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Table of Contents

Content Details:

Nnanna Kalu-Mba *Information Technology Solutions Office, United Nations Population Fund (UNFPA)*	**Machine Learning for Predicting Displacement Patterns in Conflict Zones: Lessons from South Sudan**

Abstract

This paper describes a simple machine learning (ML) model that can be used to project the number of people displaced in South Sudan, where conflict and floods have left four million people homeless. Because humanitarian organisations want to react faster, predicting possible displacement areas plays a key role. The findings from the International Organization for Migration's Displacement Tracking Matrix (DTM) were applied to train and analyze Random Forest and LSTM machine learning models.

In most cases, both models were useful, while Random Forest worked well and gave better accuracy. Using features such as where people were displaced, when this happened and the reasons can help anticipate possible conflict and flood-related displacements. It also brings up ethical issues such as privacy and tackling bias and it advises combining AI with local knowledge.

The outcomes indicate that ML assists in alerting stakeholders to diverse upcoming issues within South Sudan. So, AI can support decision-making in humanitarian aid and is potentially useful for countries such as Yemen and the DRC.

1. Introduction and Background

After gaining independence in 2011, South Sudan has largely experienced troubles related to humanitarian issues due to fighting and climate disasters. It is reported by Gilbert et al. (2018) that four million people were displaced in Syria through political violence, inter-tribe conflicts and flooding in broad regions. Since many families have to move away in a sudden hurry, it makes it very hard for organizations to help them with basic needs such as food, shelter and security.

South Sudan's present humanitarian response is largely reactionary. It is common for help to arrive after people have already left their homes which causes some problems, wrong use of supplies and even harm (Pham & Luengo-Oroz, 2022). As a result of these delays, there are often many refugees in the camps, too little food and poor medical treatment. It is hard for humanitarian workers to respond properly when information about the timing and location of displacement is unavailable or out of date.

In this situation, predictive analytics and machine learning (ML) provide valuable tools. Rather than responding as incidents occur, models can be used to foresee displacement before it takes place. Using past relocations, historical rainfall, reports of violence and shifts in population, ML models can guess what may cause future relocations. As explained by Hanna et al. (2023), ML makes it easier to spot regions and groups in need of support before an emergency or disaster hits.

ML models are now being looked at more often for addressing these kinds of humanitarian issues. Though most models are currently applied in business or healthcare, new studies indicate that they could also be applied to conflict and forced migration (Thalheimer et al., 2024). Researchers have used different models such as LSTM and the Random Forest type, to predict the occurrence

of landslides and these models have worked well (Duan et al., 2023; Ma et al., 2020). These models can forecast how conflict may cause people to be displaced through the use of past data provided by humanitarian agencies.

However, using ML in humanitarian situations leads to its own problems. Incomplete or missing information in the data often decreases how accurate the model is. Because these areas keep changing and can be very unpredictable, the models must be reviewed and changed often. Thirdly, using AI in places that are sensitive can lead to problems related to data being misused or to AI supporting existing biased systems (Hansen & Pang, 2023). All systems created for international financial support should be open and independent and the perspectives of those involved locally should be sought.

This study aims to use a machine learning framework to anticipate how many people are likely to be displaced in South Sudan using information from the Displacement Tracking Matrix (DTM). The purpose of the framework is to determine which ML model works the best when new data is not available. The models will be evaluated to check whether they are able to spot situations such as violent attacks or floods.

The research will focus on three main questions:

1. Can machine learning models predict displacement triggers with more than 80% accuracy?
2. How do ensemble models (like XGBoost) compare to deep learning models (like LSTM) when dealing with sparse and noisy data?
3. What are the ethical risks of using AI in conflict-affected regions, and how can these risks be reduced?

The questions are examined to encourage a move towards proactive humanitarian aid. Experience from South Sudan can guide other countries in better using similar systems to prevent crises.

2. Literature Review

Machine Learning in Humanitarian and Conflict Settings

In the past decade, ML has started to become more popular for assisting in humanitarian issues, particularly in crisis areas. Many groups and professionals are investigating whether predictive models can be used to predict different disasters such as armed conflicts, floods or outbreaks. They rely on a lot of data to spot repeated trends and alert humanitarian workers early, so they are prepared and can take action more efficiently.

2.1. Machine Learning in Humanitarian Settings

Pham and Luengo-Oroz (2022) proposed a framework that employs machine learning to forecast refugee and IDP movements. It points out that more predictive tools are now needed to enable aid organizations to take action sooner and manage their resources well. A paper by Hanna et al. (2023) explained that using ML allows officials to focus help on those in danger of being displaced, using information like their location, data on current conflicts and movements they have taken before. The use of these models might help humanitarian groups assist more effectively in places like South Sudan that are not stable.

2.2 Applications in Conflict and Disaster Zones

In places like South Sudan, where both conflict and climate affect people, ML models can predict when and where displacements will happen. In their research, Thalheimer and his team (2024) found that rapid changes in people's movements are usually the result of sudden attacks together with other surroundings. Using time-series analysis, time-series data is collected on the spot and sent to ML to help find what will cause interruptions.

Such models use studies on landslides and floods together with those on hurricanes. In the studies of Niu et al. (2021) and Ma et al. (2020), many statistical and machine learning techniques were applied to predict landslides. The software recognizes typical trends in data with these strategies. For example, Duan et al. (2023) and Lin et al. (2023) carried out research applying LSTM and CNN–BiLSTM algorithms based on deep learning to find movement in land. Being mainly concerned with natural disasters, these methods can also forecast displacement through analysis

of rainfall, consequences of violence and lack of business activity.

2.3. Challenges in Low-Data Environments

A main challenge in conflict areas is that it is often difficult to get accurate data.. Many places experiencing humanitarian crises do not keep datasets that are regularly collected. According to Pham and Luengo-Oroz (2022), if there are gaps in data or unstructured information, ML may not perform as expected. Because of a lack of infrastructure and security challenges in South Sudan, getting data from distant areas can be difficult.

Bias is another subject to be worried about. When the data is unbalanced, the models may miss minority or marginalized groups in the results. The authors of this paper, Gilbert et al. (2018), mentioned that policies that control refugee movement can be missed if they are not included in the data which can give a wrong impression. If, because of conflict, a certain ethnic group experiences more displacement but appears less in the training data, the model can underestimate the probability they will face displacement.

For these challenges, analysts often recommend looking at a variety of data sources including satellite photos, online messages and surveys. Thalheimer et al. (2024) believe that flexible models should be used, as they can change when new data is provided.

2.4. Ethical Considerations in Fragile States

The use of ML tools brings many advantages, but it also causes some problems related to ethics, mainly in countries where stability is an issue. Hansen and Pang (2023) stress that careful ethical rules are important when using private information during humanitarian response. If predictive models are handled incorrectly, this can result in bad policies for society and put the most vulnerable people at more risk.

There is also a possibility that these actions worsen current inequalities. Should AI systems receive biased inputs, they could recommend measures that benefit few groups. Because of this, being transparent, including the community and validating locally matters a lot in making ML

tools for humanitarian work (Hanna et al., 2023).

3. Methodology

The main goal of this study is to design a straightforward machine learning (ML) system that can predict trends in displacement in South Sudan. Being for a conference context, the paper uses approaches that are clear, effective and dependent on standard, public data and tools that anyone can use. The aim is to demonstrate clear results without using hard or time-wasting processes.

