

Financial Modelling for Portfolio Management, Investment Analysis and Non-Interest Banking

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Abstract

The study examined financial modelling for portfolio management, investment analysis and non-interest banking in polytechnic education in Nigeria. The descriptive survey design was adopted, targeting all mathematics, Statistics, and Banking and Finance academics in Plateau state Polytechnic, Jos, and United Polytechnic, Jos. A census of 30 teachers was used, and data were gathered by the use of the “financial Modelling, Portfolio management and Non-Interest Banking Questionnaire (FMPMNIQ)”, rated on a four-point Likert scale. Validity was ensured via professional review, and reliability was established using the Cronbach’s Alpha method which yielded a reliability coefficient of 0.81. Data were analyzed via the mean and standard deviation, with a 2.50 benchmark for decision-making. Findings showed that financial modelling techniques are actively applied and effective in improving investment analysis, portfolio management, and risk assessment. but, implementation in non-interest banking is limited by some constrained facts; such as, insufficient technical know-how, lack of Sharia-compliant frameworks, and inadequate resources. Based on the findings, the study recommends consistent integration of financial modelling in curricula, regular professional improvement for lecturers, and institutional funding in Sharia-compliant frameworks and relevant resources.

Keywords: Financial Modelling, Portfolio Management, Investment Analysis, Non-Interest Banking, Polytechnic Education

1. Introduction

In current financial structures, financial modelling has turned out to be a vital tool for data-driven decision-making and strategic plans in investment, banking, and portfolio management. According to Olanrewaju and Musa [1], financial modelling offers a mathematical framework for evaluating financial overall performance, forecasting funding outcomes, and minimizing dangers associated with unstable markets. It enables monetary practitioners to simulate various financial scenarios, estimate returns, and examine risk exposures by the use of quantitative and computational techniques. As Afolabi and Akinyemi [2] discovered, the developing complexity of economic markets has made conventional intuitive methods inadequate, thereby necessitating the adoption of sophisticated modelling techniques for improved efficiency and precision. In portfolio management, financial modelling facilitates the construction of most effective portfolios through integrating tools such as mean-variance evaluation, Monte Carlo simulations, and regression methods to balance risks and returns. It allows monetary analysts to forecast asset behaviour, investigate marketplace volatility, and make evidence-based investment selections. Also, in investment evaluation, modelling

techniques beautify the evaluation of project viability, estimation of future cash flows, and execution of sensitivity analyses under various monetary conditions [3]. These tools have become very beneficial in guiding institutional investors and economic managers towards attaining sustainable profitability while keeping risk tolerance.

In non-interest (Islamic) banking, financial modelling performs an extraordinary function in aligning monetary products with Shariah-compliant standards. It aids in designing fairness-based contracts consisting of mudarabah and musharakah, pricing moral financial units, and analyzing income-and-loss sharing mechanisms [4]. Such modelling guarantees that non-interest economic establishments remain aggressive and compliant with the international monetary landscape dominated with conventional interest-based systems.

Despite its increasing relevance, the integration of financial modelling in Nigerian polytechnics where future monetary analysts and portfolio managers are skilled remains constrained. Many college students and experts still rely on manual analytical methods that lack predictive accuracy and computational rigor. This gap has hindered the alignment of Nigeria's financial training with worldwide exceptional practices. As emphasized by Olanrewaju and Musa [1], equipping students with financial modelling abilities is crucial for bridging theoretical understanding and real-world application in banking and finance. Therefore, this study investigates the extent to which financial modelling techniques are carried out in portfolio management and monetary decision-making, assesses their effectiveness in improving investment analysis and risk assessment, and identifies the challenges associated with enforcing these tools in non-interest banking in Nigerian polytechnics.

1.1 Statement of the Problem

Financial modelling has become an important mechanism for improving financial stability, portfolio management, and risk evaluation across all interest-based and non-interest financial structures. It enables evidence-based decision-making by supplying predictive perception into market behaviour, optimizing investment returns, and enhancing monetary balance. However, notwithstanding its international relevance, the use of financial modelling in Nigerian polytechnics remains confined. Many college students and lecturers in banking and finance nonetheless depend upon traditional methods that hinder analytical precision, innovation, and adaptability in dynamic financial markets. This situation weakens the practical competences of polytechnic graduates, decreasing their competitiveness in an increasingly data-driven worldwide financial environment.

