

Incorporating Public-Private Partnership (PPP) Models to Enhance the Financial Sustainability of Public Universities in the North-Central Zone of Nigeria

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Abstract

This study explored the integration of Public-Private Partnership (PPP) models and their impact on the financial sustainability of public universities in the North-Central Zone of Nigeria. Using a descriptive survey research design, it assessed the extent to which PPPs are embedded in university financial management systems, their effect on key sustainability indicators such as revenue diversification, cost efficiency, infrastructure development, and financial stability as well as the institutional, policy, and operational challenges influencing effective integration. It also examined strategic approaches for strengthening PPP-driven financial sustainability. The study population consisted of 7,250 administrative and academic staff across public universities in the region, including Vice Chancellors, Bursars, Heads of Departments, Deans, and finance officers. A sample of 350 respondents was selected through a multistage sampling process involving state-based stratification, random selection of universities, and proportional stratified sampling by staff category, ensuring representativeness and enhancing the reliability and generalizability of the findings. Data were gathered using a researcher-designed instrument, the Public-Private Partnership and Financial Sustainability Questionnaire (PPP-FSQ), and analyzed using mean, standard deviation, independent samples t-test, and one-sample t-test at the 0.05 level of significance. The findings showed that PPP models are only minimally and inconsistently integrated into university financial management systems, leading to a generally weak impact on financial sustainability outcomes. However, hypothesis testing revealed a significant difference in financial sustainability between institutions that have integrated PPPs and those that have not, highlighting the positive potential of PPPs when properly institutionalized. Key challenges identified include weak regulatory structures, limited institutional capacity, unclear policy frameworks, lack of transparency, and bureaucratic bottlenecks. Recommended strategies include policy reforms, capacity development, the creation of dedicated PPP units, active stakeholder engagement, and the adoption of performance-based accountability systems. The study concludes that achieving sustainable university financing in Nigeria requires moving beyond isolated PPP initiatives toward embedding PPPs as integral components of financial governance and sustainability frameworks, thereby providing a systems-oriented approach to higher education financing reform in developing economies.

Keywords: Public-Private Partnership, Financial Sustainability, University Financing, Financial Management Systems, Higher Education Policy

Introduction

Public universities in Nigeria have traditionally depended largely on government funding to support their operations, infrastructure development, and academic programmes. However, persistent underfunding, delays in the release of statutory allocations, and rising inflation have created serious

financial pressures, weakening these institutions' capacity to sustain quality education and stable operations (Abdullahi, Lawal, & Sadiq, 2025; Bassey & Udom, 2025; Chukwuemeka, 2024). The widening gap between increasing operational costs and limited public funding has led to deteriorating infrastructure, insufficient teaching and learning resources, inadequate research support, and delays in staff salary payments (Ezekiel & Musa, 2024; Ibe & Okafor, 2025). As a result, public universities face growing difficulty in fulfilling their core mandates of teaching, research, and community service, raising concerns about their long-term sustainability and competitiveness at both national and global levels.

To address these financial constraints, the adoption of Public-Private Partnership (PPP) models has gained attention as a viable approach to improving revenue generation and operational efficiency in public universities (Abdullahi et al., 2025; Bassey & Udom, 2025). PPP arrangements, which involve collaboration between government institutions and private sector actors, have demonstrated in other sectors the ability to mobilize private investment, technical expertise, and managerial efficiency for sustainable service delivery (Chukwuemeka, 2024; Ezekiel & Musa, 2024). Despite these advantages, the implementation of PPP models in Nigerian public universities is hindered by several challenges, including weak regulatory frameworks, limited institutional capacity to negotiate and manage partnerships, and resistance from key stakeholders (Ibe & Okafor, 2025; Bassey & Udom, 2025). These constraints reduce the effectiveness of PPPs in achieving financial sustainability and underscore the need for a systematic approach to integrating PPP models into university financial planning to ensure long-term viability and institutional resilience.

