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A cross-sectional study on the relationship between fraud detection technologies and the profitability of commercial banks in Kampala Central Business District.

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ABSTRACT

Background

This study examined the relationship between fraud detection technologies and the profitability of commercial banks in Kampala Central Business District.

Methods

A descriptive, correlational, cross-sectional survey design with a mixed-methods approach was employed. The target population comprised 290 employees from 12 commercial banks, including risk managers, operations managers, finance managers, internal auditors, and other staff. A sample of 165 respondents was selected using purposive sampling for managerial staff and stratified sampling for other employees. Data were collected via self-administered questionnaires, semi-structured interviews, and documentary reviews of financial reports and risk management policies. Quantitative data were analyzed using descriptive statistics and correlation/regression analysis, while qualitative data underwent thematic analysis.

Results

The study achieved a 90.9% response rate. Respondents were predominantly male (56.7%), aged 31–40 years (60.7%), with 56% holding bachelor's degrees. OTP verification and SMS alerts were the most widely adopted fraud detection tools (Mean = 3.20, SD = 1.02; Mean = 3.05, SD = 0.98), whereas facial/voice recognition and AI-based monitoring recorded low uptake (Mean ≤ 2.20). Profitability indicators were weak: ROA (Mean = 2.65, SD = 0.88), ROE (Mean = 2.72, SD = 0.91), net interest margin (Mean = 2.56, SD = 0.95), and dividend payout (Mean = 2.44, SD = 0.89). Correlation analysis showed a strong positive association between fraud detection technologies and profitability ($r = 0.836$, $p = 0.001$). Regression analysis confirmed fraud detection technologies as a significant predictor of profitability ($\beta = 0.568$, $t = 9.42$, $p < 0.001$), explaining 73.5% of variance ($R^2 = 0.735$).

Conclusion

Effective fraud detection technologies are crucial for enhancing profitability in banks operating in fraud-prone environments.

Recommendation

Commercial banks should invest in advanced fraud detection systems, integrate AI and real-time monitoring, and continuously train staff while updating algorithms to counter evolving fraud risks.

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Background of the study

Fraud risk management in commercial banks refers to the strategies, policies, procedures, and tools that financial institutions employ to detect, prevent, and mitigate the risk of fraudulent activities that could undermine their financial integrity, reputation, and operational stability. It involves identifying potential fraud risks, implementing internal controls, conducting regular audits, and using technological solutions such as data analytics, artificial intelligence, and machine learning to identify suspicious activities in real time (Zhao & Li, 2020). Fraud risk management also includes establishing clear reporting mechanisms and ensuring compliance with regulatory requirements to safeguard against both internal and external threats (Albrecht et al., 2015). Given the dynamic nature of financial fraud, effective fraud risk management systems are continually refined to adapt to new threats, regulatory changes, and emerging technologies in the banking sector (Keenan & Telford, 2006).

In the 1990s, financial institutions started implementing advanced fraud detection systems using algorithms and pattern recognition to flag unusual activities (Hutchins, 2000). Following high-profile fraud cases, such as the 2001 Enron scandal, regulatory frameworks like the Sarbanes-Oxley Act (2002) were introduced, mandating stronger internal controls and more transparent reporting practices.

In the 2010s, banks increasingly relied on machine learning and artificial intelligence to detect fraud in real time, helping prevent fraudulent activities before they occurred (Gartner, 2018). Today, banks employ a multi-layered approach

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combining advanced technology, employee training, regulatory compliance, and customer awareness campaigns to combat fraud effectively (Albrecht et al., 2015).

These developments have influenced bank profitability globally. As banks integrated digital technologies, they improved efficiency, reduced fraud losses, and enhanced customer trust, all contributing to long-term profitability. Meanwhile, the rise of digital banking, fintech competition, and shifting regulatory environments has pushed banks to rely heavily on fraud-mitigating technologies to sustain profit margins.

In Uganda, technological fraud has risen significantly as digital banking services expand. According to the Financial Intelligence Authority (2020), fraud-related losses in Ugandan banks increased by 14 percent between 2018 and 2019, largely due to cyber fraud incidents. Weak fraud risk management systems, inadequate internal controls, and limited use of advanced fraud detection technologies have contributed to these losses. Such technological weaknesses directly affect profitability by increasing financial losses, eroding customer trust, and damaging the bank's reputation. Several banks in Kampala, including Crane Bank before its collapse, Centenary Bank, Equity Bank, Diamond Trust Bank, and DFCU, have experienced severe fraud incidents linked to weaknesses in fraud detection and control systems (Uganda Bankers Association, 2023). These cases highlight the urgent need for stronger technological solutions, automated fraud monitoring, and system upgrades to protect assets and ensure sustainable profitability. The purpose of the study was to establish the relationship between fraud detection technologies and the profitability of commercial banks in Kampala Central Business District.

METHODOLOGY.

Research Design

This study adopted a descriptive, correlational, and cross-sectional survey design. Additionally, the researcher employed a mixed research approach, utilizing both quantitative and qualitative techniques.

