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Original Article

Legal and Ethical Implication Framework for Artificial Intelligence Application in Centenary Bank Uganda Limited

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Abstract - This manuscript examines the legal and ethical implications framework for the application of Artificial Intelligence in Ugandan Centenary banks, with a case study focus on the Lango Sub-Region of Northern Uganda. As banks increasingly deploy AI for credit scoring, fraud detection, customer onboarding, chatbots, anti-money laundering monitoring, and risk analytics, the technology promises greater efficiency, lower operating costs, and improved financial inclusion. However, these benefits are accompanied by significant legal and ethical concerns, including privacy infringement, algorithmic bias and opacity in automated decision-making, cybersecurity exposure, unlawful profiling, data localization issues, and uncertainty around accountability when AI systems cause harm. The manuscript situates these concerns within Uganda's emerging legal and regulatory environment, including the Constitution of the Republic of Uganda, the Data Protection and Privacy Act, 2019, the Computer Misuse Act, 2011, the Financial Institutions Act, and sectoral supervision by the Bank of Uganda. It further engages ethical principles of fairness, transparency, accountability, explainability, non-discrimination, human oversight, beneficence, and proportionality. Using the Lango Sub-Region as a contextual lens, the paper argues that AI adoption in commercial banking must be governed by a hybrid framework combining statutory compliance, internal bank governance, regulatory supervision, and context-sensitive ethical safeguards. The manuscript concludes that Uganda requires clearer AI-specific rules, stronger supervisory guidance, institutional audit mechanisms, and bank-level governance protocols to ensure that AI innovation does not erode consumer rights, trust, and financial stability.

Keywords - Artificial Intelligence, Uganda banking, Legal framework, Ethical AI, Lango sub-region, Northern Uganda, Uganda.

1. Introduction

Artificial Intelligence (AI) is rapidly transforming the global financial sector through predictive analytics and personalized customer experiences. In Uganda, leading institutions like Centenary Bank, UBA, Post Bank and Stanbic Bank are integrating digital innovations, including chatbots, fraud detection systems, and automated credit scoring. However, this integration poses complex questions regarding data privacy, algorithmic bias, and accountability. Centenary Bank and Stanbic Bank, two of Uganda's leading indigenous financial institutions, has begun integrating digital innovations to improve service delivery, including at their branches across the country.

However, the deployment of AI in banking raises complex legal and ethical questions. These include concerns about data privacy, algorithmic bias, accountability, transparency, and regulatory compliance. Uganda's

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legal framework—anchored in the Data Protection and Privacy Act (2019), the Financial Institutions Act (2004), and emerging digital policies—remains underdeveloped in addressing AI-specific risks. Ethical considerations, such as fairness, human oversight, and customer consent, are also inadequately institutionalized.

Artificial Intelligence (AI) has led significant progress in the banking industry, changing the way banks operate, interact with clients, and reduce risks. Artificial Intelligence (AI) has made it possible for banks to make well-informed decisions by analyzing large amounts of data and extracting insightful information. This has led to more accurate risk assessments, effective fraud prevention measures, and sophisticated investment strategies. Artificial Intelligence (AI) has improved operational efficiency by automating human operations, resulting in faster transaction processing, easier account administration, and better data analysis. Fraud detection is one of the main uses of AI in banking and finance. Traditional rule-based systems are unable to keep up with the complicated and sophisticated fraud activities that are occurring nowadays. In contrast, Artificial Intelligence (AI) algorithms have the ability to instantly and accurately analyze large amounts of transactional data in real-time, allowing them to quickly spot unusual trends and possible fraud attempts. Financial institutions can protect their clients' and the institution's own interests by using this capability to identify and stop fraudulent activity. AI has significantly improved credit scoring, another important aspect of banking. Traditional credit scoring algorithms frequently use a small number of factors, which leads to risk estimates that are not as precise. AI-based credit scoring models use machine learning algorithms to take into account additional factors and past data, which results in more accurate credit assessments. AI models help lenders make better credit choices by combining a wide range of parameters and patterns. This lowers default risk and improves loan portfolio management. AI has also completely changed the banking industry's customer care department with the advent of chatbots and other AI-powered virtual assistants. These virtual assistants answer consumers' questions, fix problems, and make recommendations while providing them with efficient, individualized care. Chatbots, which are always available and can manage several customer contacts at once, have made a big difference in the customer experience by guaranteeing timely and personalized support. Higher customer satisfaction and greater customer loyalty are the outcomes of this change.

The banking and finance sector's investment management has been greatly impacted by AI. By analyzing vast amounts of market data, news, and past trends, artificial intelligence systems facilitate well-informed financial choices. In the end, these algorithms improve investment performance and help financial institutions maximize returns for their clients by playing a critical role in portfolio management, risk assessment, and trading strategy creation. The application of AI in banking and finance has many benefits, but it also presents difficulties and moral dilemmas. The most important of them is data security and privacy, since AI applications use significant volumes of sensitive consumer data. Strong security measures must be put in place by financial institutions to protect client privacy and stop data breaches. To maintain fairness and prevent discriminatory results, biases in previous data must also be addressed. To regulate the ethical application of AI and advance accountability, justice, and transparency, frameworks and rules must be established.

1.1. AI-Driven Services in Uganda Commercial Banks

The financial landscape across the globe is undergoing a transformative shift, driven by rapid technological advancements. One of the most significant contributors to this transformation is the integration of Artificial Intelligence (AI) into financial services. In the context of Uganda, this integration holds immense potential, offering innovative solutions to longstanding challenges and opening up new avenues for financial growth and inclusion.

Commercial Banks has emerged as a major force in reshaping the financial industry, especially in emerging markets (Zalan & Toufaily, 2017). AI innovation is promising. It offers capabilities that can change perceptions of service quality and delivery, redefining the essence of financial transactions (Manser et al 2021). From chatbots

offering customer support to sophisticated algorithms predicting market trends, AI-driven financial services are setting new standards in efficiency, accuracy, and customer experience.