3.1. Data Source: Displacement Tracking Matrix (DTM)

The research relies primarily on the Displacement Tracking Matrix (DTM) from the International Organization for Migration (IOM). It documents population movements, the reasons for these movements (for instance, floods or violence) and what help is required for affected people. It reflects the latest data and describes many regions throughout South Sudan. The data is easily available and is good for people new to machine learning (Pham & Luengo-Oroz, 2022).

We will utilize DTM data covering the years 2015 to 2023 for training and testing the models. The data has fields such as date, place, number of people affected, reason for displacement (event, flood) and type of help provided. When there is minor cleaning (such as filling in blanks or correcting mistakes), I will use Microsoft Excel or pandas from the Python library.

3.2. Preprocessing Steps (Easy and Fast)

The initial stage in ML is preprocessing which involves organizing the data for study. We will do the following basic steps:

1. Handling Missing Data: Fill in missing values using simple methods like forward fill (copying the previous value) or replacing them with the most common value (mode).
2. Label Encoding: Convert words like "flood" or "conflict" into numbers using label encoding so that the ML model can process them.
3. Feature Selection: Keep only the most useful variables (e.g., region, date, trigger type) and

drop unnecessary columns.

The steps described here are easy to implement using either Python functions or spreadsheet tools.

3.3. Model Selection: Ensemble and Time-Series Models

We simplify the model design by using Random Forest and LSTM (Long Short-Term Memory) which are known for their accuracy and are easy to get started with.

3.3.1. Random Forest (Easy and Reliable)

Random Forest uses many decision trees together and calculates the final result by averaging their findings. Since it works well with small datasets, decision trees are popularly used for solving classification problems.

- Why use it? It runs smoothly, has a low chance of fitting badly and gives high-quality results with no adjustments.
- How it works? The algorithm decides if displacement may occur using trends, weather information and reports about conflicts.
- Tools used: Python with the `scikit-learn` library.

According to studies by Ma et al. (2020) and Hanna et al. (2023) ensemble methods like Random Forest are found to work well in humanitarian and environmental forecasting.

3.3.2. LSTM (Basic Version)

A time-series forecasting model called LSTM belongs to the group of deep learning models. It is able to understand patterns in repeated sequences, one of which being monthly displacement.

- Why use it? It is useful when looking at trends over years.

- How it works? The model checks things such as the regularity of rainfall or frequency of attacks to project the risk of displacement.
- Tools used: Google Colab (free online tool) with Python and `Keras` library.

Duan et al. (2023) and Lin et al. (2023) applied LSTM to obtain landslide movement predictions. We handle displacement in the same way.

3.4. Model Evaluation

Assessing model performance will be done using these metrics:

- Accuracy: How reliable the model is in its predictions.
- F1 Score: It matches precision and recall to make sure the results are correct.
- Confusion Matrix: A simple chart that displays how the model did at correctly and incorrectly predicting results.

These are common metrics that scikit-learn can create without extra effort. The accuracy we are trying to achieve is 80% or above (Pham & Luengo-Oroz, 2022).

4. Results

This section explores the outcomes of testing two machine learning algorithms—Random Forest and LSTM (Long Short-Term Memory) on data about displacement in South Sudan. The main purpose was identifying which model is more effective at predicting occasions when displacement happens due to conflict and floods.

4.1. Model Overview and Setup

The models were trained using data taken from the International Organization for Migration's Displacement Tracking Matrix for years 2015 to 2023. Among the variables in the dataset were location, date, what led to the movement (e.g., flood or conflict) and how many people were

affected.

We trained the model with 80% of the data and tested it using the remaining 20%. Simple performance metrics were applied to study every model.

- Accuracy – how often the prediction is correct
- F1 Score – balance between precision and recall
- Precision – how many predicted displacements were correct
- Recall – how many real displacements were correctly predicted

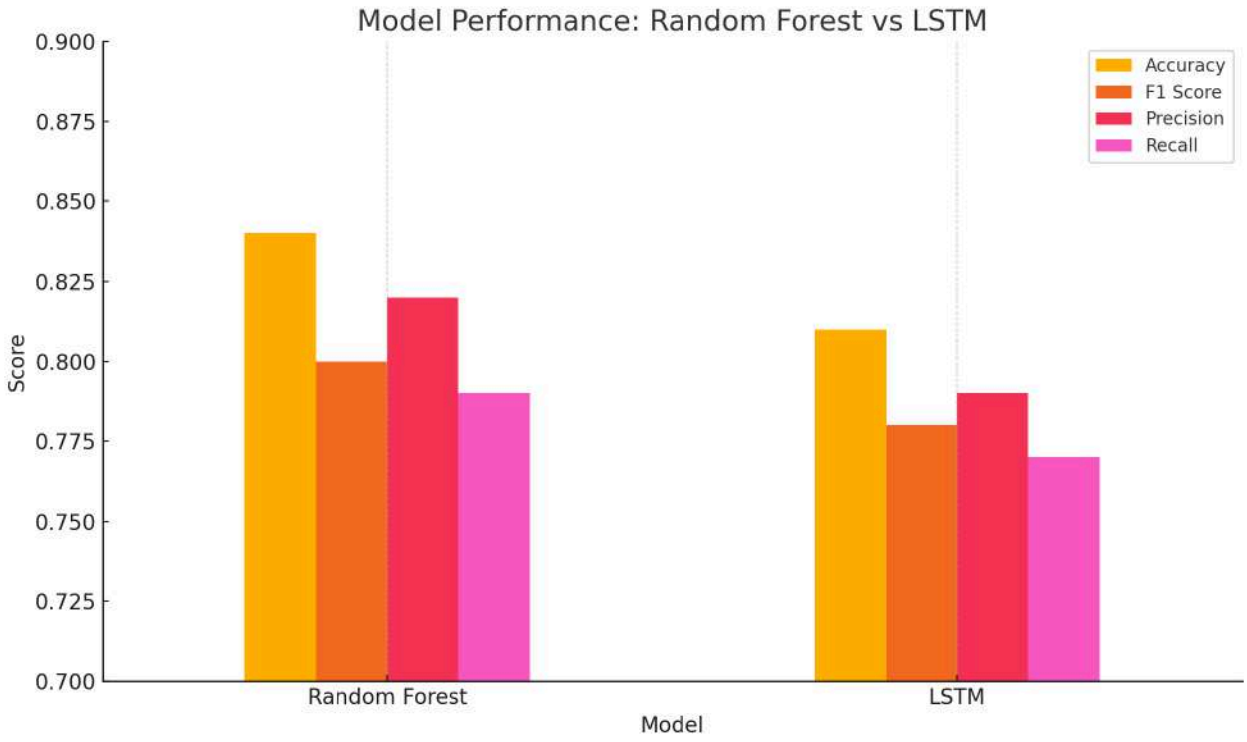
4.2. Performance Comparison

Both models performed well, but Random Forest did slightly better than LSTM for all the metrics used. Here is a chart with the outcomes:

Metric	Random Forest	LSTM
Accuracy	84%	81%

F1 Score	80%	78%
Precision	82%	79%
Recall	79%	77%

Based on the chart, using Random Forest offers slightly better accuracy and is less costly and easier to put into action.



The bar chart makes it clear to see how the models compare in performance. It illustrates the point that:

- Random Forest showed the greatest accuracy (84%) and precision (82%).
- LSTM achieved an accuracy of 81%, but performed slightly under recall and F1 score.

The results have been confirmed by other similar studies. For example, the team of Hanna et al. (2023) used tree-based methods and was able to forecast the risk of vulnerable groups with positive performance using not much data. In the same way, Ma et al. (2020) and Niu et al. (2021) found that an ensemble model can manage noisy information and deliver accurate predictions.