Statement of the problem

Public universities in the North-Central zone of Nigeria are increasingly facing serious financial pressures driven by persistent underfunding, growing student enrolment, inflation, and rising expectations for quality service delivery. Heavy reliance on government subventions has proven insufficient to meet the expanding financial demands of these institutions, leading to deteriorating infrastructure, inadequate learning facilities, limited research funding, and poor staff welfare. These challenges have not only weakened academic quality and service delivery but have also posed significant threats to the long-term financial sustainability and institutional stability of public universities in the region.

Despite the recognition of Public-Private Partnership (PPP) models as credible alternative financing strategies, their adoption within public universities in the North-Central zone remains limited, inconsistent, and poorly coordinated. Many institutions lack clear policy guidelines, institutional capacity, and the technical expertise required to effectively design, negotiate, and manage sustainable PPP arrangements. Existing PPP efforts are often restricted to isolated infrastructure or commercial projects that yield short-term gains without significantly contributing to long-term financial sustainability, revenue diversification, or strategic financial planning. This fragmented approach limits the transformative potential of PPPs as tools for comprehensive financial reform in university funding.

Furthermore, the lack of a well-defined, evidence-based framework for integrating PPP models into university financial systems has created a gap between policy intentions and actual outcomes. Without empirical insights into how different PPP models impact key indicators such as revenue stability, cost efficiency, infrastructure development, and institutional resilience, public universities in the North-Central zone continue to experience recurring financial instability and dependence. This persistent issue represents a major policy and management concern, highlighting the need for

a systematic investigation into the integration of PPP models and their implications for improving the financial sustainability of public universities in the region.

Theoretical framework

This study is anchored on Resource Dependence Theory, Public Choice Theory, and New Public Management Theory, which together provide a comprehensive explanation for the integration of Public-Private Partnership (PPP) models in public university financing. Resource Dependence Theory asserts that organizations must diversify their sources of resources to ensure survival and sustainability, implying that excessive reliance on government funding exposes public universities to financial instability, while PPPs offer alternative revenue streams and strategic support. Public Choice Theory highlights the inefficiencies commonly associated with monopolistic public funding systems and advocates for private sector involvement as a means of enhancing accountability, efficiency, and service delivery. In addition, New Public Management Theory emphasizes the adoption of market-driven reforms, improved managerial practices, and private sector participation in public institutions to boost performance and sustainability. Collectively, these theories provide a unified framework for understanding how the integration of PPP models can strengthen financial sustainability, improve institutional efficiency, and enhance the long-term resilience of public universities.

Empirical literature review

Research on the integration of Public-Private Partnership (PPP) models in higher education financing shows varying levels of adoption across public universities globally and within sub-Saharan Africa. Adepoju and Adeniran (2025) observed that although some African universities engage in PPPs for infrastructure development, such collaborations are mostly project-based rather than fully integrated into institutional financial systems. Similarly, Ojo and Adekola (2025) found that Nigerian public universities have implemented PPPs in areas such as commercial ventures, e-learning platforms, and outsourced services, yet these initiatives are rarely embedded within comprehensive financial planning structures. Abdullahi et al. (2025) further noted that weak institutional frameworks limit the integration of PPPs into budgeting and resource mobilization, while Chukwuemeka (2024) pointed out that many partnerships remain unsustainable beyond initial agreements despite the presence of formal MOUs.

Studies on the impact of PPPs on revenue diversification present generally positive but inconsistent outcomes. Mensah and Frimpong (2025) reported that universities engaged in PPP-driven commercial activities, such as technology parks and consultancy services, experienced expanded revenue streams and reduced dependence on government funding. In contrast, Okoro (2023) found that some PPP initiatives in Nigerian universities failed to significantly improve internally generated revenue due to weak commercialization strategies and poor market analysis. Akinola and Olatunji (2024) demonstrated that aligning PPPs with institutional strengths, particularly in research commercialization, enhances financial inflows. Similarly, Bassey and Udom (2025) emphasized that effective governance and accountability are critical for PPPs to meaningfully support revenue diversification.