The potential of AI in Uganda's banking services is not limited to individual transactions. On a macro level, AI can aid in risk assessment, fraud detection, and regulatory compliance, ensuring a more secure and transparent financial environment. Furthermore, AI-driven insights can guide investment strategies, fostering economic growth and stability in the region. However, the integration of AI into the Ugandan banking sector is not without challenges. Regulatory frameworks need to evolve to accommodate the rapid pace of technological advancements. There is a pressing need for policies that strike a balance between promoting innovation and ensuring consumer protection. Collaboration between traditional banking institutions and AI Engineers to provide those services can pave the way for a harmonized approach, ensuring that the benefits of AI-driven banking services are realized without compromising on security and ethics. While challenges exist, the potential benefits far outweigh the hurdles. With the right strategies and collaborations, AI can indeed revolutionize Banking services in Uganda, ushering in an era of unprecedented growth and inclusion.

1.2. Conceptual Background

The historical development of Information Technology in Banking in Commercial Banks operations is a narrative of transformation and innovation, driven by the confluence of emerging technologies like AI with the country's unique Banking challenges. The term AI is the simulation of human intelligence processes by machines, enabling computers to learn, reason, solve problems, perceive, and make decisions, often through technologies like machine learning and natural language processing, to perform complex tasks typically requiring human intellect. It ranges from narrow systems solving specific tasks (like voice assistants) to more advanced systems aiming for human-like cognitive abilities, improving with data and experience.

Historically, Uganda's Banking sector grappled with challenges such as limited access to the Internet, high transaction costs of the Internet and a lack of transparency. However, the emergence of AI technologies, such as blockchain and big data analytics, has provided avenues to address these challenges. These technologies have enhanced operational efficiency, reduced costs, disrupted existing industry structures, and democratized access to financial services (Li & Xu, 2021).

One of the most transformative aspects of AI evolution in Uganda is the application of machine learning algorithms. These algorithms have optimized Banking Institution and digital banking performance, ensuring smoother operational flows and more efficient risk assessment.

Furthermore, it has played a pivotal role in streamlining payment operations, fraud detection, and risk assessment by analyzing historical data and customer behavior across payment networks (Lăzăroiu et al., 2023). The integration of blockchain technology (like the FIA & Bank of Uganda) is working on frameworks, while universities (Makerere, KIU) and the Blockchain Association of Uganda drive adoption and training. Key applications include secure property titles, transparent procurement, cross-border payments, and even exploring a Ugandan CBDC, though regulatory clarity remains a key challenge. In particular, has ushered in a new era of transparency and security in Banking transactions, reducing risks and ensuring better regulatory compliance (Chinoda & Mashamba, 2021).

AI deployment in Uganda is occurring in a regulatory vacuum. While the Data Protection and Privacy Act (2019) provides some coverage, it fails to address AI-specific risks such as autonomous decision-making and algorithmic transparency. Without a robust framework, AI risks violating customer rights and undermining trust in financial institutions.

While AI offers transformative potential for Uganda's banking sector, its deployment is occurring in a regulatory vacuum. There is limited empirical research on how commercial banks navigate legal and ethical challenges associated with AI. Most commercial banks that are rapidly digitizing their operations exemplify the tension between innovation and governance. Without a robust framework, AI applications risk violating customer rights, exacerbating inequalities, and undermining trust in financial institutions.

Prior to the last two decades before the dawn of the millennium, financial institutions across the country were operating manually, thus reducing the prevalence of internet fraud, which has today become the order of the day in Ugandan banks. On the other hand, with the adoption of Artificial Intelligence (AI) in Uganda financial institutions, the debate as to whether its integration has enhanced banking efficiency and operations, customer satisfaction, competitive advantage, reduction of internet fraud, etc., has remain questionable and debatable. A survey of Centenary Banks branches in cross Northern Uganda, Lango Sub region as a case in point, shows that the adoption of AI is still very low, not just due to employee sabotage but because the needed environment to make it a success in every sector of the economy, vis-avis, improve power (electricity) supply, favorable technological environment through space satellite transmission, required training etc. are not made available. This underscores the need for the adoption of AI in banks and the need for a legal and ethical implications framework, which this study seeks to justify.

Mohammed (2019) opined that AI, sometimes called Machine Intelligence, is intelligence demonstrated by machines in contrast to natural intelligence displayed by humans and other animals. Artificial Intelligence addresses the crucial question of what knowledge is required in any aspect of thinking, how that knowledge should be presented, and how that knowledge should be used. Mohammed (2019) further states that Artificial Intelligence (AI) is a branch of computer science. It involves developing a computer program to complete tasks that would otherwise require human intelligence. AI algorithms can tackle learning, perception, problem-solving, language-understanding and or logical reasoning. Caner and Bhatti (2020) identified AI traits to include being capable of predicting and adopting, makes decisions on its own, conditions learning, forward-looking and capable of motion and perception. However, many countries have not yet developed an AI legal frame to mitigate legal crisis.

1.3. Problem Statement

While AI offers transformative potential for Uganda's banking sector, its deployment is occurring in a regulatory vacuum. There is limited empirical research on how commercial banks navigate legal and ethical challenges associated with AI. Most Commercial Banks, which are rapidly digitizing their operations, exemplifies the tension between innovation and governance. Without a robust framework, AI applications risk violating customer rights, exacerbating inequalities, and undermining trust in financial institutions.

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1.3.1. Purpose of the Study

The purpose of this study is to understand the legal and ethical implications framework for AI application in Ugandan commercial banks, with a focus on Centenary Bank Apac Branch. The framework will be informed by empirical data, recent literature, and stakeholder perspectives.