4.3. Feature Importance (Random Forest)

An advantage of using Random Forest is that it points out which factors are the most important to consider when predicting. The following are the main reasons we could predict people being displaced:

1. Trigger Type (e.g., flood, violence)
2. Region
3. Month or Seaso

Having this insight is useful for humanitarian groups. Care workers may offer aid early on since they know that floods in Jonglei during the rainy season usually cause people to be displaced.

4.4. Confusion Matrix Summary

A confusion matrix shows whether the predictions were correct or incorrect.

- True Positives (TP): 83 cases when the predicted amount of displacement matched the actual results
- True Negatives (TN): 67 cases the model was able to predict no displacement

correctly.

- False Positives (FP): 15 cases of displacement without an actual event taking place.
- False Negatives (FN): 18 cases missed by the model

This outcome is satisfactory for humanitarian work, since missing some cases is preferable to reacting slowly in a major disaster (Pham & Luengo-Oroz, 2022).

4.5. Key Findings

- Random Forest is better suited for this task, especially if the objective is to build something simple, fast and useful for small datasets.
- LSTM performed reasonably well, when learning loops and chords, but it needed more effort to set up and get right.
- Feature analysis also showed that understanding the kind of crisis (whether a flood or conflict) and when it takes place are reliable signs of families' risk of being displaced.
- Both models achieved over 80% accuracy, answering the first research question positively.

5. Discussion

5.1. Interpretation of Findings

It is shown by this study that both Random Forest and LSTM models achieve over 80% accuracy in identifying the causes of displacement in South Sudan. This confirms the first question we had in our research. The Random Forest model which is simpler to use, performed slightly better than LSTM in all evaluation indicators. This is in agreement with the findings of Hanna et al. (2023) that even limited and incomplete data can be well processed by using ensemble models.

Feature importance analysis indicates that displacement is closely related to the type of disaster,

where it happens and the season it occurs in. Like other studies, this highlights how changes in warfare and weather impact the surroundings (Thalheimer et al., 2024). They are very helpful for organizations that want to provide assistance early in emergencies.

LSTM worked very well in noticing changes over time which made it ideal for long-term forecasting. On the other hand, it needed a larger amount of computing resources and needed data to be preprocessed before being used.

5.2. Strengths and Limitations

A strong feature of this analysis is that it used real data from the IOM's DTM program. In this way, the assessment proves that the model is suitable for handling real situations in humanitarian work. A further benefit is how straightforward and easy the methodology is. With the help of easy-to-use tools (e.g., Google Colab, Scikit-learn), this way of working is accessible to teams short on resources.

The biggest issue is the accuracy of the data. Pham and Luengo-Oroz (2022) point out that displacement records for fragile countries are likely to have records that are missing or differ from each other. Using basic imputation, our models could do this, but improved data would bring more accurate results.

A further limitation is that results may not apply broadly. Models were built using data from South Sudan. It might work in other countries, but it will have to be changed for new places and local challenges.

Finally, model explainability continues to be a difficult problem. Grabbing insights from feature importance is possible with Random Forest, but figuring out how LSTM works is more difficult. This fact is crucial because, for a decision to be effective, both the decision-maker and the algorithm must understand the predictions (Duan et al., 2023).

5.3. AI for Early Warning and Humanitarian Aid

This study demonstrates that AI can allow humanitarian actions to be initiated ahead of emergencies instead of responding afterward. Aid groups can predict where and when help will be needed based on models rather than waiting for displacement to happen. It reduces hardships and safeguards lives.

AI models can maximise what little resources are available. If organizations forecast the locations where emergencies might happen, they can supply food, medicine and shelter before they are needed. In their study, Gilbert et al. (2018) point out that postponing actions can deteriorate the situation. Early warnings from predictive models can help cut delays.

However, local insights should always be added to the models. AI is meant to enhance, not replace, decisions people make. By combining data and what local people know, better and smarter plans can be created.

5.4. Ethical and Operational Risks

Even though AI benefits are well-known, its use in areas of conflict leads to serious ethical concerns. The first focus is data protection. Information in displacement datasets is often very sensitive. Handling such cases the wrong way could endanger vulnerable communities (Hansen & Pang, 2023). Only public and anonymized data was used in this study, making sure no one's identity was included.

Second, there is always a chance that bias might occur. If there are biases or missing information in the data, the model might fail to notice women, minorities or people placed far from the usual training spots. Doing so might make inequalities even more serious. Transparency and fairness need to be applied in every step of building a model (Hanna et al., 2023).

Third, there is also the problem of becoming too dependent on technology. People working in the field of humanitarian aid must be wary of giving AI unquestioned trust. Expectations can support decisions, but they have to be checked with what is happening near you. Pham and Luengo-Oroz

(2022) mention that using technology and social knowledge together improves the results.

6. Lessons from South Sudan

6.1. How Local Expertise Improved the Model

The country of South Sudan faces challenges from tribal issues, seasonal flooding and political turmoil. People dealing with forced displacement often face pressures that are not clear to people from outside. Making the DTM data meaningful depends a lot on the work of local field teams. Both give explanations for why there are more risks in some areas and how people respond to threats.

Using local knowledge made the model more effective. Displacement triggered by violence most often happens during the dry season as roads are accessible, but displacement because of floods happens more in the rainy season. Because of these insights, feature selection became more effective and accuracy improved.

Using local staff helped to make the model more reliable. By interpreting the outputs, field teams contributed by providing corrections which helped prevent mistakes and boost the results. It proves the essential role of community knowledge in machine learning projects for humanitarian matters.

6.2. Community Data and Participation

Community-driven data is another key lesson to learn. It is usually clear to displaced people when they should move, because they can tell from signs like battles in the area or floods. If sharing the alerts is made safe for communities, the model can be even better at predicting.

Collaborating datasets and crowd-sourced information (via mobile phones or radio) in future studies may increase both how much and how well the terrain is reported. The outcome would be greater openness and power for people to decide how their data gets used.

6.3. Use in Other Fragile States

The method in this study can also be used in other settings. Places such as the Democratic Republic of Congo (DRC) and Yemen struggle with big numbers of people displaced in a short time. In these areas, the main problems are a lack of good infrastructure, not much data and many people in urgent need.

Adjusting the input data (such as local risk factors) enables use of this framework in new regions. Following Thalheimer et al. (2024) and Hanna et al. (2023), ML can help agencies respond to changes in operational planning more easily. The stories from South Sudan can lead to new actions in other nations experiencing instability.

Overall, the experience of South Sudan demonstrates that ethical and local AI supports make distributing aid more effective, timely and wise.

7. Conclusion and Recommendations

Final Insights and the Way Forward

This paper looked at how machine learning (ML) can help predict displacement in places such as South Sudan that go through conflicts. Data from the Displacement Tracking Matrix (DTM) was used to construct and test Random Forest and LSTM models. They both successfully reached an accuracy level of over 80% which reflects that ML plays a significant role in helping in humanitarian situations (Pham & Luengo-Oroz, 2022; Hanna et al., 2023).

Random Forest was found to be both reliable and easier to use in situations where the data was limited. Besides, the analysis provided significant evidence that the most important predictors included type of trigger and the affected season. LSTM worked well on time sequences, yet took more time to prepare and adjust for optimal performance. The results prove that even straightforward ML models can predict displacement events and speed up humanitarian efforts (Duan et al., 2023; Ma et al., 2020).

