interact with a bank is on a rise. Sluggish payment processes will be a thing of the past as Blockchain is set to inculcate the advantage of real-time payment process, hastening up the procedure of payment, thereby increasing support and satisfaction.

Adaptation of Artificial Intelligence in banking sector has advantages and disadvantages associated with it, some of them are enlisted below (Mannino et al., 2015).

3.2.8.1 Advantages
- It can enable and accelerate automation of all the processes in banking.

- Less room for human errors.
- It can significantly reduce the cost of banking services.
- It can aid in systematically analyzing behavior pattern of customers and offer them more personalized services to cater their needs.
- With the use of machine learning, artificial intelligence systems can identify abnormalities in patterns to recognize security threats and responds to them in time.

3.2.8.2 Disadvantages
- It is disruptive for all the bank processes to adopt artificial intelligence in their day-to-day operations.
- Complete automation of process will lead to no supervision.
- It lacks the ability to take decisions under special circumstances.
- It requires more security protocols for developing a safe automated environment.

4. Methodology

Research methodology is defined as a well-planned and methodical academically procedure that is used for gathering the required data related to a research study for accomplishing all of its aims and objectives effectively (Kothari, 2004). The study employed descriptive survey design. Descriptive research involves gathering data that describe events and then organizes, tabulates, depicts, and describes the data collection (Glass & Hopkins, 1984). It often uses visual aids such as graphs and charts to aid the reader in understanding the data distribution. Because the human mind cannot extract the full import of a large mass of raw data, descriptive statistics are very important in reducing the data to manageable form. When in-depth, narrative descriptions of small numbers of cases are involved, the research uses description as a tool to organize data into patterns that emerge during analysis. Those patterns aid the mind in comprehending a qualitative study and its implications. The research strategy for this study was based on a pilot study followed by a survey that was used to collect primary quantitative data from the respondents. Questionnaires, observations and interviews were used as research instruments, 120 bank employees were approached and surveyed to understand the areas of implementation of AI and its impact on the performance of banking sector in Zimbabwe.

A pilot study was first undertaken to determine which technologies banks in Zimbabwe had adopted in their operations. This was done by assessing banks websites, Twitter pages, Facebook pages and chat engines. Secondly, draft questionnaires were developed and tested before they were amended and sent to the field for data collection.

5. Data Analysis

5.1 Initial research

Table 1: Digital media and chatbot penetration data obtained from Zimbabwe bank websites

Number of Banks	% of banks with								
	Websites	Facebook	Twitter	YouTube	Mobile Banking	Instagram	Chat Engine	Chatbot	ATM and Online Banking
19 banks	100%	100%	100%	90%	100%	80%	80%	16%	100%

From the research results it was observed that Zimbabwe banks have embraced e-banking and social media in their operations and a paltry 16% has embraced chatbots which are a form of AI. The table shows that there is a high adoption of digital technology in the banking sector in Zimbabwe but a significantly low adoption of AI technology. There is no evidence in literature the cause of this low AI uptake and this is the gap this research would fill through primary research.