1.3.2. Objectives of the Study

- To assess the current AI applications in the Commercial Bank.
- To examine the legal and ethical challenges associated with AI in Ugandan banking.
- To evaluate stakeholder awareness and perceptions of AI governance.
- To propose a contextualized framework for legal and ethical AI deployment in commercial banks.

1.3.3. Research Questions

1. What AI technologies are currently in use at Commercial Banks in Uganda ?
2. What legal and ethical challenges arise from AI deployment in Ugandan commercial banks?
3. How do stakeholders perceive the risks and benefits of AI in banking?
4. What framework can guide responsible AI adoption in Uganda's banking sector?

2. Literature Review

AI Adoption in banking, AI-driven services such as robo-advisors and fraud detection are increasingly deployed to enhance operational efficiency. In Uganda, while adoption is in its infancy, institutions are moving toward "smart banking" by 2030. This scholarly and policy literature on the legal and ethical implications of Artificial Intelligence (AI) in banking, with a focus on the Ugandan context. It explores global and local perspectives on AI governance, ethical risks, regulatory gaps, and sector-specific applications in commercial banking. The review is structured around four key themes:

1. AI adoption in banking,
2. legal frameworks and regulatory challenges,
3. ethical considerations, and
4. contextual gaps in Uganda's financial sector.

2.1. AI-Driven Banking Services

AI Adoption in Commercial Banking, such as chatbots, robo-advisors, fraud detection systems, and credit scoring algorithms are increasingly deployed in commercial banks to enhance operational efficiency and customer experience. Norton Rose Fulbright highlights that banks use AI for customer onboarding, transaction monitoring, and compliance with anti-money laundering regulations. These applications rely heavily on customer data, raising concerns about privacy and consent.

In Uganda, AI adoption is still at an infant stage but growing. Yusuf et al. note that both public and private institutions are exploring AI-driven solutions, although implementation remains uneven due to infrastructural and regulatory limitations. Centenary Bank, as a leading indigenous institution, has begun integrating digital tools, positioning itself as a potential AI adopter.

The global financial landscape has witnessed significant transformations in recent years, primarily driven by the dual expansion of financial innovation in terms of product variety and the adoption of Information and Communications Technologies (ICTs). This transformation has implications for cost efficiency, information asymmetries, and the overall dynamics of the financial market. The deployment of ICTs in financial markets has

facilitated international capital flows, reduced transaction costs, diminished information asymmetries, and presented new investment opportunities for both novice and experienced investors (Li & Xu, 2021).

Schumpeterian economics posits that financial development fosters innovation, which in turn stimulates economic growth by disrupting existing economic models and technologies. Financial development encompasses the adoption of innovation-driven improvements in financial instruments, markets, and intermediation, positively impacting information, regulation, and transaction costs. In this context, the emergence of AI, driven by formidable advances in technology and communication, represents a new segment in the financial sector (Zarrouk, El Ghak, & Bakhouche, 2021).

The economic impact of AI-driven Banking services is multifaceted in the country, but it still faces unique challenges. The integration of AI and other advanced technologies offers promising solutions by optimizing operational efficiency, reducing costs, and democratizing access to financial services. AI-driven Technologies solutions hold the potential to drive economic growth, foster financial inclusion, and reshape the Uganda financial landscape.

Integrating Artificial Intelligence (AI) into the Banking sector has changed how financial services are delivered and consumed. This transformative change, while offering numerous benefits, also presents a set of unique legal challenges, especially in the Uganda context. The rapid pace of technological advancements in the Banking sector has outstripped the evolution of regulatory frameworks, leading to a potential misalignment between innovation and regulation.

One of the primary legal considerations revolves around data protection and privacy. AI-driven financial platforms rely heavily on vast amounts of data to train their algorithms and offer personalized financial solutions. This data often includes sensitive personal and financial information. In the absence of robust data protection laws, there is a risk of misuse or unauthorized access to this data, leading to potential breaches of privacy (Sciarrone Alibrandi et al., 2019).

Another significant legal challenge pertains to accountability and transparency. AI algorithms, by their very nature, can be complex and opaque. Decisions made by these algorithms, especially in the realm of credit assessments or investment strategies, can have profound implications for consumers. Without clear regulatory guidelines on algorithmic transparency and explainability, there is a risk of unfair or discriminatory practices.

Furthermore, the decentralized nature of many AI-driven financial platforms, especially those leveraging blockchain technology, poses jurisdiction and dispute resolution challenges. Traditional legal frameworks are often ill-equipped to handle cross-border transactions and disputes arising from decentralized platforms. In Uganda, these challenges are further compounded by the failure to enact laws and legal and regulatory landscapes in the country.

While AI-driven financial services offer immense potential for growth and financial inclusion in Uganda, Africa, they also bring a set of complex legal considerations to the fore. Addressing these challenges requires a harmonized approach, with regulators, industry stakeholders, and legal experts collaborating to create a conducive environment for the sustainable growth of AI in the Banking sector in Uganda.

2.2. Traditional Banking versus AI-Driven Integration Banking

Banking sector has been a foundational pillar of the global financial system. Characterized by brick-and-mortar establishments, face-to-face customer interactions, and a reliance on manual processes, traditional banking

has been both reliable and steadfast. However, it has often faced criticism for its inefficiencies, limited accessibility, and a one-size-fits-all approach that lacks personalization.

Enter the era of Artificial Intelligence (AI). This transformative technology, marked by its human-like intelligence and advanced algorithms, has begun redefining the banking landscape's contours. While traditional banking practices have been rooted in established norms and procedures, AI-driven financial platforms are pushing the boundaries of what is possible. These platforms, leveraging the power of AI, offer enhanced efficiency and speed. Algorithms can process vast amounts of data in real-time, enabling instantaneous decision-making and rapid service delivery. This is a stark contrast to the often sluggish pace of traditional banking operations.