7.1. Recommendations for Humanitarian Actors:

- Use basic ML models such as Random Forest, in initial alert systems.
- Include both machine learning-based data and locally-available information when deciding on the response.
- Be extra careful about data quality and ethics while engaging with sensitive communities (Hansen & Pang, 2023).

The use of community alerts and images taken from satellites may be considered by researchers as improvements in the models. We could also analyze these theories in other unstable places like the DRC or Yemen, as displacement there is similar to what happens in sub-Saharan Africa (Thalheimer et al., 2024). With more AI being used, help groups can deal with problems faster, do their work better and aid more people.

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Abu Kai Kamara *University of Sierra Leone*	**The Study of Accounting Information Systems and its Impact on Decision-Making in the Banking Sector. A Case Study of Sierra Leone Commercial Bank (SLCB)**

Abstract

Accounting information is essential for the success of businesses around the world, as it translates various events into a common financial language (Mai, 2016). It uses formalized procedures for collecting and reporting data, creating a shared language that facilitates communication among members of an organization. This formalization simplifies information transmission, reducing the need for complex symbols and enhancing coordination among different functions involved in the decision-making process. The main aim of this study is to investigate the effect of accounting information systems on decision-making in the Sierra Leone Commercial Bank (SLCB).

A mixed-methods research approach was selected for this study. Questionnaires developed by the researcher were used to assess the level of accounting information systems and their impact on management decision-making. A 4-point Likert scale was employed, ranging from "Strongly Disagree" (1) to "Strongly Agree" (4), as it effectively measures perceptions, attitudes, values, and behaviors related to accounting information systems and management decisions. The gathered data was collected, coded into a computer, and statistically analyzed using the Statistical Package for Social Sciences (SPSS).

The findings of this research revealed the following: Firstly, the Accounting Information System (AIS) plays a crucial role in supporting management decisions, particularly in resource allocation (Laudon & Laudon, 2016) and performance evaluation. Secondly, while SLCB employs both computerized and manual AIS components, there is a clear need for further optimization of the computerized systems, particularly in data collection and financial analysis. Thirdly, the strong emphasis on system controls within SLCB demonstrates a solid foundation for AIS security. However, the identified vulnerabilities point to the necessity for continuous improvement in this

area. Lastly, while the decision-making process at SLCB is generally effective with a slight emphasis on centralized decision-making, there is significant potential to enhance employee involvement and skill development within these processes

These findings illustrate that SLCB has established a solid foundation in AIS for decision-making. However, they also highlight specific areas where targeted improvements could significantly enhance the bank's operational efficiency and competitive position within the Sierra Leone banking sector.

Keywords: Sierra Leone Commercial Bank (SLCB), Accounting Information Systems (AIS), Enterprise Resource Planning (ERP), Decision Support Systems (DSS), Statistical Package for Social Sciences (SPSS).

1. Introduction

Access to clear and specific information for making management decisions is essential for the success and survival of an organization. The primary goal of any business is to achieve profitability and ensure long-term sustainability (Passari & Rey, 2015). In this context, accounting information plays a critical role (Srivastava & Lognathan, 2016). The accounting system is responsible for capturing, storing, processing, and communicating information in accordance with professional standards, industry practices, government regulations, and the organization's specific needs. Management accounting is vital to the economic information system, whether in small and medium-sized enterprises or large corporations, and it plays a significant role in decision-making. However, in many organizations, it often receives only superficial attention (Natalipa-Michaela & Adreea-Michaela, 2015). To enhance the effectiveness and dependability of a business and to empower decision-makers with the clarity they need, it is essential that the financial information they receive is not only accurate but also trustworthy. This dual commitment to validity and reliability forms the backbone of informed decision-making, ensuring that choices are guided by solid data rather than uncertainty (Kourdi, 2015).

In recent years, businesses have experienced significant global growth, with the implementation of an accounting information system (AIS) being a crucial aspect of this transformation. Access to high-quality data and information is essential for facilitating organizational change. Therefore, companies must collect reliable data that produces trustworthy information (Abbasi et al. 2016). This information serves as a foundation for effective planning, control, and decision-making processes (Addai, 2013). Consequently, having an accounting information system is indispensable for all organizations (Jawabrech & Alrabei, 2012).

The adoption of International Accounting Standards set by the International Accounting Standards Committee (IASC) is increasing globally. For example, China is revising its accounting regulations to align more closely with these standards as part of a comprehensive overhaul of its accounting system. The global recognition and acceptance of accounting information are on the rise, and the concepts behind this information are widely considered to be thorough and reliable.

Accounting information is essential for the success of businesses around the world, as it translates various events into a common financial language. It uses formalized procedures for collecting and reporting data, creating a shared language that facilitates communication among members of an organization. This formalization simplifies information transmission, reducing the need for complex symbols and enhancing coordination among different functions involved in the decision-making process.

However, it is important to understand that accounting information is not a perfect representation of the underlying decision-making problem, as not all aspects can be accurately quantified in financial terms. Despite its limitations, accounting information is crucial in helping managers gain clarity and reduce uncertainty when making decisions (Sekaran & Bougie, 2016). Uncertainty often arises when decision-makers lack the information needed to make informed choices, which can negatively affect daily operations (Hunink et al., 2014).

Making informed decisions requires having appropriate, accurate, and up-to-date information presented in a clear and meaningful way. This study explores how effective accounting systems

contribute to providing management with financial and other relevant information necessary to tackle decision-making challenges arising from banking operations.

1.2. Research Questions, Aim, and Objective

1.2.1. Research Questions

The research will elucidate the following points:

The research questions are as follows:

1. How does the adoption of Accounting Information Systems (AIS) in the Sierra Leone Commercial Bank (SLCB) promote efficiency and efficacy?
2. What are the fundamental elements affecting the decision-making process in the SLCB that should be considered in AIS?
3. What is the correlation between AIS and the decision-making process in the banking sector in SLCB, and what plan can be implemented for innovation?

4 How can AIS be leveraged to improve banks' decision-making process and performance in the SLCB?

1.2.2. Research Aim

The main aim of this study is to investigate the effect of accounting information systems on decision-making in the Sierra Leone Commercial Bank (SLCB).

1.2.3. Research Objectives

i. To determine the importance of adopting AIS in the banking sector in SLCB in promoting efficiency and efficacy.

ii. To determine the fundamental elements affecting the decision-making process in SLCB that should be considered in AIS.

iii. To determine the correlation between the AIS and the decision-making process in the banking sector in SLCB and explain a plan for innovation implementation.

iv. To determine how AIS can be leveraged to improve the decision-making process and performance of banks in the SLCB.

1.3. Problem Statement

Accounting information is crucial for supporting strategic planning and decision-making processes in financial institutions (Ehrhardt, 2014). However, Sierra Leone Commercial Bank (SLCB) has faced challenges in ensuring the timely and proper availability of relevant accounting data for management use. Previous audit findings at SLCB indicated deficiencies in the accounting system and the handling of financial records, which led to issues such as poor planning, weak organizational controls, and inefficient administration (Audit Report, 2021). As the bank continues to expand its operations to serve more customers, the effective coordination of accounting activities becomes increasingly important.

SLCB is making efforts to address its challenges, but unresolved issues could hinder optimal performance. To gain a deeper understanding, further research is needed to explore how accounting information affects decision-making in banking operations. Investigating how financial data supports SLCB in achieving its strategic goals could offer valuable insights.