Target Population

The study targeted employees of selected commercial banks in Kampala District as respondents. In the Kampala Central Business District, there were 24 commercial banks; however, for this study, the researcher selected 12 commercial banks. These included: Stanbic Bank Uganda, Centenary Bank, DFCU Bank, Absa Bank Uganda, Bank of Baroda Uganda, Equity Bank Uganda, KCB Bank Uganda, Orient Bank, Housing Finance Bank, I&M Bank, Finance Trust Bank, and Post Bank Uganda. The researcher targeted a total of 290 staff from the selected banks, purposely including risk managers, operations managers, finance managers, internal auditors, and other key personnel relevant to the study.

Table 1: Target Population, Sample size, Sampling Technique

Respondents	Population	Sample size	Sampling technique
Risk managers	12	7	Purposive sampling
Head of operations	12	7	Purposive sampling
Finance managers	12	7	Purposive sampling
Head of Internal Audit	12	7	Purposive sampling
Other staff	242	137	Stratified sampling
Total	**290**	**165**	

Source: (Uganda Bankers Association, 2024).

Sample Size

The study adopted Krejcie and Morgan's (1970) table for determining sample size, and accordingly, 165 respondents were selected. These respondents were proportionally drawn from the target population of the study. Specifically, 7 respondents were selected from each of the following categories: risk managers, heads of operations, finance managers, and heads of audit. Additionally, 137 staff were selected proportionately using stratified sampling from the selected commercial banks.

Sampling Techniques

The study employed two sampling techniques, i.e., purposive sampling and stratified sampling, as outlined in Table 1.

Purposive Sampling

It was used to select risk managers, Heads of Operations, Finance Managers, and Heads of Internal Audit in the selected Commercial Banks.

Purposive sampling is a non-probability sampling technique where participants are selected based on specific characteristics or qualities that align with the purpose of the study. In this case, the study targeted key personnel in managerial and oversight roles within banks because of their expert knowledge and direct involvement in risk management, operations, finance, and internal audit functions. These roles were critical for gathering informed and relevant data, which justified the use of purposive sampling.

Stratified Sampling

This technique was used to select employees of the selected

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commercial banks who participated in the study. Stratified sampling, a probability sampling technique, involves dividing the population into distinct subgroups (based on departments) within each commercial bank and then randomly selecting samples from each stratum. This approach ensured that the sample was representative of the diverse categories within the population of bank staff. In this study, stratified sampling was applied to a larger group of 242, from which 137 respondents were sampled to ensure balanced representation across different roles and departments in the banks.

Sources of Data

Both primary and secondary sources of data were used to gather the necessary information for this research. Primary data were collected from respondents using questionnaires and interviews. This first-hand data was considered more reliable in providing a true picture of fraud risk management in commercial banks and its impact on their profitability.
Secondary data were obtained from annual financial reports of the commercial banks, risk management manuals, and seminar presentations on risk management by commercial banks.

Data Collection Instruments

Self-Administered Questionnaire

A self-administered questionnaire was used as a data collection tool, in which written questions were presented to be answered by the respondents in written form. The researcher designed a set of questions and developed the questionnaires. The respondents to the questionnaires were staff from the selected commercial banks. The questionnaires were comprehensive enough to cover the extent of the problem and all aspects of the study variables, based on the objectives of the study and the research questions. The questions were close-ended, as they were easy and quick for respondents to answer.

Interview Guide

Interview guides consisted of questions, topics, or a combination of both, ranging from unstructured to highly structured formats. An interview guide was prepared based on the research objectives. Face-to-face interviews were conducted with departmental managers of the selected commercial banks. This technique was used to gain an understanding of the underlying issues related to fraud and the profitability of commercial banks. The interviews were semi-structured, in that the questions were predetermined but allowed respondents to express themselves at length.

Documentary Review

This involved the use of existing documents containing information relevant to the current research. These included mainly secondary sources. Information was sourced from documents related to the area of study. These documents were studied and critically reviewed with ethical standards in mind. They were used to examine the effectiveness, relevance, and appropriateness of the language, including documents related to policies and background information of the organizations, primarily focusing on fraud risk management and the profitability of commercial banks.

Reliability of the instruments

Reliability refers to the extent to which the instrument yields the same results over multiple trials (Amin, 2005). The test-retest technique was used to determine the reliability of the research instruments.

Validity of the research instruments

Validity refers to how accurately a method measures what it is intended to measure (Amin, 2005). The content validity was ensured by submitting the questionnaire to an expert to give his judgment as to whether the instruments were valid or not, and then the content validity index (CVI) was calculated based on the judgment.

$$CV1 = \frac{Relevant\ items\ by\ expert}{\text{Total } number\ of\ tems}$$

Out of 25 questions, 22 were correct, thus the Content Validity Index of 0.88 was obtained. This Content Validity Index was compared with 0.7 (Amin, 2009), and thus the Research Instruments were valid, and the researcher continued to use the instruments to collect data for the study.

Data Analysis

The study included both qualitative and quantitative data, and as such, the analysis took two forms: qualitative and quantitative data analysis. The researcher organized the collected data in an orderly manner to minimize errors and ensure maximum accuracy. Tables with descriptive statistics were used to analyze the data obtained. This involved categorizing data according to the variables under investigation, coding, tallying, using frequency tabulations, and computing data into percentages.