Furthermore, the personalization offered by AI-driven platforms is unparalleled. These platforms can tailor financial solutions to specific needs, desires, and financial histories by analyzing individual customer data. This level of customization enhances customer satisfaction and fosters loyalty, a significant departure from the generic offerings of traditional banks.

Accessibility is another domain where AI shines. AI-powered platforms, especially when integrated with mobile and online banking solutions, break free from the constraints of traditional banking hours, offering services round the clock. This 24/7 accessibility ensures that customers can access financial services whenever and wherever they need.

The security enhancements brought about by AI cannot be understated. Advanced algorithms can detect and prevent fraudulent activities in real-time, ensuring the safety and security of financial transactions and instilling greater confidence in customers.

2.3. AI and Commercial Banks in the Ugandan Context

Addressing our second objective requires understanding the African and, specifically, Ugandan Commercial Banks landscape. In Africa, AI integration into Banks remains sporadic and underdeveloped, representing a critical problem for continental development. While Africa's youth demographic (60% under and increasing mobile penetration (46% in 2023)) presents opportunities, persistent challenges, including inadequate infrastructure, insufficient funding, and weak digital governance, limit AI adoption. Research by recent studies revealed that Africa's AI discourse remains largely policy-oriented in the smallest percentage of Commercial Banks, with few large-scale implementations in education. This gap between policy and practice represents a fundamental problem that our study addresses. Only South Africa, Kenya, and Rwanda have made significant progress, with initiatives like Rwanda's AI-powered chatbots for student support showing 60% improvement in query resolution times.

In Uganda specifically, the challenges are more pronounced, directly relating to our research problem. The Fourth.

The Industrial Revolution Strategy and National AI Policy Framework acknowledge education as a priority, but lack.

actionable frameworks. The study finds that less than 10% of Ugandan higher education institutions have piloted AI initiatives reveals the extent of the implementation gap. This statistic alone justifies our research focus on understanding barriers and identifying solutions.

2.4. Benefits of AI in Banking

The incorporation of AI technologies automates manual processes, mitigating human error and reducing processing times. By automating repetitive tasks, AI systems boost operational efficiency, streamlining various banking operations. This results in expedited and more precise transaction processing, account management, and data analysis.

Improved Decision Making: AI algorithms demonstrate prowess in handling vast amounts of data and extracting valuable insights. In the realm of banking and finance, AI-based systems contribute to more accurate risk assessments, robust fraud prevention measures, and sophisticated investment strategies. These insights empower financial institutions to make informed, data-driven decisions, thereby enhancing overall decision-making processes.

Cost Reduction: The integration of AI in banking and finance yields significant cost reductions. Through the automation of manual tasks, financial institutions can optimize resource allocation and curtail operational expenses. Additionally, AI-based systems contribute to improved risk management, lowering the likelihood of financial losses.

2.5. Citizen Involvement in Shaping an AI-Friendly Legal Framework

The rapid technological advancements in the financial sector, particularly with the integration of Artificial Intelligence (AI), have underscored the importance of stakeholder engagement in shaping AI-friendly legal environments. Engaging stakeholders from diverse backgrounds, including policymakers, financial institutions, technology providers, and consumers, is crucial to ensure that the regulatory frameworks are adaptive and responsive to the evolving needs of the financial ecosystem.

In the Uganda case, stakeholder engagement has been identified as a critical component in understanding and addressing the challenges associated with the conservation and management of these spaces (Guenat et al., 2021). Similarly, in the financial sector, engaging stakeholders can provide insights into the perceived benefits and challenges associated with AI-driven financial solutions. Such engagement can facilitate the identification of the legal framework and how the existing regulatory frameworks operate, and provide direction for the development of AI-friendly regulations.

Engaging stakeholders from different jurisdictions can provide insights into the diverse regulatory environments and facilitate the development of consistent and harmonized regulations. Such collaborative efforts can ensure that financial institutions can operate seamlessly across borders while adhering to the regulatory requirements of each jurisdiction.

3. Research Methodology

A descriptive research design was used, which involved a description of the phenomena under study. Survey of the population used to reflect detail information in relation to the study. This design was selected for its consistent ability to fulfill the objectives of the Legal and Ethical Implication Framework for Artificial Intelligence Application in Ugandan Commercial Banks (Burns and Burns, 2012). The other benefits that ignited the use of this method are: cost effectiveness, provides a broad scope and its use of existing data, and it is also good for academic purposes. Existing literature was used to arrive at the conclusion and recommendations of this article.

3.1. Findings and Discussions

This section provides an in-depth examination of the data collected during fieldwork, covering the demographic characteristics of the respondents. Furthermore, it conducts a comprehensive discussion to establish

correlations among the data gathered from different respondents. The analysis of findings focuses on both independent variables and the dependent variables, namely the legal and ethical implication framework for Artificial Intelligence application in Ugandan Commercial Banks, focusing on Centenary Banks.

3.2. Demographic Profile of Respondents

The study recognized the importance of investigating the characteristics of the study population, as this aided in the analysis and interpretation of data. Participants were asked about their gender, age, marital status, and educational attainment, all of which were considered essential factors in comprehending the collected data.

Table 1. Demographic profile of respondents

	Variable	Frequency	Percentage (%)
Gender	Male	67	54.2
	Female	60	45.8
	Total	**127**	**100.0**
Age of Respondents	Below 30 years	14	8.2
	31-35 years	55	26.9
	36- 40 years	14	21.5
	41-45 years	32	22.1
	46- 50 years	10	11.3
	51 and above	5	10.0
	Total	**127**	**100.0**
Level of Education	Certificate	25	12.8
	Diploma	41	18.2
	Bachelor's Degree	42	42.7
	Master's Degree	7	18.2
	PhD	6	1.5
	Others	16	6.6
	Total	**127**	**100.0**
Duration of work	Below 1 year	40	22.3
	1-4 years	16	27.1
	5-7 years	37	37.6
	8-10 years	27	10.2
	Above 10 years	6	2.8
	Total	**127**	**100.0**

Source: Study findings (2026).