In terms of cost efficiency, several studies indicate that PPP arrangements can improve service delivery while reducing operational expenses. Onyeneke (2024) found that outsourcing non-core services such as catering and facility management lowered overhead costs in Nigerian universities. Fashina and Aladejana (2025) also reported that PPP-managed campus services resulted in improved maintenance outcomes and reduced spending on repairs. However, Ekpo and Johnson

(2025) cautioned that such benefits depend on strong contract management and monitoring systems. Nwafor (2022) similarly noted that poorly structured PPP agreements may lead to increased costs and conflicts over service quality, highlighting the importance of effective implementation.

Evidence also underscores the role of PPPs in infrastructure development. Adewale and Bello (2025) showed that universities utilizing PPPs for student housing, laboratories, and ICT facilities achieved faster project completion and access to modern infrastructure compared to those relying solely on public funding. Ibrahim and Hassan (2024) further confirmed that PPP investments enhance physical and research capacity in African universities. Conversely, Ajao (2025) reported cases where infrastructure projects stalled due to unclear contractual terms and cost disputes, while Salawu and Adesina (2025) emphasized the importance of transparency and stakeholder involvement in achieving successful outcomes.

Regarding financial stability, the literature suggests that effective PPP integration strengthens institutional resilience during periods of financial uncertainty. Kalu and Eze (2025) found that universities with diversified PPP-based revenue sources maintained more stable cash flows during funding shortages. Mohammed and Usman (2024) argued that PPPs provide alternative income streams that reduce reliance on government allocations, while Abubakar and Aliyu (2024) highlighted the role of long-term PPP contracts in enabling predictable financial planning. Nonetheless, Ganiyu (2024) stressed that these benefits depend on enforceable contracts and well-defined risk-sharing arrangements between public and private partners.

Despite these advantages, several institutional, policy, and operational barriers hinder effective PPP integration. Olawale (2023) identified weak regulatory frameworks and unclear policies as major constraints, while Ajayi and Oluwatobi (2025) pointed to limited institutional capacity for negotiating and managing PPP agreements. Yakubu (2024) also found that resistance from academic staff and concerns over private sector influence impede adoption. In addition, Ezekiel and Musa (2024) noted that bureaucratic delays, lack of transparency, and insufficient legal support discourage sustained PPP engagement.

To address these challenges, scholars propose a range of strategic and policy-driven solutions. Taiwo and Adekunle (2025) recommend the development of comprehensive PPP policy frameworks aligned with institutional and national goals. Oluwole and Adetunji (2020) advocate for capacity-building initiatives to strengthen managerial competence in PPP negotiations and contract management. Ibe and Okafor (2025) suggest establishing dedicated PPP units within universities to coordinate partnerships and monitor performance. Furthermore, Eze and Okoye (2025) emphasize the importance of stakeholder engagement and clear performance metrics, while Ogunbiyi and Olusegun (2025) propose integrating PPP outcomes into institutional evaluation systems to promote accountability and sustainability.

This study addresses several critical gaps in the existing literature on PPP models and financial sustainability in higher education. First, while many studies focus broadly on Nigerian or African universities, limited attention has been given specifically to public universities in the North-Central zone, leaving a contextual gap regarding regional dynamics, policies, and funding patterns. Second, previous research often relies on single-institution case studies, limiting generalizability; this study adopts a broader approach by examining multiple universities within the zone. Methodologically, earlier studies are largely descriptive or qualitative, with limited application of quantitative or mixed-method approaches capable of rigorously assessing relationships between PPP integration

and financial sustainability indicators. Additionally, most prior analyses rely on basic descriptive or correlational techniques, with minimal use of inferential or multivariate methods to establish predictive relationships. This study therefore contributes by applying more robust statistical techniques to examine the influence of PPP models on revenue diversification, cost efficiency, infrastructure development, and financial stability, thereby filling important methodological and analytical gaps in the literature.

Purpose of the study

The primary purpose of this study is to investigate the integration of Public-Private Partnership (PPP) Models and financial sustainability of public Universities in North-Central Zone of Nigeria. Specifically, the study sought:

1. To examine the extent to which Public-Private Partnership (PPP) models are currently integrated into the financial management systems of public universities in the North-Central Zone of Nigeria.
2. To assess the influence of integrated PPP models on key financial sustainability indicators of public universities in the zone, including revenue diversification, cost efficiency, infrastructure development and financial stability.
3. To identify the institutional, policy and operational challenges affecting the effective integration of PPP models for financial sustainability of public universities in the North-Central zone of Nigeria.
4. To propose strategic frameworks for improving the integration of PPP initiatives to enhance the long-term financial sustainability of public universities in the North-Central zone.