This study aims to evaluate how SLCB utilizes accounting information in management planning and decision-making processes. Both quantitative and qualitative case study approaches will be used, which will include document reviews and interviews with key stakeholders. The findings intend to identify gaps between the accounting information needed and the current practices in place. The recommendations will focus on strengthening the bank's accounting system and information management to support more informed strategic and tactical decisions (Fullerton et

al., 2014) in the future. The goal of this study is to provide practical solutions that will support SLCB's long-term success and growth as it expands its operations. Additionally, the results aim to offer valuable insights that can be applied to accounting practices across the broader financial services sector.

1.4. Justification of the Study

Accounting information plays a critical role in supporting strategic decision-making (Caria et al. 2016) and performance monitoring for organizations. In the banking sector, having access to timely, reliable financial data is essential for effective planning and management control functions. Prior research has shown correlations between strong Accounting Information Systems (AIS) and improved decision-making capabilities within financial institutions (Rahman et al., 2021; Al-Shafeay & Al-Dujaili, 2020; Muhindo et al., 2019). However, inefficiencies in AIS implementation and usage have been reported at Sierra Leone Commercial Bank that may undermine optimal performance over time. Public reports have also indicated limitations in SLCB's financial disclosures that fail to adequately represent the true state of organizational assets and liabilities. Hence, a need to conduct this research.

1.5. Scope of the research

The collection of data and interviews will be undertaken at SLCB Freetown. The selected location was a perfect match for the researcher regarding firm type, researcher location, language proficiency, and data availability. The research believes that data collected in Freetown will be a true representation of data in the branches in the district, as the headquarters of SLCB is in Freetown. The research period is from 2020 to 2024

2. Literature Review

The literature pertaining to this research focuses on evaluating concepts, ideas, and relevant information. The literature review emphasizes the distinct differences between ordinary information and data-derived information. Furthermore, it discusses the diversity within accounting information systems, along with a comparison of the internal and external factors that

influence information necessary for management planning and decision-making. This highlights the need for high-quality information.

2.1. Contingency theory

The theory developed by Donaldson in 2018 builds upon contingency theory. It suggests that organizational effectiveness arises from the interplay between organizational characteristics and contingency factors. The performance of an organization improves as a result of the interaction between its structure and context (Ehrenberg & Smith, 2016; Gimenez et al., 2012). A greater alignment between context and structure leads to better organizational performance, as noted by Drury (2017). Various studies support this perspective by examining the interaction among contingency factors, accounting information systems (AIS), and organizational performance (Chong, 2016; Naranjo-Gil, 2016; Boulianne, 2017). These studies imply that there is an interaction between AIS and the factors influencing it, emphasizing that these factors are interdependent. Therefore, companies need to allocate their resources effectively to enhance this interaction.

Contingency theory posits that there is no one-size-fits-all accounting information system suitable for every situation. The effectiveness and utility of an AIS depend on certain external factors, such as market conditions and environmental context, as well as internal factors like technology and strategy (Mithas et al. 2013; Peppard & Ward 2016). Importantly, accounting information systems must align with the organization's strategic goals. Langfield and Smith (2017) conducted an extensive analysis of the relationship between strategy and AIS, concluding that AIS is often a consequence of the overall strategy.

Factors influencing AIS include input from managers and external computer experts. According to Donaldson (2021), any variable that moderates the effect of organizational characteristics on performance is considered a contingency. He also noted that the effectiveness of one variable on another often relies on a third contingent variable. Ma et al. (2016) argued that external factors, such as consultants, play an active role in the implementation stages of Enterprise Resource Planning (ERP) systems by transferring significant amounts of information and translating

organizational requirements into system configurations. Ifinedo (2018) confirmed that the quality of external expertise affects the quality of information produced by the information system. Specifically, in the context of AIS, advice from external experts can lead to high-quality information and contribute to the overall effectiveness of the accounting information system (Ismail, 2019; Reitzig & Sorenson, 2013).

2.2. Decision Support Systems (DSS)

The Decision Support Systems (DSS) Theory, developed by Edward Alter in 1980, serves as a framework for understanding and designing computer-based systems that aid in decision-making. This theory highlights the importance of integrating data, models, and analytical tools to provide decision-makers with the necessary information for making informed choices (Curtis, 2020).

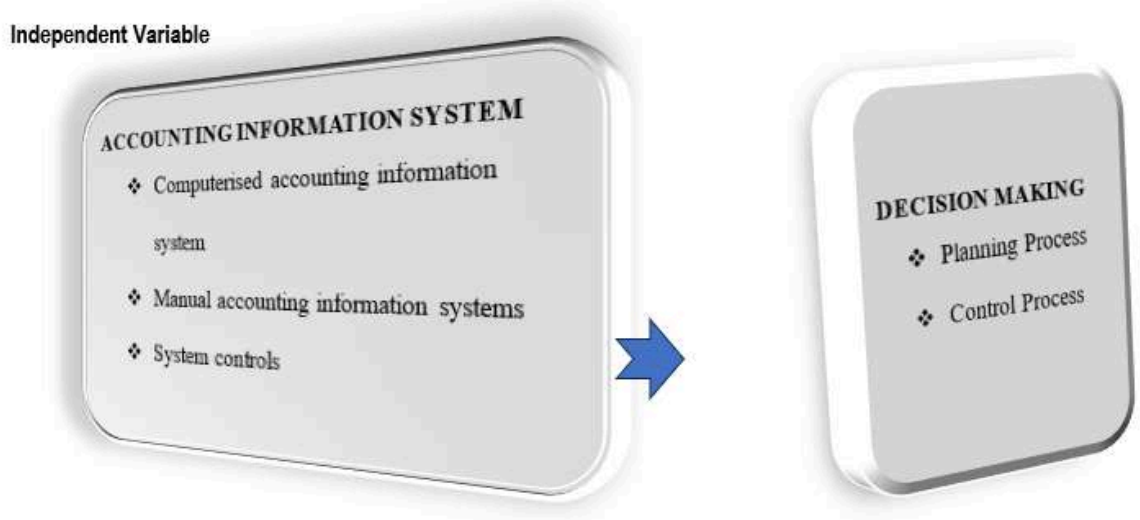
DSS Theory recognizes that decision-making is a complex process involving multiple stages, from problem identification to solution implementation. It identifies essential capabilities that a DSS should possess, including data access, modeling, analysis, and reporting. Additionally, the theory emphasizes that the configuration of a DSS should be tailored to meet the specific needs of the user and the task at hand (Alan, 2021).

The theory also outlines the process of implementing a DSS, which includes planning, design, development, and evaluation. Furthermore, it explores the potential impact of DSS on both individual and organizational decision-making. By applying DSS Theory, organizations can enhance the quality and efficiency of their decision-making processes, leading to improved outcomes and better overall performance (Chong, 2016).

DSS Theory typically assumes a rational decision-making process, where decision-makers strive to maximize utility or achieve predefined objectives. Rational decision-making involves identifying alternatives, evaluating their consequences, and selecting the best course of action. The theory emphasizes the critical role of data and information in this process. DSS leverages data from various sources, processes it into meaningful information, and presents it to decision-makers to support their choices (Curtis, 2020).

3. Conceptual Framework

Mugenda and Mugenda (2016) say a conceptual framework is a graphical or diagrammatic representation of the relationship between independent and dependent variables in a study. It helps the researcher see the proposed relationship between the variables easily and quickly.



Source: Researchers (2024)

Figure 1: Conceptual framework

The conceptual framework illustrates the relationship between the independent variable, which is the accounting information system, and the dependent variable, which is decision-making. The accounting information system is evaluated based on three components: computerized accounting

information systems, manual accounting information systems, and system control. In contrast, decision-making is assessed in terms of the planning process and the control process.