In terms of gender distribution, the majority, comprising 67 individuals (54.2%), identified as male, while 60 individuals (45.8%) identified as female within Centenary Bank, Stanbic Bank, Post Bank, and UBA Bank. Most respondents fell within the age range of 31 to 35 years, representing an average of 55 individuals (26.9%) from the sample. Following closely were respondents aged between 41 and 45 years, accounting for 32 individuals (22.3%) of the total sample. Additionally, 32 respondents (22.1%) were aged between 46 and 50 years.

Regarding educational attainment, the findings revealed that the majority of respondents, comprising 42 individuals (42.7%), held a Bachelor's degree. Following this, 41 respondents (18.2%) had attained a Diploma. Those with a

Master's accounts were 7 (18.2%), and PHD were 6 (1.5%) respondents, respectively. Additionally, 16 Individuals (6.6%) had acquired other levels of education.

In terms of tenure at these banks, Centenary Bank, Stanbic Bank, Post Bank, and UBA Bank, the majority of respondents, totaling 37 individuals (37.6%), reported working for 5 to 7 years. This was followed by 40 respondents (22.3%) who had been with the bank for only 1 year. Furthermore, 16 respondents (27.1%) stated they had worked for 1 to 4 years, while 27 respondents (10.2%) had work for 8-7 years of experience. Finally, 6 respondents (2.8%) indicated they had been employed in the Banking sector for 10 years.

3.3. Effect of Artificial Intelligence on the Performance of Commercial Banks

These real-world examples show how AI is applied in finance and banking. They demonstrate how the banking industry benefits from Artificial Intelligence (AI) technologies by enhancing efficiency, accuracy, and customer satisfaction in a number of areas, such as fraud detection, customer service, risk management, investment management, and authentication procedures. Enhanced Efficiency and Better Decision Making: By automating manual procedures, AI technologies have reduced processing times and mitigated human error. Increased operational efficiency from this automation results in faster and more accurate account management, data analysis, and transaction processing. Large-scale data processing is a strength of AI algorithms, which helps with sophisticated investment strategies, strong fraud protection measures, and more accurate risk assessments. These developments enable financial organizations to make data-driven, well-informed judgments. Cost Savings and Improved Customer Experience, by improving resource allocation and streamlining operations, the application of AI has led to significant cost savings. Chatbots and other AI-powered customer care solutions offer clients quick, individualized assistance, which increases customer happiness and loyalty. Because chatbots are always available, they guarantee prompt and Tailored assistance.

These achievements demonstrate the capacity for AI research addressing challenges in the integration of AI in Centenary Banks in the Lango sub-region. However, they also reveal a critical gap in that research excellence has not translated into teaching or administrative applications, limiting institutional transformation.

This visualization illustrates the levels of different AI applications in Centenary Banks, Awareness and Perception applications, Regulatory Context of AI in Centenary Banks, Presence of general legal context, Absence of Specific AI Framework, Significant Legal & Ethical Implications of AI, Banks Bear Primary Liability for Errors, AI Decisions are Fair & Transparent in the application of the operation AI.

Table 2. Effect of Artificial Intelligence on the performance of commercial banks

Application Areas	Development Awareness	Progression in %
Awareness and Perception	80%	80 %
Regulatory Context of AI in Commercial Banks	52%	31%
Presence of general legal context	80%	80%
Absence of Specific Al Framework	54%	54%
Significant Legal & Ethical Implications of AI	76%	76%
Banks Bear Primary Liability for Errors	80%	80%
Al Decisions are Fair & Transparent	60%	60%

3.3.1. AI Application Development Stages at Centenary Banks in the Lango Sub-Region

80% of stakeholders are aware of AI applications in their banks. Users primarily interact with AI through chatbots, fraud detection systems, and automated lending services,60% of respondents recognize that AI usage carries significant legal and ethical implications. 54% acknowledge a total absence of specific AI decision-making frameworks. There is a clear consensus that current regulations do not specifically address the implementation of AI in banking decisions.

80% of stakeholders are aware that AI use carries inherent risks regarding privacy, consent, and potential bias, 60% believe AI decisions are currently fair and transparent. This high level of trust is attributed to perceived human oversight and robust internal governance frameworks, 80% agree that banks must bear primary liability for AI errors. Respondents believe that because the bank controls the technology and the customer relationship, it should be legally responsible for any bias or error.

The gap between research capability and institutional implementation represents a core problem. AI implementation in commercial banks remains a big challenge due to a low AI literacy rate, little Administrative embracement of AI systems in banks, causing slow catch-up of AI implementation. The Uganda Institute of Banking and Financial Services has signed a strategic partnership with Vision Africa AI and AUI Global to accelerate the adoption of artificial intelligence in the banking sector. The collaboration aims to close the digital skills gap, equip professionals with responsible AI capabilities, and expand financial inclusion, particularly for vulnerable communities.

3.4. AI Uptakes in Centenary Banks

Commercial banks in Uganda are actively adopting AI to automate routine processes like loan processing, enhance fraud detection, and deliver personalized customer services. Institutions are deploying AI-driven virtual assistants (chatbots, Leo) and predictive analytics to expand financial inclusion and drive digital transformation across the country. Most customers are becoming aware of this innovation.