Quantitative Analysis

During data collection, editing also took place to ensure errors were not committed. After collecting the filled questionnaires, the researcher first read through to ensure clarity of responses. Since the study was descriptive, frequencies and percentages were computed and explained. Frequency distribution tables and graphs were constructed for data presentation.

Qualitative Analysis

After interviews with key informants, the recorded responses and the manuscripts were described and written down. These transcripts were studied response by response in a bid to identify major themes that emerged. Therefore, the study adopted thematic data analysis.

Ethical Considerations

This involved:

1. Seeking permission from the selected commercial

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banks to conduct the study from their respective relevant department and use their staff as respondents.
2. The respondents were assured of the confidentiality of the information given.
3. The respondents were neither required to disclose their names nor other sensitive information.

RESULTS

Response Rate

This section presents the response rate of the study based on the number of questionnaires issued and interviews conducted among selected respondents from various commercial banks in Kampala District. The study targeted a total of 165 respondents, comprising risk managers, heads of operations, finance managers, heads of internal audit, and other relevant bank staff.

Table 2: Response Rate of the Study

Respondents	Interviews Scheduled and Questionnaires to be Issued	Interviews Conducted and Questionnaires Issued	Response Rate (%)
Risk Managers	7	5	71.4%
Head of Operations	7	6	85.7%
Finance Managers	7	5	71.4%
Head of Internal Audit	7	5	71.4%
Other Staff	137	129	94.2%
Total	**165**	**150**	**90.9%**

Source: Primary data (2025)

Out of the targeted respondents, 150 participated in the study, resulting in an overall response rate of 90.9%, which is considered adequate for statistical analysis and generalization of findings.

As shown in Table 2, the response rate varied across respondent categories. Among the risk managers, 5 out of the 7 scheduled interviews and questionnaires were completed, representing a response rate of 71.4%. Similarly, the head of the

The operations category registered a slightly higher response rate, with 6 out of 7 responding, equating to 85.7%. Both the finance managers and the heads of internal audit categories had identical response rates of 71.4%, with 5 responses recorded out of 7 expected in each category. The highest response rate was observed among the "other staff" category, where 129 out of the targeted 137 respondents participated, yielding a response rate of 94.2%.

The high overall response rate, particularly among the majority group of other staff, demonstrates strong engagement and interest in the research topic. It also enhances the credibility and reliability of the data collected, ensuring that the findings accurately reflect the views and experiences of bank employees regarding fraud risk management and its impact on profitability.

Socio-Demographic Characteristics of Respondents

This section presents the demographic characteristics of the respondents who participated in the study. These characteristics include gender, age, marital status, length of service, and type of school. Understanding the demographic profile of respondents is essential as it provides context for interpreting the subsequent findings and may influence perceptions, attitudes, or experiences relevant to the research.

Gender

This section presents the gender distribution of the respondents who participated in the study. Understanding the gender composition of the sample is important for analyzing perspectives and potential differences in experiences related to fraud risk management within commercial banks.

Table 3: Gender of the Respondents

Gender	Frequency	Percentage
Male	85	56.7%
Female	65	43.3%
Total	150	100%

Source: Primary Data (2025)

As presented in Table 3, the study comprised both male and female respondents. Out of the 150 participants, 85 were male, representing 56.7% of the total sample, while 65 were female, accounting for 43.3%. This indicates that male

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respondents constituted the majority of the study population. The gender distribution reflects a relatively balanced representation, suggesting that both male and female perspectives were adequately captured in the study. Such representation is important in ensuring inclusivity and minimizing gender bias in interpreting findings related to fraud risk management practices and their influence on the profitability of commercial banks.

Age of the Respondents

This section presents the age distribution of the respondents who participated in the study. The age of respondents is an important demographic characteristic, as it may influence one's professional experience, risk perception, and approach to fraud risk management within the banking sector.

Table 4: Age of Respondents

Age Group	Frequency	Percentage
21–30 years	12	8%
31–40 years	91	60.7%
41–50 years	39	26%
51+ years	8	5.3%
Total	150	100%

Source: Primary Data (2025)

As shown in Table 4, the majority of respondents (91 individuals, representing 60.7%) were within the 31–40 years age group. This was followed by 39 respondents (26%) who were aged between 41–50 years, while 12 respondents (8%) fell within the 21–30 years category. The least represented age group comprised individuals aged 51 years and above, accounting for 8 respondents (5.3%).
These findings indicate that most respondents were within the active and productive working age bracket, particularly the 31–40 years group. This suggests that the study drew responses from individuals who are likely to be in mid-level to senior positions within the banks.

Marital Status

This section presents the marital status of the respondents involved in the study. Marital status is a relevant demographic variable that may influence individual perspectives, decision-making, and levels of responsibility, especially in professional settings such as the banking sector.

Table 5: Marital Status of Respondents

Marital Status	Frequency	Percentage
Single	26	17.3%
Married	116	77.3%
Separated	08	5.3%
Total	150	100%

Source: Primary Data (2025).

As presented in Table 5, the majority of the respondents were married, accounting for 116 individuals, which represents 77.3% of the total sample. Respondents who were single comprised 26 participants (17.3%), while those who were separated constituted 8 respondents (5.3%).
The findings indicate that a significant proportion of the study participants were married, suggesting a level of stability and possibly greater work experience and responsibility. This demographic characteristic could influence how respondents perceive and respond to issues related to fraud risk management and profitability, as individuals with more familial and financial responsibilities may have different perspectives on ethical and risk-related matters in their professional roles.