5.2 Primary Research (Questionnaire)

The primary research was done using an online questionnaire that was administered to ten banks targeting bank employees. A total of 160 questionnaires were posted and 120 participants responded giving a response rate of 75%. It was observed that the majority of the participants 37% are in the age group 31-40 years and the majority being male constituting 75%
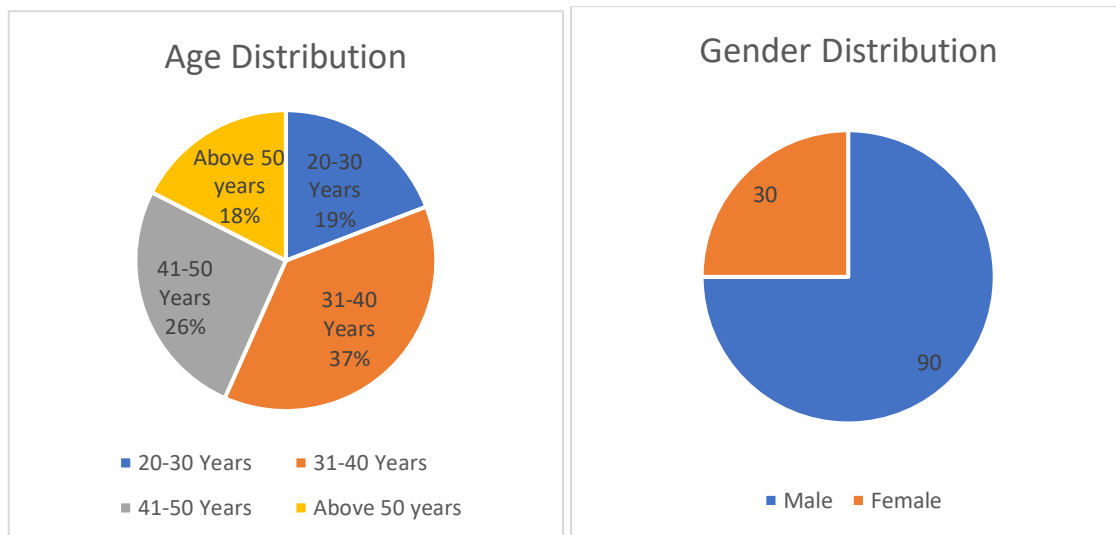
Figure 4: Demographic Distribution

5.3 AI Adoption Analysis
5.3.1 Research Question 1

AI in banks can be categorized in the following three categories.

    i.   AI to enhance customer interaction and experience.

ii.   AI to enhance bank processes.

iii.   AI to enhance security and risk control.

Please describe the types of AI initiatives you bank is developing/deploying and what are the barriers to AI adoption if any.
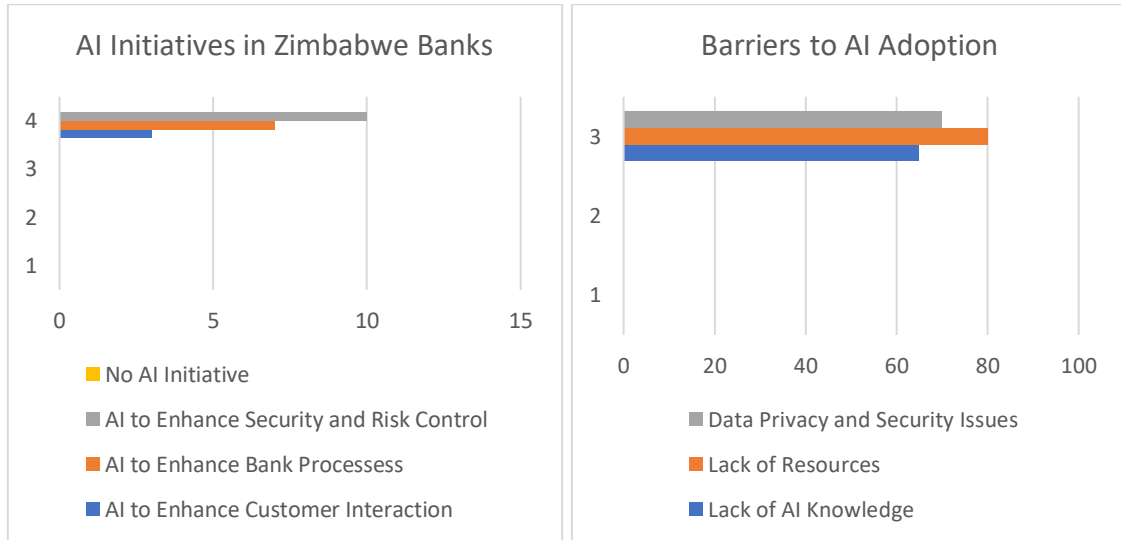
Figure 5: AI adoption in Zimbabwe banks and barriers to adoption

From the frequency distribution all ten banks have adopted some form of AI. All ten surveyed banks had adopted AI initiatives to enhance security and risk control. They revealed that the AI software to enhance security and risk control was embedded in their banking software and were not at liberty to disclose how the software operates so as to have a competitive advantage. Seven out of ten bank had adopted AI to enhance bank processes, also the AI software was embedded in their banking software and only three banks had adopted AI to enhance customer interaction in the form of chatbots. These chatbots have been given human names namely Batsi, Noku and Ally. On barriers to AI adoption 80 participants said it's due to lack of resources, 65 participants said it was lack AI knowledge and 70 participants said they do not trust AI technologies in that they may breach data privacy and security.