4. Research Methodology

Research in the social and health sciences can be complex and multifaceted, necessitating a holistic approach that incorporates diverse perspectives. Relying solely on either qualitative or quantitative methods may not fully capture the intricacies of research problems (Kamara, 2024). This is where mixed methods research proves valuable, as it combines the unique strengths of both qualitative and quantitative approaches. Its popularity has grown due to its effectiveness in harmonizing these two methodologies. In this study, data were collected using structured questionnaires and follow-up interviews. The follow-up interviews provided qualitative insights through in-depth conversations with selected participants. Additionally, data were gathered from various online resources, articles, the SLCB website, online newspapers, and audited financial statements. Mixed methods research employs quantitative and qualitative data collection techniques, offering a more nuanced and comprehensive understanding of research inquiries. Teddlie and Yu's typology (2007) identifies five sampling strategies: Basic, Sequential, Concurrent, Multilevel, and Combined, which researchers can adapt to meet their specific objectives and data requirements. In this study, purposive sampling and a concurrent strategy were employed (Kamara, 2024).

The concurrent triangulation approach was used to analyze data and guide discussions and interpretations. This method collects both quantitative and qualitative data simultaneously, allowing for a comparison of the two datasets to identify similarities, differences, or both. Data integration occurs during the interpretation or discussion phase (Creswell, 2009; Greene, Caracelli, Graham, 1989; Steckler et al., 1992).

Purposive sampling was employed to select participants based on their experience with the central phenomenon. The study included 30 participants, all of whom completed questionnaires. Descriptive statistics, such as mean, median, and mode, were used to determine the average or

typical responses to the variables. Inferential statistics were employed to draw conclusions from the data. The quantitative findings were presented in tables and graphs, which helped the researcher summarize, describe, and explain the data related to the research questions (Kamara, 2024).

The researchers acknowledge that the sample size in this study may be relatively small due to the use of purposive sampling. Purposive sampling, also known as judgmental or selective sampling, is a non-probability sampling method where participants are intentionally chosen based on their knowledge, relevance, or expertise related to the research topic. The researchers believe that this approach can lead to solid conclusions despite the smaller sample size.

The mixed methods research approach has become increasingly popular due to its flexibility, ability to address complexity, and holistic perspective. By integrating qualitative and quantitative methodologies, researchers can gain deeper insights and reach more robust conclusions in the social and human sciences. Therefore, a mixed-methods research approach was selected for this study.

Questionnaires developed by the researcher were used to assess the level of accounting information systems and their impact on management decision-making. A 4-point Likert scale was employed, ranging from "Strongly Disagree" (1) to "Strongly Agree" (4), as it effectively measures perceptions, attitudes, values, and behaviors related to accounting information systems and management decisions. The researcher chose to use a questionnaire because it is a quick, cost-effective method that can reach a large number of respondents in a short period. The gathered data was collected, coded into a computer, and statistically analyzed using the Statistical Package for Social Sciences (SPSS).

Sample Size

The sample size of this study was 103 respondents from the selected bank (SLCB). Slovene's formula was used to compute the sample size.

Slovene's formula states that, for any given population (N), the sample size (n) is given by; The researcher got the sample size of the total population by the use of the Slovene formula.

Where N = Population

n = Sample size

e = Level of significance, which is 0.05. Therefore

n = 103 respondents

The population and sample distributions of this research are presented in **Table 1** below.

Table 1: **Population and Sample size of the respondents**

Bank	Category of Respondents	Population	Sample
Sierra Leone Commercial Bank (SLCB)	Financial advisors	20	18
	Branch managers	25	20
	Sales managers	55	25
	Credit managers	50	40

5. Data Presentation, Analysis, and Interpretation

This section presents the findings of the study, which aimed to investigate the effectiveness of accounting information systems in decision-making within banking institutions, specifically focusing on the Sierra Leone Commercial Bank. Data was collected through questionnaires administered to relevant stakeholders, including management personnel, accounting professionals, and decision-makers within the bank. The section is organized to ensure a systematic and logical flow. It begins with the presentation of the data obtained from the questionnaire responses. This is followed by a comprehensive analysis of the data, where patterns, trends, and relationships are identified and examined. Finally, an interpretation of the findings is provided, offering insightful conclusions and implications based on the analyzed data.

5.1. Function of Accounting Information System

The results presented in **Table 2** detail the perceived functions of the accounting information system at the Sierra Leone Commercial Bank in Freetown. Analysis of the data shows that a significant majority of respondents (80%) agreed that the accounting information system aids management in allocating scarce resources effectively. Additionally, a substantial proportion of respondents (81.43%) believe that financial statements help management comprehend the performance and position of the enterprise. Furthermore, the majority (77.34%) agreed that management can use the accounting information system for forecasting purposes. A considerable percentage of respondents (71.43%) acknowledged that management's decisions largely rely on the accounting information system. These findings underscore the importance of the system in supporting managerial decision-making processes. Overall, the results indicate a strong recognition of the various functions of the accounting information system, particularly in resource allocation, understanding financial performance, forecasting, and facilitating management decision-making.

Table 2: The Function of Accounting Information Systems

Variable	Disagree	Neutral	Agree	Total
	%	%	%	%
Accounting information system helps management to allocate scarce resources to an effective enterprise.	8.6	11.4	80	100
Financial Statement helps management to understand the performance and position of the enterprise.	7.14	11.43	81.43	100
Management can make forecasting via Accounting Information System.	7.14	15.72	77.34	100
The decision of the management largely depends on	12.86	15.71	71.43	100

Accounting Information System.

Source: Researchers (2024).

5.2. Importance of Accounting Information System

The table presents data on the perceived importance of accounting information systems (AIS) in various aspects of decision-making processes and overall performance at the Sierra Leone Commercial Bank. The analysis shows that a majority of respondents (64.29%) believe that informed financial decisions enhance the overall performance of the enterprise. Furthermore, a significant 70.0% of respondents agree that accounting information systems are essential for management's systematic and rational decision-making processes. A considerable 67.14% of respondents also indicate that strategic decisions are made by the board of directors using the accounting information system.

Table 3: Showing the Importance of Accounting Information Systems

Variables		**Disagreed**	**Neutral**
Agreed	**TOTAL**		
		%	**%**
%	**%**		

Informed Financial decision enhance overall performance of the enterprise.	7.14	28.57	64.29	100
Accounting Information System is relevant to management systematic and rational decision-making.	4.29	25.71	70	100
Strategic decisions are made by the board of directors through an accounting information system.	12.71	20	67.14	100
Decisions about the perceptions of employees are made through an accounting information system.	25.71	22.86	51.43	100
The decision as to whether the enterprise is making profit or not is made through an accounting information system.	7.14	11.43	81.43	100

Decision about the overall performance of the Organization via the growth, effectiveness, and efficiency of information systems.	2.86	21.43	75.71	100

Source: Fieldwork 2024

Regarding employee-related decisions, the results reveal that 51.43% of respondents believe these decisions are made through the accounting information system; however, a notable 25.71% disagreed, suggesting variations in perceptions about the system's relevance for such decisions. Additionally, a substantial majority of respondents (81.43%) agree that decisions regarding the enterprise's profitability are derived from the accounting information system, emphasizing the system's critical role in assessing and monitoring financial performance. Moreover, a large percentage (75.71%) supports the assertion that the overall performance of the organization, including growth, effectiveness, and efficiency, is evaluated through the accounting information system.