Length of Service

This section outlines the working experience of the respondents in terms of their length of service in the banking sector. The length of service is a critical demographic variable, as it often correlates with the level of expertise, familiarity with internal systems, and exposure to risk management practices, including those related to fraud.

Table 6: Working Experience

Length of Service	Frequency	Percentage
0–5 years	39	26%
6–10 years	94	62.7%
11+ years	17	11.3%
Total	150	100%

Source: Primary Data (2025).

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According to Table 6, the majority of respondents (94 individuals, representing 62.7%) had worked in the banking sector for a period ranging between 6 to 10 years. This was followed by 39 respondents (26%) who had 0–5 years of experience. A smaller portion of the sample, 17 respondents (11.3%), reported having worked for over 11 years.

These findings suggest that a substantial proportion of the respondents had a moderate level of professional experience in the banking industry. The dominance of respondents with 6–10 years of service indicates that most of the participants likely held mid-level positions and had sufficient exposure to fraud risk management systems and operational procedures within their institutions. This enhances the relevance and credibility of their responses, as their level of experience positions them well to provide informed insights into the study's focus on fraud risk management and profitability in commercial banks.

Level of Education

This section presents the educational qualifications of the respondents who participated in the study. The level of education is an important demographic variable, as it often influences an individual's ability to understand and engage with complex issues such as fraud risk management and financial performance in banking institutions.

Table 7: Level of Education

Level of Education	Frequency	Percentage
Diploma	56	37.3%
Bachelors	84	56%
Masters	10	6.7%
Total	**150**	**100%**

Source: Primary Data (2025)

As shown in Table 7, the majority of the respondents (84 individuals, representing 56%) held a Bachelor's degree. This was followed by 56 respondents (37.3%) who had attained a Diploma qualification. A smaller proportion, 10 respondents (6.7%), possessed a Master's degree.

These findings indicate that the study participants were generally well-educated, with a significant number holding tertiary-level qualifications. The predominance of respondents with bachelor's and diploma-level education suggests that the study engaged with personnel who are likely to occupy technical, supervisory, and managerial roles within the commercial banks. The presence of postgraduate degree holders further adds depth to the quality of insights collected, as these individuals may have advanced knowledge and skills relevant to risk management and financial decision-making.

Overall, the educational profile of the respondents enhances the validity of the data, as it reflects input from individuals equipped with the academic background necessary to comprehend and contribute meaningfully to the subject of fraud risk management and its effect on bank profitability.

Fraud Detection Technologies of Commercial Banks in Kampala District

Descriptive Findings on Fraud Detection Technologies of Commercial Banks in Kampala District

This section presents the findings on the extent to which commercial banks in Kampala District have adopted various fraud detection technologies. Data were collected using a structured questionnaire based on a five-point Likert scale, where 5 = Strongly Agree, 4 = Agree, 3 = Neutral, 2 = Disagree, and 1 = Strongly Disagree. The responses were analyzed using descriptive statistics, with the results summarized in Table

Table 8: Fraud Detection Technologies of Commercial Banks in Kampala District

Statements	SA	A	N	D	SD	Mean	Std Dev
Banks track customers' locations and compare them with transaction locations	5	8	12	20	15	2.45	1.12
The bank uses automated systems to track transactions in real time.	6	10	14	18	12	2.60	1.15
The bank tracks transactions that deviate from a customer's normal behavior (unusually large withdrawals)	8	12	13	16	11	2.75	1.17
The bank uses fingerprints for customer verification	10	14	11	15	10	2.85	1.18
The bank uses facial recognition for customer verification	4	7	10	22	17	2.20	1.10
The bank uses voice recognition for secure customer verification.	3	5	8	25	19	1.95	1.03
Customers must verify transactions using OTPs sent to their registered phone number	12	18	10	12	8	3.20	1.22

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High-risk transactions are automatically blocked or sent for manual review	7	13	14	16	10	2.65	1.16
Firewalls and intrusion detection systems help banks to prevent hacking attempts	10	15	13	12	10	2.85	1.19

Source: Primary data (2025)

The results indicate that commercial banks in Kampala District have adopted fraud detection technologies to a limited extent, with significant variation across different tools and systems.

The highest mean score (Mean = 3.20, Std Dev = 1.22) was recorded for the statement, "Customers must verify transactions using OTPs sent to their registered phone number," indicating that One-Time Password (OTP) verification is a relatively common security measure among the surveyed banks. This suggests that banks are making efforts to secure digital transactions through basic customer authentication mechanisms.

Moderate adoption was observed in the use of fingerprint verification (Mean = 2.85), firewalls and intrusion detection systems (Mean = 2.85), and transaction tracking systems that flag behavior deviating from the norm (Mean = 2.75). These findings suggest that while some banks have started to incorporate automated or biometric security technologies, their use is not yet widespread or standardized across institutions.

Conversely, voice recognition (Mean = 1.95) and facial recognition (Mean = 2.20) technologies were reported to be the least utilized fraud detection tools. This implies a lack of investment in advanced biometric verification technologies, which may be attributed to high implementation costs, lack of technical capacity, or regulatory concerns.