The problem extends beyond the classroom into the structure of monetary education itself, where outdated pedagogical strategies and inflexible curricula limit the improvement of technical and modelling-associated skills [1]. In non-interest banking, the problem is even extra real, as existing financial models aren't easily adaptable to Shariah-compliant frameworks. This breaches the accuracy of profit-sharing, risk evaluation, and asset management techniques. Moreover, institutional challenges which include inadequate access to digital infrastructure, inadequate training for teachers, and lack of modelling software program complicate the realistic adoption of present day economic equipment. Consequently, there exists a gap between theoretical financial practise and its real-life utility in both traditional and non-interest financial systems.

This study therefore seeks to examine the volume of application, effectiveness, and challenges of financial modelling in

portfolio management, investment analysis, and non-interest banking in Nigerian polytechnics.

1.2. Objectives

1. To examine the extent to which financial modelling techniques are applied in portfolio management and investment decision-making within the banking and finance sector.
2. To assess the effectiveness of financial modelling in enhancing investment analysis and risk assessment in both interest-based and non-interest financial institutions.
3. To identify the challenges of implementing financial modelling tools in non-interest banking operations for improved financial performance.

1.3. Research Questions

1. To what extent are financial modelling techniques applied in portfolio management and investment decision-making within polytechnics in Nigeria?
2. How effective is financial modelling in enhancing investment analysis and risk assessment in both interest-based and non-interest financial studies in Nigerian polytechnics?
3. What challenges hinder the effective implementation of financial modelling tools in teaching and learning non-interest banking operations for improved financial performance in Nigerian polytechnics?

2. Literature Review

Financial modelling is widely recognized as a quantitative tool that supports decision-making, investment planning, and performance evaluation. It integrates mathematical, statistical, and accounting

principles to examine financial relationships and forecast outcomes. Olanrewaju (2021) describes financial modelling as a link between theoretical economic concepts and real-world application, while Bello and Afolabi (2020) emphasize its role in enhancing analytical reasoning through scenario simulation. In educational settings, particularly in polytechnics, financial modelling strengthens students' quantitative and financial literacy skills needed for modern banking and investment environments (Eze & Chukwu, 2022).

Portfolio management, which involves the selection, allocation, and assessment of financial assets, also depends on financial modelling for optimal decision-making. Adebayo (2021) notes that portfolio management combines analytical tools and strategic judgment to balance risk and return. Bello and Afolabi (2020) highlight financial modelling as essential for projecting asset performance, comparing investment alternatives, and ensuring efficient resource allocation. Modern portfolio strategies increasingly incorporate data analytics to improve financial sustainability across both interest-based and non-interest banking systems (Owusu & Boateng, 2023).

Non-interest banking—often called Islamic or interest-free banking—operates under ethical principles that prohibit interest (riba), excessive uncertainty (gharar), and investments considered socially harmful. It relies on asset-backed and profit-sharing contracts such as Murabaha, Mudarabah, and Musharakah (Ahmad, 2021). Yusuf (2022) argues that non-interest banking promotes fairness and transparency, while Mohammed and Bello (2023) highlight its potential for financial inclusion among individuals who avoid interest-based institutions for ethical or religious reasons.

Although financial modelling is important in Islamic finance, its application faces

challenges. Conventional models such as discounted cash flow and internal rate of return depend on interest-based benchmarks that are incompatible with Sharia principles. This creates difficulties in valuation and performance measurement (Yusuf, 2021). Limited historical data on Islamic financial instruments further weakens model accuracy, particularly in emerging economies. Additionally, the complexity of profit-and-loss sharing contracts requires advanced modelling techniques beyond traditional linear frameworks (Ahmad, 2022). A lack of harmonized Sharia-compliant modelling standards and a shortage of experts trained in both quantitative finance and Islamic jurisprudence also hinder adoption (Suleiman, 2023).

Empirical evidence reinforces these challenges. Yusuf (2021) found that scarce standardized data reduces model reliability in non-interest banks in Nigeria, while Ahmad (2022) observed that complex contractual structures complicate model design in Malaysian Islamic banks. These studies underscore the need for improved data infrastructure, methodological innovation, and strengthened professional capacity.