The statistics show that banks in Zimbabwe are not customer centric, they are concerned about migrating their exposer to risk so as to have a competitive advantage over other banks and barriers to AI adoption are lack of AI knowledge, lack of resources and data privacy and security issues.

5.4 Research Question 2

To what extend do you agree with the following statement regarding AI: "We have confidence in AI based decisions or outputs":

o   Completely disagree;
o   Slightly agree;
o   Neutral;
o   Strongly agree;
o   Completely agree;

o Too early to tell.
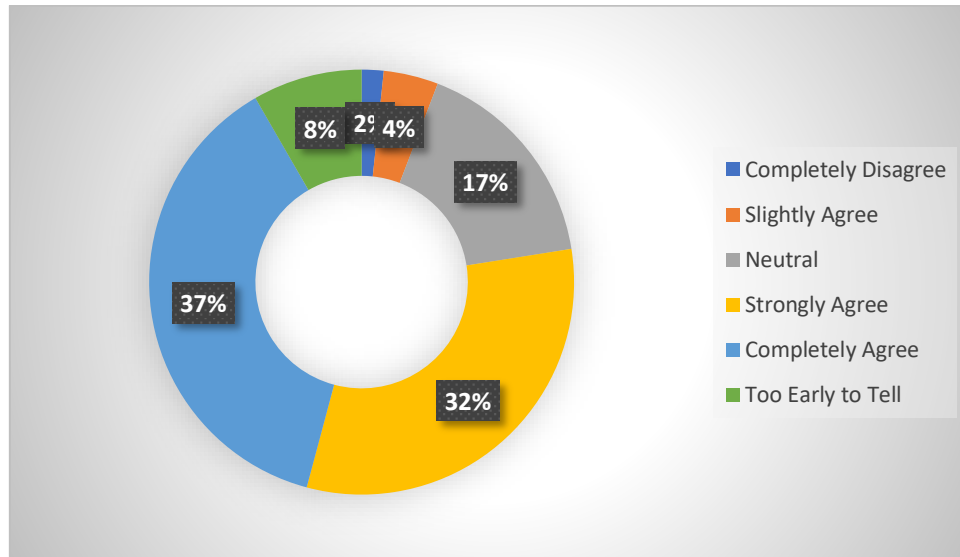
Figure 6: Confidence in AI based Outputs or Decisions

From Figure 6 it was observed that 37% of the participants completely agree that they had confidence in AI based outputs of decisions, 32% strongly agree, 17% neutral, 4% slightly agree, 8% too early to tell and 2% completely disagree. From the pie chart it can be concluded that the majority of the participants have confidence in AI.

5.5 Research Question 3

To what extend do you agree with the following statement regarding AI: "We are concerned about the impact of AI on employee relations".

o Completely disagree
o Slightly agree
o Neutral
o Strongly agree
o Completely agree
o Unsure.