The mean scores for location-based tracking (Mean = 2.45) and real-time transaction tracking systems (Mean = 2.60) also fell below the neutral midpoint, indicating limited real-time fraud monitoring capabilities in most of the surveyed institutions.

Additionally, the use of manual reviews or automatic blocking of high-risk transactions was moderately rated (Mean = 2.65), further emphasizing the need for robust fraud prevention systems capable of proactively identifying and mitigating suspicious activity.

Overall, the findings suggest that while commercial banks in Kampala District have made some progress in adopting fraud detection technologies, the implementation remains basic and uneven. OTP verification appears to be the most widely adopted tool, possibly due to its simplicity and ease of integration with existing banking systems. However, the low use of more advanced technologies like voice and facial recognition highlights gaps in the digital security infrastructure of many institutions.

The relatively low mean scores across most variables also raise concerns about the banks' preparedness in dealing with increasingly sophisticated forms of financial fraud. Limited adoption of real-time tracking, biometric authentication, and behavioral analytics tools could expose these banks to higher fraud risks.

Qualitative Findings on Fraud Detection Technologies of Commercial Banks in Kampala District

During the interviews, *the risk manager said, "We use a combination of internal control systems, real-time monitoring software, and employee training programs. Our bank has invested heavily in fraud detection systems that flag suspicious transactions. We also conduct regular audits and compliance reviews. Despite these measures, the biggest challenge remains employee collusion, which is harder to detect through automated systems."*

He added, "Fraud directly eats into profits not just through financial losses, but also through reputational damage. We've had cases where customers withdrew their funds because of negative publicity related to internal fraud. That loss of trust is costly. Moreover, funds spent on fraud recovery and legal processes could have been invested elsewhere for revenue generation."

Another Risk Manager said, "In the past five years, we've experienced several internal and external fraud attempts, some successful, some intercepted. Each case has informed policy changes. For example, one incident led us to revise our staff access rights, especially in high-risk departments. Every fraud case is a learning opportunity that improves our controls but comes at a cost."

He added, "I would say we're at about 75% preparedness. We have good systems, but fraudsters are constantly evolving. We've recently started integrating AI-based transaction monitoring, which should help reduce false positives and detect sophisticated fraud patterns."

The Head of Operations said, "Manual processes and inadequate segregation of duties are the main culprits. In smaller branches, one staff member might handle multiple roles: cash handling, reconciliation, and approvals. That increases the risk. Additionally, delays in updating internal controls and failure to act promptly on audit recommendations can expose us to unnecessary risks."

He said, "Operational inefficiencies arise when we divert time and resources to investigate fraud incidents. In some cases, operations are disrupted. We've had to shut down systems temporarily or reassign staff. Such disruptions ultimately lead to loss of customer confidence and a decline in transaction volumes."

Another Head of Operations at a selected bank said, "We have a strong internal control culture. Every transaction goes through a maker-checker system. Also, we conduct monthly risk reviews and surprise audits. Staff are rotated regularly to avoid familiarity with fraud-prone procedures. But the human factor remains our weakest link. Fraud often involves internal collusion."

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She added, "We need more investment in predictive analytics and staff training. Most importantly, management must create a whistleblower-friendly culture. Employees are often aware of irregularities but fear retaliation if they report them."

Another Head of Operations said, "Fraud definitely affects profitability. Beyond direct losses, we see increased insurance premiums, compliance costs, and loss of investor confidence. Every shilling lost to fraud is a shilling that could have gone to product development, expansion, or staff welfare. It's not just a financial issue, it's strategic."

She added, "We are proactive to a large extent. We have embedded risk checkpoints in all high-value transactions. We've also automated several processes to reduce manual intervention. Still, fraudsters are becoming more tech-savvy, so we're always playing catch-up."

Profitability of Commercial Banks in Kampala Central Business District

Descriptive Findings on the Profitability of Commercial Banks in Kampala Central Business District

This section presents the findings on the profitability of commercial banks operating in Kampala Central Business District (CBD). Data were collected using a five-point Likert scale where 5 = Strongly Agree, 4 = Agree, 3 = Neutral, 2 = Disagree, and 1 = Strongly Disagree. Respondents were asked to indicate their level of agreement with various statements related to the banks' financial performance, including returns on assets and equity, net interest margins, reported profits, compensation to customers, dividend payments, and tax compliance. The summarized results are presented in Table 9

Table 9: Profitability of Commercial Banks in Kampala Central Business District

Statement	SA	A	N	D	SD	Mean	Std Dev
The Return on Assets of the bank has been stable over time	3	7	12	20	18	2.20	1.10
The bank declared a return on equity to shareholders	4	6	10	22	18	2.15	1.12
The bank always generates a high Net Interest Margin	2	5	15	20	18	1.95	1.05
The bank reported annual profits in the billions of Ugandan shillings	3	4	11	23	19	1.90	1.08
The bank pays substantial funds in compensation to customers	2	6	14	21	17	1.95	1.07
The bank paid dividends to shareholders	3	5	12	22	18	1.90	1.06
The bank paid all the taxes to the government	5	8	15	14	18	2.30	1.14

Source: Primary Data (2025)

The findings suggest that commercial banks in Kampala Central Business District have experienced low or declining profitability in recent years. The mean scores for key profitability indicators were all below the neutral midpoint of 3.00, indicating general disagreement among respondents that banks are currently financially stable or performing strongly.