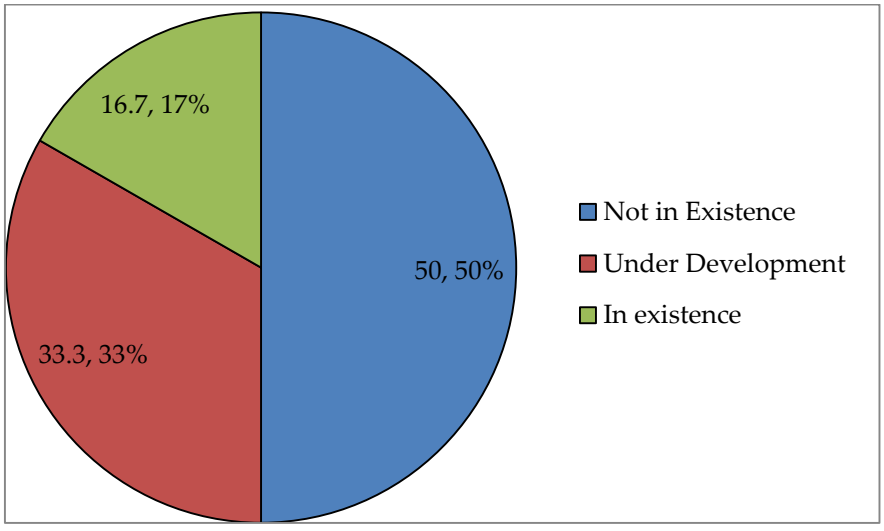


Fig. 1 Awareness about AI use in Centenary Bank

The respondents were probed to understand if there are any laws or regulatory frameworks related to AI usage and development in Centenary Bank. The study established that there are no laws or regulations. Frameworks (50%) are not in place, while other respondents (33.3%) claim they are under development. The framework mentioned (16.7%) is in existence related to AI adoption and cyber risk management. The majority

(50%) stated that the absence of an AI policy negatively impacts AI innovation and deployment. However, 33.3 per cent claim there is no impact, as shown in Figure 2, possibly because they do not know that the ecosystem exists.

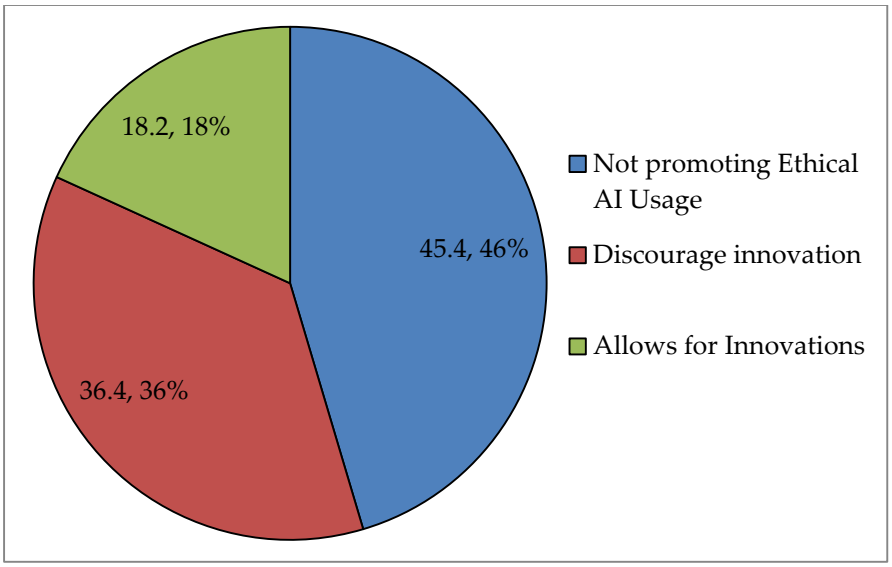


Fig. 2 Impact of absence of policies on AI in Uganda

The negative impact is that it discourages research and development (36.4%) as well as not promoting ethical AI use and risk mitigation (45.4%). Some respondents, however, argue that the unregulated AI space (18.2%) allows for innovations. The transformative power of AI will enhance strategic decision-making capability and improve efficiency as it will allow for rapid identification and resolution of complex problems. Furthermore, in the private sector, AI technology will increase the speed of innovation, reduce operational costs and time-to-market. On the lack of legal and regulatory frameworks, 48.2 per cent stated that it positively impacts AI innovation and deployment in the various sectors, and 35.1 per cent do not see any impacts. The remaining 16.7 per cent stated that the absence impacts innovation and deployment negatively. This is a noticeable positive impact of AI.

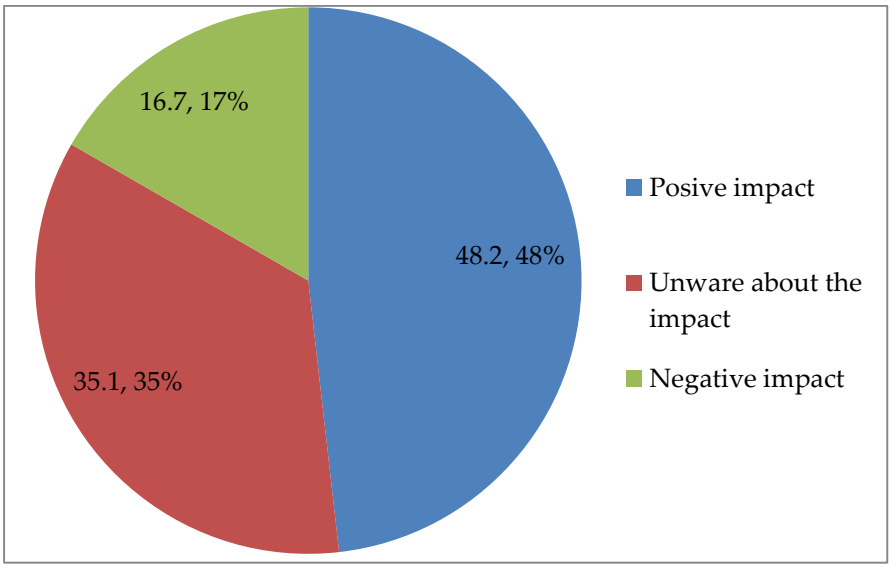


Fig. 3 Impact of legal and regulatory framework

Lack of legal and regulatory frameworks to support the responsible use of AI does not foster innovation in Banking, and does not build trust and customers' confidence, security, and address legal challenges introduced by AI. AI-related risks as a result of the absence of a legal framework.