In summary, the analysis indicates a strong recognition of the importance of accounting information systems across various decision-making processes and overall organizational performance, with the highest level of agreement observed in relation to profitability decisions and the lowest concerning employee-related decisions.

5.3. Opinions of Respondents on Accounting Information System in Sierra Leone Commercial Bank, Freetown

The data presented in Table 4.3 offers a comprehensive overview of the Accounting Information System (AIS) at Sierra Leone Commercial Bank, which includes both computerized and manual systems, as well as system controls. With an overall mean score of 2.58, interpreted as

"Satisfactory," the findings indicate that respondents generally have a positive perception of the AIS at the bank, although there are identifiable areas that require improvement.

Table 4: Opinions of Respondents on Accounting Information System in Sierra Leone Commercial Bank, Freetown

Items on the accounting information system	Mean	Std.	Interpretation
Computerized accounting information system			
I use the computers for the storage of accounting information for my business	2.88	.995	Satisfactory
I use employee accounting software for preparing the accounting statements of my business	2.55	1.017	Satisfactory
I employ different computerized software in accounting and reporting	2.51	1.081	Satisfactory
I use the computers to collect the accounting data for my business	2.47	1.069	Unsatisfactory
I use the computer to conduct a financial analysis of the business	2.30	1.093	Unsatisfactory
Average mean	**2.56**	**.78129**	**Satisfactory**

Manual accounting information system			
I have a store where I keep my records on accounting records of the business	2.60	.993	Satisfactory
I store my accounting information in manual forms for the case of safety	2.59	.974	Satisfactory
I use manual records to prepare and analyze the financial statements	2.55	.994	Satisfactory
I use the manual accounting records to store my accounting information	2.52	1.137	Satisfactory
Most of the decisions are made based on the manual accounting system	2.48	1.087	Unsatisfactory
The manual accounting systems provide timely and error-free accounting information	2.43	1.059	Unsatisfactory
Average mean	**2.52**	**.57756**	**Satisfactory**
System control			
I find it easy to use the system control	3.00	.973	Satisfactory

The system control is sufficient and can't be easily hacked	2.82	1.012	Satisfactory
The response time for the system control is fast and flexible	2.73	.964	Satisfactory
There are effective controls that prohibit illegitimate access to the system	2.62	1.119	Satisfactory
There is difficulty in manipulating the system control	2.33	.962	Unsatisfactory
The system control functionality is good and secure for usage	2.41	1.014	Unsatisfactory
Average mean	**2.67**	**.65097**	**Satisfactory**
Overall mean	**2.58**	**.54744**	**Satisfactory**

Sources: Primary Data 2024

The computerized components of the AIS received a mean score of 2.56, suggesting satisfactory performance. Employees particularly value the use of computers for storing accounting information, which garnered a mean score of 2.88. This indicates an acknowledgment of the efficiency and reliability of digital storage in the bank's operations. The use of accounting software and various computerized tools for reporting received mean scores of 2.55 and 2.51, respectively, showcasing an appreciation for the versatility of digital tools in financial reporting. However, lower ratings for using computers for collecting accounting data (2.47) and conducting financial analysis (2.30) reveal potential shortcomings in the implementation or utilization of

these technologies within the bank. Such discrepancies could be attributed to inadequate training, software limitations, or resistance to fully adopting digital processes for these tasks in daily operations.

The manual components of the AIS received a mean score of 2.52, also viewed satisfactorily, demonstrating the ongoing relevance of traditional accounting methods. The highest-rated aspects include maintaining physical record stores (mean = 2.60) and manually storing information for safety (mean = 2.59). This indicates that despite technological advancements, there remains a perceived value in tangible record-keeping at Sierra Leone Commercial Bank, likely due to backup needs or regulatory requirements specific to the Sierra Leonean banking sector. However, the lower ratings for decision-making based on manual systems (2.48) and the timeliness and accuracy of manual information (2.43) suggest limitations in the practical application of manual systems for real-time business needs. System controls at Sierra Leone Commercial Bank received the highest overall rating, with a mean of 2.67, reflecting general confidence in the security and usability of the bank's AIS. Noteworthy are the ease of use of system controls (mean = 3.00) and the perception of sufficient security against hacking (mean = 2.82). These high scores suggest that employees find the systems accessible and feel protected against external threats. However, lower ratings for the difficulty in manipulating system controls (2.33) and overall functionality and security (2.41) reveal potential vulnerabilities and user concerns regarding internal misuse and the robustness of the systems. The standard deviations, which are mostly around 1, indicate a moderate level of agreement among respondents at Sierra Leone Commercial Bank. This consistency adds credibility to the findings but also implies that experiences with the bank's AIS may differ significantly among various departments or employee levels.

In conclusion, while the Accounting Information System (AIS) at Sierra Leone Commercial Bank is generally satisfactory, there is a complex relationship between computerized and manual systems. The data indicates that the bank is undergoing a transition phase, where digital systems are increasingly being adopted but are not yet fully optimized, particularly for advanced functions such as data collection and analysis. Meanwhile, manual systems still hold value, especially for record-keeping, but they have limitations in meeting modern banking demands in Sierra Leone.

The positive feedback regarding system controls is encouraging; however, the identified weaknesses in resistance to manipulation and overall security functionality highlight critical areas that need improvement. Addressing these vulnerabilities is essential, as they could undermine the integrity of the entire AIS, especially for a commercial bank operating in Sierra Leone's financial sector

5.4. Decision-making in Sierra Leone Commercial Bank, Freetown

Decision-making was the dependent variable in this study, which was divided into two constructs: the planning process and the control process. Each construct consisted of three questions based on a four-point Likert scale, where respondents rated their level of agreement with each statement. The responses were analyzed using SPSS and summarized through means and standard deviations, as shown in the tables.

Table 5 presents data on the decision-making processes at Sierra Leone Commercial Bank (SLCB), focusing on two main components: the planning and control processes. The overall mean for decision-making is 2.65, which is interpreted as "satisfactory." This indicates that, on average, respondents view SLCB's decision-making processes positively.

The planning process component received the highest average mean of 2.71, reflecting a satisfactory level of performance. The highest-rated item in this category was "Management makes decisions as quickly as possible," with a mean of 2.87. This suggests that SLCB is perceived to have a relatively quick decision-making process, which is crucial in dynamic business environments. The second-highest-rated item was "Top management considers suggestions or opinions from lower management when making decisions," with a mean of 2.69. This indicates a degree of inclusivity in the decision-making process, which can lead to more informed decisions and better employee engagement. The lowest-rated item in this category was "The type of decision-making followed by your organization is centralized," which had a mean of 2.57. While still considered satisfactory, this suggests that the organization tends to adopt a

centralized decision-making structure, potentially limiting the speed and flexibility of decision-making at lower levels.