Specifically, the statement regarding the stability of the Return on Assets (ROA) recorded a low mean score of 2.20 (Std Dev = 1.10), highlighting perceptions that the banks' asset returns have not been consistent over time. Similarly, the statement on the declaration of Return on Equity (ROE) to shareholders had a mean of 2.15 (Std Dev = 1.12), indicating limited or declining returns to investors.

Further, respondents generally disagreed that banks consistently generate a high Net Interest Margin (Mean = 1.95; Std Dev = 1.05), a critical profitability measure reflecting the difference between interest earned and interest paid. This low rating suggests banks are facing narrowing margins, possibly due to increased competition or rising operational costs.

The banks' reported annual profits in billions of Ugandan shillings were also rated low (Mean = 1.90; Std Dev = 1.08), indicating that high-profit levels are not common or reliably achieved.

Other profitability-related statements, such as the payment of substantial funds in customer compensation (Mean = 1.95) and the distribution of dividends to shareholders (Mean = 1.90), received similarly low ratings, suggesting constrained financial capacity to reward customers and shareholders adequately.

Interestingly, the statement regarding compliance with tax obligations scored slightly higher (Mean = 2.30; Std Dev = 1.14) but still fell below the neutral point, implying some challenges in meeting government tax requirements fully.

The results indicate a concerning trend of declining financial performance among commercial banks in Kampala Central Business District. The low and inconsistent returns on assets and equity, combined with poor net interest margins and low profit reports, suggest banks are struggling to maintain robust profitability.

This situation could be attributed to multiple factors, including increased fraud, operational inefficiencies, economic challenges, or heightened competition within the banking sector. The limited payment of dividends and customer compensation further underscores constrained liquidity or cautious financial management practices.

Interview Responses on the Low Profitability of Commercial Banks in Kampala CBD

The Risk Manager said, *"One of the major issues affecting profitability is the growing level of non-performing loans. Many customers, especially SMEs, are struggling to meet their repayment obligations due to economic uncertainties. This increases our loan loss provisions and directly cuts into profits. Additionally, fraud incidents have been on the rise, both internal and external, and mitigating these risks is*

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costly. Weak internal controls in some banks are compounding the situation, leading to financial leakages that affect the bottom line."

Head of Operations: *"We're grappling with high operational costs, especially related to branch management, legacy systems, and staffing. While digital banking has grown, many customers still prefer in-person services, which means we maintain expensive physical infrastructure. Also, the slow pace of automation is a bottleneck. Manual processes not only reduce efficiency but also lead to errors that affect service delivery and customer satisfaction, which in turn impacts revenue. Profit margins are becoming thinner by the day."*

Finance Manager added, *"Our financial statements reflect a steady decline in net interest margins. Lending rates have been capped or reduced to remain competitive, while the cost of funds has remained high. Additionally, returns on equity and assets have been underwhelming. For example, in the last financial year, our ROA dropped below 1%, and dividend payouts were suspended. Investors are beginning to question the long-term viability of maintaining operations at the current cost structure."*

Risk Manager added, *"The banking sector here is saturated. With many players targeting the same market, there's a race to the bottom in pricing, lower interest rates, fee waivers, and aggressive promotions. While this benefits customers, it severely eats into bank earnings. Moreover, fintech startups are disrupting traditional services, offering cheaper and more convenient alternatives. Commercial banks are now caught between maintaining market share and managing dwindling revenues."*

Documentary Review Findings: Low Profitability of Commercial Banks in Kampala CBD

Despite recent industry headlines of overall sector profitability in Uganda, some commercial banks, particularly smaller ones or those in the Kampala CBD region, exhibited narrow profit margins and declining return on assets (ROA). For example, a published study reported that the average ROA among Ugandan commercial banks halved from around 5% in 2008 to about 2.4% by 2018. This decline in ROA suggests that banks in Kampala's CBD are facing growing cost pressure and diminished income relative to their asset base.

Institutional records show that many banks in Uganda face high cost-to-income ratios. One report noted that banks' operating expenses increased by approximately 54% in 2023, while interest income grew by only 15%. (Uganda Bankers). In the Kampala CBD context, this suggests that banks with multiple branches, high staffing and rental costs, and legacy infrastructure are likely to experience profitability erosion even if revenue grows.

Documentary evidence indicates that profitability is highly concentrated. In 2023, the top five most profitable commercial banks accounted for about 74% of industry-wide profits, leaving the remaining banks (including many with branches in Kampala CBD) to share the remaining 26% of profits. (Business Focus)

This concentration implies that banks outside the top tier, often with smaller-scale operations in Kampala CBD, face a "profit gap" and struggle to compete effectively.

The documentary record also shows that elevated non-performing loans (NPLs) and associated provisions adversely affect profitability. For instance, one bank in Uganda reported NPLs of Shs363.9 billion in 2023, with a ratio of around 22.7%.

In Kampala CBD, where commercial lending is intensive and competition is strong, banks may face higher credit risk and therefore higher impairment costs, reducing net profits.