Therefore, the literature demonstrates that financial modelling enhances investment analysis and portfolio management while supporting informed decision-making. However, its effective integration into non-interest banking requires Sharia-compliant frameworks, specialized expertise, and reliable financial data systems.

3.Methodology

The study adopted the descriptive survey design to obtain standardized data on lecturers' views regarding the challenges of implementing financial modelling in non-interest banking in Plateau State. The population of the study comprised all

mathematics, statistics, and banking and finance lecturers in Plateau State Polytechnic, Jos, and United Polytechnic, Jos, both located in Plateau State. Given the manageable size of the population, a census approach was adopted, involving all 30 lecturers as respondents. Data were gathered using a structured questionnaire titled "Financial Modelling, Portfolio Management and Non-Interest Banking Questionnaire (FMPMNIQ)," designed to elicit responses on the specific challenges faced by non-interest banks in applying financial modelling techniques. The questionnaire employed a four-point Likert scale ranging from Strongly Agree (4) to Strongly Disagree (1) to facilitate quantitative analysis of responses. The validity of the instrument was established through expert review by two banking and finance lecturers and one research specialist, all from the University of Jos, to ensure content relevance, clarity, and appropriateness of items. Reliability was confirmed through a pilot study conducted with 3 mathematics lecturers, 2 statistics lecturers, and 2 banking and finance lecturers from Nasarawa State Polytechnic, Lafia, which yielded a Cronbach's Alpha coefficient of 0.81, indicating strong internal consistency and reliability of the instrument. Data collection was conducted through personal administration of the questionnaires by the researcher to ensure a high return rate and to clarify any ambiguities in the items. The collected data were analyzed using mean and standard deviation, with a benchmark of 2.50 serving as the decision criterion for agreement or disagreement on each questionnaire item. The results are presented in tables and discussed in detail in the subsequent sections of the study.

4.Results

Research Question 1: To what extent are financial modelling techniques applied in

portfolio management and investment decision-making within polytechnics in Nigeria?

Table 1: Extent of Financial Modeling Application in Portfolio Management and Investment Decision-Making

S/NO	STATEMENT	SA	A	D	SD	N	MEAN	STD	REMARK
1	Financial modelling techniques are regularly used by lecturers to illustrate portfolio management concepts in the classroom	15	15	-	-	30	3.50	0.51	Agree
2	Students are exposed to real-life investment decision-making simulations using financial modelling tools.	10	19	01	-	30	3.30	0.53	Agree
3	Financial models are integrated into practical exercises for analyzing investment alternatives in polytechnic courses.	13	17	-	-	30	3.43	0.50	Agree
4	Lecturers consistently use financial modelling to demonstrate the impact of market changes on portfolio performance.	15	15	-	-	30	3.50	0.51	Agree
5	The use of financial modelling techniques enhances students' understanding of investment decision-making processes.	15	13	1	1	30	3.42	0.52	Agree

All items show strong agreement among respondents, as the mean scores are well above the 2.50 benchmark, indicating that financial modelling is positively applied in portfolio management and investment decision-making in polytechnic education.

analysis and risk assessment in both interest-based and non-interest financial studies in Nigerian polytechnics?

Table 2: Effectiveness of Financial Modeling in Enhancing Investment Analysis and Risk Assessment

Research Question 2: How effective is financial modelling in enhancing investment

S/NO	STATEMENT	SA	A	D	SD	N	MEAN	STD	REMARK
6	Financial modelling improves students' ability to evaluate potential investment opportunities accurately.	14	16	-	-	30	3.47	0.50	Agree
7	Financial models are effective in teaching risk assessment strategies in both interest-based and non-interest banking studies.	12	17	1	-	30	3.37	0.54	Agree
8	Students can predict the performance of investment options more effectively through financial modelling exercises.	13	16	-	1	30	3.34	0.52	Agree
9	Financial modelling enhances the practical understanding of profitability and risk in investment decisions.	15	14	1	-	30	3.46	0.53	Agree
10	The application of financial modelling tools significantly improves analytical skills in investment analysis for students.	14	15	1	-	30	3.43	0.51	Agree

All five items show strong agreement among respondents, with mean scores well above the 2.50 benchmark. This indicates that lecturers perceive financial modelling as effective in enhancing investment analysis and risk assessment in both interest-based and non-interest financial studies. Standard deviations are low (0.50–0.54), suggesting a consistent response pattern among the 30 respondents.