From the pie chart it was observed that 50.42% completely agree. 40.33% strongly agree, 15.13% neutral, 7.6% slightly agree, 3.2% completely disagree and 5.4% unsure with the statement "We are concerned about the impact of AI on employee relations". Thus, the majority of the participants believe that their jobs may the threatened by the introduction of AI hence they are bound to resist the adoption of AI in their banks.
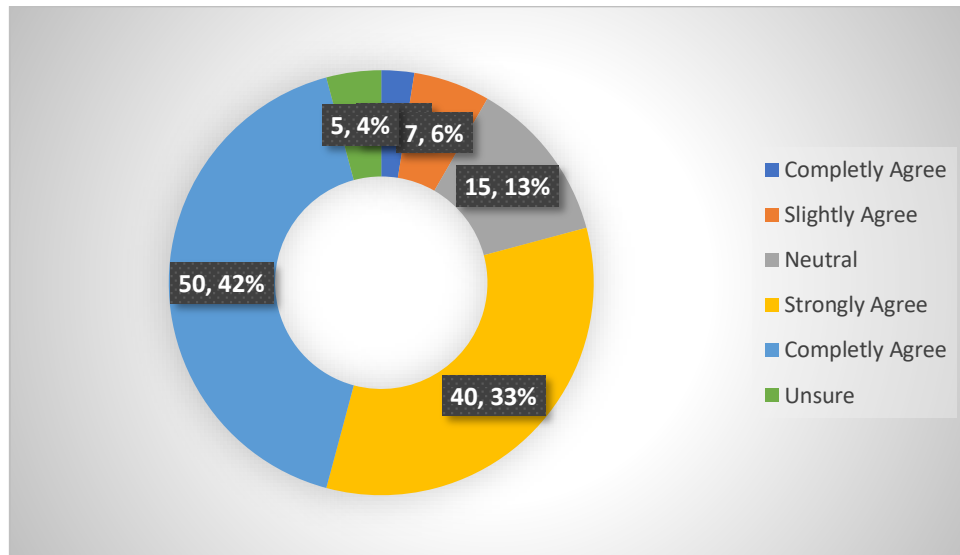
Figure 7: Threat of AI to Employees

6. Recommendations

The banking sector in Zimbabwe has deployed AI in the back offices to enhance security, bank processes and to enhance the efficiency of banking processes. However, they should consider deploying AI to enhance customer interaction and experience so as to segment their customers so that they can follow their customers spending habits. By segmentation, banks can target a particular customer with information pertinent to that particular customer so as not to waste resources broadcasting to every customer. On Internet Banking banks should deploy customized websites for customers with information relevant to that particular customer, customization can be achieved using data obtained from the spending habits data of customers, data is collected from points such as ATMs, Point of Sale Machines transactions, Internet Banking, Mobile Banking transactions etc. Using these vast amount of data machine learning algorithms are then used to find hidden traits in the data which are analyzed and aid in decision marking which in turn will give that particular bank a completive advantage over other banks.

7. Conclusions

The study revealed that adoption of AI the banking sector in Zimbabwe is still in its infancy and the adopted services are to enhance bank processes, so as to enhance the efficiency of banking processes, process automation/optimization, reporting, predictive maintenance in IT, complaints management, document classification, automated data extraction, KYC (Know-Your Customer) document processing, credit scoring, etc.

They have also adopted AI to enhance security and risk control so as to enhanced, compliance monitoring, any kind of anomaly detection, AML (Anti-Money Laundering) detection and monitoring, system capacity limit prediction, support of data quality assurance, fraud prevention, payment transaction monitoring, cyber risk prevention.

Few banks have adopted AI to enhance customer interaction and experience. Only 3 banks have chatbots which are available on their WhatsApp platform but they have not adopted other AI services to enhance customer satisfaction such as voice banking, robo advice, biometric authentication and authorization, customer segmentation in the form of customized websites to make sure that most relevant information is presented to targeted customers. Instead banks broadcast their information using the SMS platform which may irritate other customers who view these broadcasts as spam. The non-availability of biometric authentication and authorization has left customers vulnerable to cyber fraudsters, where customers are defrauded using card cloning and card swap.

The research also revealed that all banks in Zimbabwe have adopted e-banking in the form of ATM cards, point of sale machines, mobile banking, Internet banking, and use of chart engines as well as that they are active on Facebook, Instagram, WhatsApp and YouTube social media platforms.

The study also revealed that while employers do not anticipate a big impact on jobs from AI, employees are nervous. Employees should know that AI augment human activities on the job but do not replace humans altogether. In fact, the adoption of AI may open new opportunities in training and maintenance of these systems.

About the Author

Leonard Shambira is a lecturer in the department of Mathematics and Computer Science at Great Zimbabwe University.

Conflict of Interest

The author declares that there is no conflict of interest.

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