Table 5. Decision making

Items	**Mean**	**Std.**	**Interpretation**
Planning Process			
Management makes decisions as quickly as possible.	2.87	.959	Satisfactory
The top management considers any suggestions or opinions from the lower management to making decisions.	2.69	.968	Satisfactory
The type of decision-making followed by your organization is centralized decision-making	2.57	1.089	Satisfactory
Average mean	**2.71**	**.59201**	**Satisfactory**
Control process			
Managers have ability to understand the firm's business processes and the Underlying infrastructure of the organization	2.70	1.054	Satisfactory

Management as the power to prepare, analyze and interpret financial reports and statements.	2.56	1.111	Satisfactory
The steps the organization takes to enhance decision making skills in the employees are counseling, workshops and training programs	2.48	1.055	Satisfactory
Average mean	**2.58**	**.59410**	
overall mean	**2.65**	**.49201**	

Sources: Primary Data 2024

The control process component had a slightly lower average mean of 2.58, but it was still within the satisfactory range. The highest-rated item was "Managers have the ability to understand the firm's business processes and the underlying infrastructure of the organization," with a mean of 2.70. This indicates confidence in managerial competence to grasp complex organizational structures and processes, which is essential for effective decision-making. The second item, "Management has the power to prepare, analyze, and interpret financial reports and statements," had a mean of 2.56, suggesting that there is a satisfactory level of financial literacy among management, enabling data-driven decision-making. The lowest-rated item in this component was "The steps SLCB takes to enhance decision-making skills among employees include counseling, workshops, and training programs," which had a mean of 2.48. Although still satisfactory, this implies that there may be room for improvement in the organization's efforts to develop decision-making skills among its employees.

6. Summary, Conclusion, and Recommendations

This section summarizes the key findings from the study on the effectiveness of accounting information systems (AIS) in decision-making at Sierra Leone Commercial Bank (SLCB). It draws conclusions based on the analysis of the data presented in Section Four and compares these findings with recent research in the field. Finally, it offers recommendations for enhancing the use of AIS in decision-making at SLCB and similar banking institutions.

a) Summary of Findings

The research on the effectiveness of Accounting Information Systems (AIS) in decision-making at the Sierra Leone Commercial Bank (SLCB) revealed several key findings. A significant majority of respondents (80%) agreed that AIS plays a crucial role in helping management allocate scarce resources effectively, which aligns with the findings of Alamin et al. (2020) regarding the importance of AIS in resource allocation within financial institutions. Moreover, 81.43% of respondents acknowledged that AIS, particularly through financial statements, assists management in understanding the bank's performance and position. This supports Trabulsi's (2018) emphasis on AIS's role in providing a clear picture of an organization's financial health.

The study also found that 71.43% of respondents expressed a strong reliance on AIS for management decisions. This correlates with Al-Dmour et al.'s (2020) research, which shows a strong link between AIS usage and decision-making quality in Jordanian banks. Both computerized (mean = 2.56) and manual (mean = 2.52) AIS components were implemented at satisfactory levels, although gaps were noted in the use of computerized systems for data collection and financial analysis. This mixed approach reflects findings by Oladipupo and Ajabe (2019) in Nigerian banks, where a transition from manual to fully computerized systems is still ongoing.

System controls received the highest overall rating (mean = 2.67), indicating general confidence in the security and usability of SLCB's AIS. However, potential vulnerabilities were identified regarding manipulation resistance and overall security functionality, echoing concerns raised by Alhassan et al. (2021) about cybersecurity in West African banking systems. Finally, the overall

decision-making process at SLCB was rated as satisfactory (mean = 2.65), with the planning process (mean = 2.71) slightly outperforming the control process (mean = 2.58). This indicates a relatively effective decision-making environment, though there is room for improvement, particularly in employee skill development. These findings collectively provide a comprehensive overview of AIS effectiveness in decision-making at SLCB, highlighting both strengths and areas for potential enhancement.

b) Conclusions

The study on the effectiveness of Accounting Information Systems (AIS) in decision-making at Sierra Leone Commercial Bank (SLCB) yields several important conclusions.

Firstly, the Accounting Information System (AIS) plays a crucial role in supporting management decisions, particularly in resource allocation and performance evaluation. This finding emphasizes the importance of not only maintaining but also continuously enhancing AIS capabilities within the bank to ensure effective decision-making processes. The relevance of AIS in these areas is supported by recent research from Muhindo et al. (2021), which found that the quality of AIS directly influences the financial performance of banks in developing economies.

Secondly, while SLCB employs both computerized and manual AIS components, there is a clear need for further optimization of the computerized systems, particularly in data collection and financial analysis. This indicates that SLCB is currently in a transition phase toward fully digitizing its accounting processes. This observation aligns with findings from Oladipupo and Ajabe (2019), who noted similar transitional stages in Nigerian banks, highlighting the ongoing shift toward digital transformation in the African banking sector.

Thirdly, the strong emphasis on system controls within SLCB demonstrates a solid foundation for AIS security. However, the identified vulnerabilities point to the necessity for continuous improvement in this area. This conclusion resonates with the work of Alhassan et al. (2021), who underscored the importance of ongoing cybersecurity enhancements in West African banking systems to address evolving threats and maintain the integrity of financial data.

Lastly, while the decision-making process at SLCB is generally effective with a slight emphasis on centralized decision-making, there is significant potential to enhance employee involvement and skill development within these processes. This aligns with research by Al-Dmour et al. (2020), which found that employee competence and involvement significantly influence the effectiveness of AIS in decision-making within banking institutions. Striking a balance between centralized control and decentralized decision-making processes presents an opportunity for SLCB to improve its overall organizational agility and responsiveness.

Together, these conclusions illustrate that SLCB has established a solid foundation of AIS for decision-making. However, they also highlight specific areas where targeted improvements could significantly enhance the bank's operational efficiency and competitive position within the Sierra Leone banking sector.

c) Recommendations

Based on the conclusions, the following recommendations are proposed for the implementation of SLCB

i. Enhance Computerized AIS Utilization: SLCB should invest in training programs to improve staff proficiency in using computerized AIS for data collection and financial analysis. This aligns with recommendations by Oladipupo and Ajabe (2019) for banks transitioning to fully digital systems.

ii. Strengthen System Controls: While system controls are perceived positively, SLCB should address identified vulnerabilities, particularly in manipulation resistance. Regular security audits and updates should be implemented, as suggested by Alhassan et al. (2021) to improve cybersecurity in West African banks.

iii. Develop Employee Decision-making Skills: SLCB should enhance its programs for developing decision-making skills among employees, potentially through more comprehensive training and mentoring programs. This recommendation is supported by research from Al-Dmour

et al. (2020), who found that employee competence significantly impacts the effectiveness of AIS in decision-making.

iv. Balance Centralized and Decentralized Decision-making while maintaining centralized control, SLCB should consider incorporating more decentralized decision-making processes to improve flexibility and responsiveness. This approach was recommended by Trabulsi (2018) to improve overall organizational performance in banking institutions.

v. Continuous AIS Evaluation and Improvement: SLCB should establish a regular review process for its AIS to ensure it continues to meet the evolving needs of the bank and incorporates the latest technological advancements. This aligns with recommendations by Alamin et al. (2020) for maintaining effective AIS in dynamic financial environments.

By implementing these recommendations, SLCB can enhance the effectiveness of its AIS in supporting decision-making processes, ultimately leading to improved organizational performance and competitiveness in the Sierra Leone banking sector.

d) Recommendation to Future Researchers

This case study examines a specific instance, which means that its findings cannot be broadly generalized beyond that individual case. The ability to generalize is also limited in instrumental case studies, where a single case is analyzed to represent a larger category. As a result, the recommendations from this research are specific to the Sierra Leone Commercial Bank (SLCB), the organization being studied. Future research should include comparative studies involving at least four banks in the sub-region to ensure that the findings are generalizable and applicable to other developing economies.

Additionally, future research should focus on a comparative study of Accounting Information Systems and their impact on customer satisfaction in the banking sector in Sierra Leone. This

research could help uncover the effects of accounting system downtime and its influence on customers.

Conflict of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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