Research Question 3: What challenges hinder the effective implementation of financial modelling tools in teaching and learning non-interest banking operations for improved financial performance in Nigerian polytechnics?

Table 3: Challenges of Effective Implementation of Financial Modeling tools in Non-Interest banking Operations

S/NO	STATEMENT	SA	A	D	SD	N	MEAN	STD	REMARK
11	Lack of sufficient historical data on non-interest financial instruments hinders the application of financial modelling in teaching.	16	13	1	-	30	3.49	0.53	Agree
12	Limited technical expertise among lecturers affects the effective use of financial modelling tools in non-interest banking courses.	15	14	-	1	30	3.47	0.54	Agree
13	The absence of standardized Sharia-compliant financial modelling frameworks creates challenges for practical teaching.	14	15	1	-	30	3.43	0.51	Agree
14	Financial modelling exercises are constrained by inadequate software, technology, or resources in polytechnic institutions.	13	12	4	1	30	3.14	0.55	Agree
15	Complexity of risk-sharing contracts in non-interest banking makes it difficult to design practical financial modelling exercises for students.	14	13	2	1	30	3.25	0.52	Agree

From data in Table 3, respondents strongly agree that the identified factors are key challenges affecting the teaching and learning of financial modelling in non-interest banking. The mean scores of the items are all above 2.50, indicating agreement, while low standard deviations (0.51–0.55) show consistency of responses. This aligns with earlier literature highlighting issues such as limited data, lack of technical expertise, and absence of Sharia-compliant frameworks as barriers to effective implementation.

5. Discussion

The study shows that financial modelling techniques are widely used in polytechnics in Nigeria to support teaching in portfolio management and investment decision-making. Lecturers regularly apply financial

models to explain concepts, conduct practical exercises, and simulate real market scenarios. This aligns with earlier studies (e.g., Ali; Yusuf) that confirm financial modelling improves students' understanding of investment behaviour and portfolio performance.

Findings also indicate that financial modelling is considered highly effective for enhancing investment analysis and risk assessment in both interest-based and non-interest banking programmes. Respondents agreed that modelling tools help students evaluate opportunities, quantify risks, and strengthen analytical skills. This supports the views of Ahmad and Mohammed & Bello, who argue that modelling promotes accurate assessment of returns, uncertainty, and profitability.

However, the study identified several challenges affecting the use of financial modelling in non-interest banking education. Key barriers include inadequate historical data, limited technical expertise, lack of Sharia-compliant modelling standards, insufficient software and teaching resources, and the complexity of risk-sharing contracts. These challenges are consistent with the concerns raised by Yusuf, Ahmad, and Suleiman. Overall, the findings highlight the need for better capacity building, improved infrastructure, and standardized Sharia-compliant modelling frameworks to enhance teaching and learning in non-interest banking.

6. Conclusion

The study found that financial modelling is broadly applied and powerful in enhancing portfolio management, financial decision-making, and risk assessment within Nigerian polytechnics. Lecturers mentioned its value in improving students' analytical abilities and sensible information of each interest and non-interest financial systems. However, challenges together with limited historical data, inadequate technical know-how, lack of Sharia-compliant frameworks, and insufficient sources hinder its full implementation. In conclusion, addressing those challenges is important to maximise the benefits of financial modelling and enhance students' competence in investment evaluation and financial decision-making.

7. Recommendations

1. The study showed that financial modelling techniques are widely applied and enhance students' practical understanding in portfolio management, polytechnics should further integrate these techniques consistently into their courses.
2. Given that financial modelling effectively improves students' investment analysis and

risk assessment skills, lecturers should receive continuous training in advanced modelling tools to maximize teaching effectiveness.

3. It was gathered that the implementation of financial modelling in non-interest banking faces challenges such as limited data, technical expertise, and Sharia-compliant frameworks, institutions should invest in appropriate frameworks, resources, and capacity building to address these barriers.

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