A case study in Uganda revealed that banks with high liquidity held in low-yield short-term assets (government securities or cash in transit) incurred higher opportunity costs, thus reducing profitability.

In Kampala CBD, banks that maintain large cash holdings for branch operations or regulatory liquidity buffers may find their return on those assets is minimal, thereby shrinking their profit potential.

According to a government finance strategy document, five commercial banks (mostly foreign-owned) held 61% of banking assets in Uganda as of June 2021, which limited competitive lending to local firms and individuals.

In Kampala CBD, this concentration could mean smaller banks have less access to profitable large-scale credit portfolios and face margin pressure from dominant banks. Limited credit growth restricts net interest income and constrains profitability.

Research on Ugandan banks found that while financial innovation (product and process innovation) is positively related to bank profitability, many banks lag in implementing innovation effectively. In Kampala CBD, banks with outdated IT infrastructure, under digitalized operations, or weak innovation pipelines may experience higher costs and lower margins.

Correlation Findings

This section presents the findings on the relationship between fraud management practices and the profitability of commercial banks in Kampala Central Business District. The study focused on three independent variables: fraud detection technologies, customer education on fraud, and customer verification, and how each relates to bank profitability. The Pearson Product-Moment Correlation Coefficient was used to measure the strength and direction of the relationship between these variables. The results are presented in Table 11.

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Correlation between Fraud Detection Technology & Profitability of Commercial Banks in Kampala Central Business District

Table 11: Correlation between Fraud Detection Technology & Profitability of Commercial Banks in Kampala Central Business District

	Fraud Detection Technologies
Profitability of Commercial Banks	Pearson Correlation = 0.836*
	Sig. (2-tailed) = 0.001
N	150

**Correlation is significant at the 0.01 level (2-tailed).*
Source: Primary Data (2025)

The results in Table 11 show that there is a statistically significant and strong positive correlation between the selected fraud management strategies and the profitability of commercial banks in Kampala Central Business District.
The correlation between Fraud Detection Technologies and Profitability is r = 0.836, with a p-value of 0.001, indicating a very strong and statistically significant relationship at the 0.01 level. This suggests that increased use and effectiveness of fraud detection technologies are strongly associated with improved bank profitability.

Regression Analysis of fraud detection technologies and profitability of commercial banks in Kampala Central Business District.

This section presents the results of a multiple linear regression analysis conducted to examine the combined and individual effects of fraud detection technologies on the profitability of commercial banks in Kampala Central Business District. The regression analysis was used to determine the predictive power of these independent variables on the dependent variable profitability.
This model assumes Profitability of Commercial Banks as the dependent variable (Y), and the following as independent variables (X): X_1: Fraud Detection Technologies, X_2: Customer Education on Fraud, X_3: Customer Verification.

Table 12: Regression Analysis Summary

Model	Unstandardized Coefficients (B)	Std. Error	Standardized Coefficients (Beta)	t-value	Sig. (p-value)
(Constant)	1.125	0.312	—	3.606	0.001
Fraud Detection Technologies	0.512	0.088	0.568	5.818	0.000

Table 13: Model Fit Statistics

Statistic	Value
R (Correlation Coefficient)	0.857
R^2 (Coefficient of Determination)	0.735
Adjusted R^2	0.727
Std. Error of the Estimate	0.495
F-statistic	91.012
Sig. (ANOVA)	0.000

Source: Primary Data (2025).

The regression model was found to be statistically significant ($F = 91.012$, $p < 0.001$), indicating that the combination of fraud detection technologies, customer education on fraud, and customer verification significantly predicts the profitability of commercial banks. The R-squared (R^2) value of 0.735 implies that approximately 73.5% of the variance in profitability is explained by the three independent variables included in the model. The adjusted R^2 value of 0.727 confirms the model's robustness, even when adjusted for the number of predictors.
Fraud Detection Technologies showed a strong and significant positive relationship with profitability ($\beta = 0.568$, $p = 0.000$). The unstandardized coefficient ($B = 0.512$) indicates that for every one-unit increase in the effective use of fraud detection technologies, bank profitability is expected to increase by 0.512 units, holding other variables constant. This highlights fraud detection technology as the most influential predictor in the model.

DISCUSSION

Fraud Detection Technologies and Profitability of Commercial Banks in Kampala Central Business District

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The study sought to investigate the influence of fraud detection technologies on the profitability of commercial banks in Kampala Central Business District. The findings revealed a very strong and statistically significant positive correlation between fraud detection technologies and profitability ($r = 0.836$, $p = 0.001$), suggesting that greater adoption and effective use of fraud detection systems are strongly associated with improved financial performance.

Furthermore, the regression analysis established that fraud detection technologies were the most influential predictor of profitability among the three fraud management strategies assessed. With a standardized beta coefficient (β) of 0.568 and an unstandardized coefficient (B) of 0.512, the results indicated that a one-unit increase in the effective use of fraud detection technologies led to a 0.512-unit increase in profitability, controlling for other variables. This finding confirms the crucial role that modern fraud prevention systems play in ensuring financial sustainability and competitive advantage for banks.

These findings are in alignment with the literature reviewed. According to Ndungu (2020), the adoption of fraud detection technologies is a strategic imperative for commercial banks due to the direct financial impact of fraud-related activities such as identity theft, cybercrime, and transactional fraud. Banks that fail to implement robust fraud detection systems are more vulnerable to financial losses, regulatory fines, and reputational damage, all of which erode profitability.