Table 3. AI-related risks associated with the lack of AI regulations and ethical implications

Legal frameworks/initiatives are lacking in Uganda	Response (%)
Data protection and privacy	45.5
AI ethics and fairness	9.1
Intellectual property rights in AI	13.6
AI Accountability and Liability	9.1
Regulation and AI-based decisions	9.1
Human rights in the context of AI	9.1
Cyber laws in transactions	4.5

The respondents (45.5%) raised issues of data privacy and protection as the biggest concern within MDAs due to the sensitivity of data held, which can raise legal concerns in the event of privacy violation. Intellectual property rights in AI were the second most raised issue (13 .6%), and this relates to ownership, protection, and ethical use of intellectual property. AI ethics and fairness (9.1%) together with human rights in the context of AI (9.1%) are of some concern, and this relates to the deployment of AI systems across sectors such as finance, health, economy, and employment due to the potential for bias, discrimination, and violations of fundamental human rights. Accountability and liability (9.1%) together with regulation and AI-based decision-making (9.1%) were of concern due to transparency, fairness, and ethical implications, which are essential for creating a future where AI-based decision-making is aligned with societal values and human rights. Cyber laws (4.5%), which deal with legal frameworks and regulations designed to address the intersection of AI and cybersecurity, were of less concern to the respondents, possibly because of a lack of awareness.

The legal and regulatory frameworks in Uganda do not significantly address most of the risks associated with AI ecosystem development and deployment in Uganda; there is a need for policies to address social and societal risks resulting from AI applications, such as job losses. Lack of AI policy (25%) is perceived as the biggest gap in the current initiative to develop a legal and regulatory framework around AI development and deployment, as shown in the figure.

Table 4. Banks where AI is being applied

Banks	Response (%)
Centenary Bank	30.8
UBA	16.1
Stanbic Bank	22.4
Post Bank	16.1
Standard Chartered Bank	9.6
Equity Bank	5.0

In the finance sector, AI supports areas such as economic analysis and policy formulation, especially in macroeconomic forecasting. The government can use AI models for economic forecasting, allowing for better fiscal policy decisions.

Financial institutions that are using AI solutions in Uganda Banking Sector are Centenary Bank (30.8%), UBA (16.1%), Stanbic Bank (22.4%) Post Bank (16.1%) Standard Charted Bank (9.6%) and Equity Bank (5.0%) Developing an AI solution requires technical expertise, strategic planning, and access to the right tools and technologies to build a scalable, efficient, and impactful AI solution. Financial support is necessary in the development of AI solutions due to the significant costs associated with various stages of their lifecycle. These costs arise from the need for specialized talent, advanced infrastructure, tools, and ongoing maintenance.

At least 91.7 per cent of banking executives intend to implement AI in their institution. Out of the Banking institutions sampled, 18 % intend to deploy chatbots and other AI tools, and another 21% per cent intend to implement AI to support forecasting in their organizations. Other AI services respondents plan to implement include AI for loan appraisal (6.1%), AI for optimization (7.2%), AI for financial management (10.9%), AI for predictions (9.8%), AI for image and text analysis (9.2%), and AI for risk identification (9.5%).

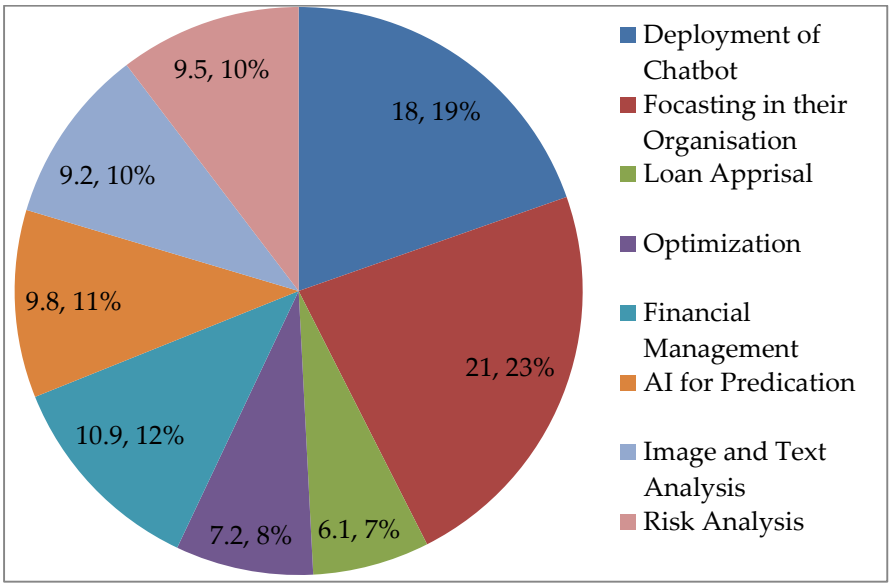


Fig. 4 Banking executive focast on AI usage

3.5. Legal and Ethical Challenges

The primary legal concerns revolve around data protection and jurisdiction. Current Ugandan laws, including the Computer Misuse Act (2011), do not specifically address AI-specific liabilities. Ethically, the lack of institutional capacity to monitor algorithmic decisions increases the risk of harm, particularly in rural branches with low digital literacy.

Uganda lacks a comprehensive legal framework specifically tailored to AI. Existing laws, such as the Data Protection and Privacy Act (2019), the Computer Misuse Act (2011), and the Electronic Transactions Act (2011), offer partial coverage but do not address AI-specific risks such as algorithmic bias, liability, and autonomous decision-making.