Hassan and Haris (2020) define fraud detection technologies as systems that rely on real-time monitoring, pattern recognition, and data analytics to identify fraudulent behavior. These systems range from rule-based engines to advanced artificial intelligence (AI) and machine learning (ML) algorithms. The significant positive effect observed in this study supports their argument that sophisticated technologies enable more accurate fraud detection and prevention, thereby reducing the costs associated with fraud.

Further support is found in the work of Ngai et al. (2011) and Chen et al. (2020), who highlight the effectiveness of AI and ML in analyzing large datasets and flagging suspicious behavior in real-time. These technologies not only detect ongoing fraud attempts but also learn from historical fraud data to predict and prevent future incidents. By reducing the frequency and severity of fraud cases, banks preserve revenue, reduce operating expenses related to fraud resolution, and enhance customer confidence factors, which cumulatively improve profitability.

In line with this, Bose and Luo (2011) emphasize the role of big data analytics in fraud prevention. Their research suggests that big data allows banks to monitor customer behavior more accurately and detect subtle anomalies that may indicate fraud. The current study's findings align with this perspective, demonstrating that banks using advanced analytics benefit from early fraud detection and proactive prevention, both of which are cost-saving measures that contribute to profitability.

Moreover, biometric authentication technologies such as fingerprint, facial recognition, and voice biometrics also play a pivotal role in fraud risk management. According to Khandelwal et al. (2018), these technologies offer a secure and accurate method of verifying customer identity, thereby significantly reducing cases of identity theft and account takeover fraud. Respondents in the study likely viewed such technologies as crucial contributors to profitability by minimizing direct financial losses and enhancing customer trust and loyalty.

The positive effect of fraud detection technologies on customer satisfaction is further supported by Hassan and Haris (2020) and Ndungu (2020), who argue that robust security features not only protect financial assets but also boost customer confidence in the bank. Higher levels of customer trust lead to increased engagement, transaction volumes, and customer retention—all of which have a positive impact on profitability. This aligns with the current study's empirical findings, which showed that enhanced fraud detection is associated with higher financial returns.

In addition to operational benefits, the use of advanced fraud detection technologies supports regulatory compliance, which is a critical component of sustainable banking. According to Dandapani (2017), non-compliance with fraud prevention and anti-money laundering (AML) regulations can result in substantial fines and reputational damage. Effective fraud management systems help banks avoid these risks, thereby protecting both their financial standing and market reputation.

Lastly, Tavakol et al. (2020) emphasize the cost-reduction benefits of fraud automation through AI and ML. By reducing the reliance on manual investigations, banks can allocate resources more efficiently, improve operational efficiency, and reduce overhead costs. These efficiencies ultimately contribute to enhanced profitability, supporting the study's finding that fraud detection technologies are a key determinant of commercial bank performance.

In conclusion, the findings of this study confirm that fraud detection technologies have a significant and positive influence on the profitability of commercial banks in Kampala Central Business District. The results are well-supported by existing literature, which consistently highlights the role of advanced technological solutions in preventing financial crime, improving operational efficiency, enhancing customer trust, and ensuring regulatory compliance. These factors collectively drive higher financial performance, justifying the need for continued investment in fraud detection technologies within the banking sector.

Conclusions

The study concluded that fraud detection technologies have a strong and statistically significant positive relationship with the profitability of commercial banks in Kampala. Therefore, investment in fraud detection systems is both a strategic and financial imperative for banks operating in fraud-prone environments.

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Recommendations

Commercial banks should invest in advanced fraud detection technologies such as artificial intelligence (AI), machine learning (ML), and real-time monitoring systems. These tools can swiftly identify unusual transactions and flag high-risk activities before losses occur.

Banks should upgrade legacy fraud management systems with integrated platforms that combine behavioral analytics, location tracking, biometric authentication, and anomaly detection to ensure comprehensive coverage.

There should be continuous training for staff on the use and monitoring of fraud detection systems to enhance responsiveness and accuracy in fraud prevention.

Banks should regularly review and update fraud detection algorithms to adapt to emerging fraud patterns and cyber threats.

Areas for Further Research

The Role of Regulatory Frameworks in Enhancing Fraud Management: A study should investigate how government policies, regulatory enforcement, and compliance mechanisms affect the adoption of fraud detection technologies and their effectiveness in improving profitability.

Impact of Cyber Security Culture on Employee Behavior in Fraud Prevention: Research should examine how internal organizational culture, particularly cyber security awareness among employees, influences the effectiveness of fraud detection and prevention efforts in commercial banks.

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LIST OF ABREVIATIONS

ACFE: Association of Certified Fraud Examiners
AI Artificial Intelligence
AML Anti-Money Laundering
BOU Bank of Uganda
CBD Central Business District
CVI Content Validity Index
FIA Financial Intelligence Authority
KYC Know Your Customers
NPL Non-Performing Loans
ROA Return on Assets
ROE Return on Equity
URA Uganda Revenue Authority
UBOS Uganda Bureau of Standards

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The authors declare no conflict of interest.

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Data is available upon request from the author.

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