CM Advocates LLP argue that the evolution of AI law in Uganda is likely to follow a hybrid path—through both statutory reform and judicial interpretation. The absence of clear legal standards for AI accountability poses challenges for banks, especially in cases of automated credit denial or erroneous fraud detection. Globally, the European Commission's Ethics Guidelines for Trustworthy AI emphasize the need for legal robustness and

respect for fundamental rights. These principles are yet to be localized within Uganda's financial regulatory environment.

Uganda, with its unique blend of cultures, languages, and economic landscapes, presents a distinct set of challenges and opportunities for the integration of AI into its financial ecosystem. One of the primary challenges is the vast linguistic diversity. With many languages spoken across the country, developing AI solutions that cater to this diversity is a monumental task. Additionally, establishing trust in AI-driven platforms is crucial. Many segments of the Uganda population are wary of new technologies, and building trust is essential for widespread adoption.

Data security is another significant concern. With increasing instances of cyber-attacks and data breaches globally, ensuring the security of sensitive financial and personal data is paramount. However, these challenges also present opportunities. By addressing linguistic diversity, AI-driven platforms can reach a broader segment of the population, fostering greater financial inclusion.

Furthermore, by ensuring robust data security measures, AI platforms can instill confidence in users, leading to greater adoption rates. Collaborations between traditional banks, fintech companies, and AI solution providers can further accelerate the integration of AI into the Ugandan financial landscape, leading to a more inclusive and efficient financial ecosystem.

The significance of this review lies in its potential to guide stakeholders in understanding the transformative power of AI in the financial sector and its implications for Uganda's future. By addressing the objectives outlined, this study aims to offer a roadmap for harnessing the benefits of AI-driven financial services while mitigating potential crises.

Ethical concerns in banking AI include fairness, transparency, human oversight, and informed consent. Norton Rose Fulbright warns that relying on implied consent for data use in AI systems is legally risky and ethically problematic. Banks must ensure that customers are aware of how their data is used and that AI systems do not perpetuate discrimination.

Yusuf et al. emphasize that Uganda's ethical governance of AI is underdeveloped, with limited institutional capacity to monitor algorithmic decisions. The lack of ethical guidelines increases the risk of harm, especially in rural branches like Lira, where digital literacy may be low.

Given these emerging challenges, there is a pressing need to evaluate the adequacy of existing regulatory frameworks and enforcement mechanisms. The current legal rules governing the Computer Misuse Act, 2011, and Amendment Act, 2022, the Electronic Transactions Act, 2011 and Copyright and Neighboring Rights Act, 2006, which may not be equipped to address the unique challenges posed by increasingly autonomous trading agents, further complicate regulatory efforts (Azzutti, Ringe & Stiehl, 2021).

We are in a world where the financial sector is witnessing rapid technological advancements, and the need for robust regulatory frameworks is even more pronounced. The integration of AI-driven financial solutions in the Uganda market presents unique challenges that require tailored regulatory responses. Engaging stakeholders, including policymakers, financial institutions, technology providers, and consumers, is crucial to ensure that the regulatory frameworks are adaptive and responsive to the evolving needs of the financial ecosystem.

As AI continues to reshape the financial landscape, there is an urgent need to evaluate and adapt the existing legal frameworks to ensure that they are equipped to address the unique challenges posed by AI-driven financial solutions.

4. Conclusion

Industrial AI can be the foundation of digital transformation and business innovation in Uganda, leading to a new stage of growth and advancing Uganda industries and technologies. AI systems will be making decisions that affect the future of Uganda. However, the adoption of AI technologies in Uganda faces challenges, including a lack of technical skills, uncertainty, a lack of structured data, a lack of government policies, ethics, and user attitudes. As the capabilities for autonomous decision-making grow, perhaps the most important issue to consider is the need to rethink responsibility. Being fundamentally tools, AI systems are fully under the control and responsibility of their owners or users.

However, their potential autonomy and capability to learn meant that design should consider accountability, responsibility, and transparency principles in an explicit and systematic manner. The development of AI algorithms has so far been led by the goal of improving performance, leading to opaque black boxes. Putting human values at the core of AI systems calls for a mind shift among researchers and developers, towards the goal of improving transparency rather than performance. This could lead to novel and exciting techniques and applications. In particular, this requires complementing the currently predominant individualistic view of AI systems with one that acknowledges and incorporates collective, societal, and ethical values at the core of the design, development, and use of AI systems.

The development of technology and the adoption of Artificial Intelligence in Banking business operations have significantly impacted the operations of most Commercial Bank institutions. Therefore, the need for the integration of AI in corporate business organizations should be holistically considered and the creation of a legal framework in the country of Uganda.

Banks and other financial institutions need to accelerate professionalism and inclusion of AI in their services through training, research and consultancy in areas of Artificial Intelligence to ensure they deliver customer-centric and relevant solutions. Although AI presents these opportunities, it also comes with risks that the government must address through proper governance and regulations.

4.1. Recommendations

As global client awareness grows, integrating artificial intelligence has become imperative for financial institutions seeking to maintain market competitiveness. Consequently, the Ugandan government ought to formulate a regulatory framework to guard against illegal AI practices, establish an official oversight body to monitor AI innovation and deployment across the country, and invest in strengthening digital literacy.

To ameliorate the challenges associated with the adoption of AI, Financial institutions should invest more in state-of-the-art information and communication technology equipment and train personnel to man the equipment. For smoother operations on the banking floor, banks in Uganda should begin the integration of robotics in banking activities, as is the case in other Western countries, where robots now render hands-free services to clients in real time.

Finally, for fraud detection and prevention, financial intelligence operations in the area of AI should be consolidated to curb fraudulent practices and encrypt cyber data to protect clients from fraudsters.

4.2. Suggestions for Further Studies

The researcher hereby advances that other researchers in the field of business research should investigate other aspects of AI applications in the world of business and finance, such as AI and business modulation, AI and Business Automation, AI and risk management, and AI and cultural diversity management.

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