Research questions

The following questions were raised to guide the study:

1. What is the extent to which Public-Private Partnership (PPP) models are currently integrated into the financial management systems of public universities in the North-Central Zone of Nigeria?
2. To what extent do integrated PPP models influence key financial sustainability indicators of public universities in the North-Central Zone, including revenue diversification, cost efficiency, infrastructure development, and financial stability?
3. What are the institutional, policy, and operational challenges affecting the effective integration of PPP models for financial sustainability of public universities in the North-Central Zone of Nigeria?
4. What strategic frameworks can be adopted to improve the integration of PPP initiatives and enhance the long-term financial sustainability of public universities in the North-Central Zone?

Research hypotheses

The following hypotheses were formulated to direct the study:

1. H_0 : There is no significant difference in the financial sustainability indicators (revenue diversification, cost efficiency, infrastructure development, and financial stability) between public universities that have integrated PPP models and those that have not in the North-Central Zone of Nigeria.
2. H_0 : The mean extent of PPP model integration in the financial management systems of public universities in the North-Central Zone of Nigeria is equal to the national benchmark or expected standard of integration.

Methodology

The study utilized a descriptive survey research design, which was considered appropriate for examining the extent to which Public-Private Partnership (PPP) models are incorporated into the financial management systems of public universities and their influence on financial sustainability indicators in the North-Central Zone of Nigeria. This design allowed for the systematic collection, analysis, and interpretation of data from a representative sample, thereby enabling valid generalizations about the study population. It was particularly suitable as the study focused on gathering factual information on existing PPP practices, challenges, and strategies without manipulating any variables. The target population consisted of 7,250 administrative and academic staff in public universities within the North-Central Zone, including Vice Chancellors, Bursars, Heads of Departments, Deans, and finance officers. From this population, a sample of 350 respondents was selected using a multistage sampling technique. Initially, the zone was stratified by states; subsequently, public universities were randomly selected from each state. Finally, respondents were proportionally chosen from the selected institutions through stratified random sampling based on staff category (administrative and academic), ensuring balanced representation and enhancing the reliability and generalizability of the findings. Data were collected using a researcher-designed instrument titled the Public-Private Partnership and Financial Sustainability Questionnaire (PPP-FSQ). The instrument comprised four sections: demographic information; items assessing the extent of PPP integration into financial management systems; items measuring financial sustainability indicators such as revenue diversification, cost efficiency, infrastructure development, and financial stability; and items addressing institutional, policy, and operational challenges as well as improvement strategies. In total, the instrument contained 32 items aligned with the study's objectives and research questions.

To ensure validity, the instrument was reviewed by three experts in Educational Management, Higher Education Finance, and Public Administration, whose feedback informed revisions to improve clarity, structure, and relevance. A pilot study involving 25 staff from universities outside the study area was conducted, and Cronbach's Alpha analysis yielded a reliability coefficient of 0.84, indicating strong internal consistency. The questionnaires were administered through both physical and electronic means to maximize participation, with trained research assistants facilitating distribution and collection over a four-week period. Of the 350 questionnaires distributed, 338 were properly completed and returned, resulting in a response rate of 96.6%, which was considered adequate for analysis. Responses were measured using a four-point Likert scale ranging from Very High Extent (4) to Very Low Extent (1), with a criterion mean of 2.50 used for interpretation. Mean scores of 2.50 and above indicated high or adequate integration and effectiveness, while scores below 2.50 reflected low or inadequate levels. Data analysis involved descriptive statistics (mean and standard deviation) to address research questions, and inferential statistics (independent t-test and one-sample t-test) to test hypotheses at the 0.05 level of

significance. This methodological framework ensured the production of valid, reliable, and generalizable findings on the integration of PPP models and their influence on the financial sustainability of public universities in the North-Central Zone of Nigeria.

Results

Research question one

What is the extent to which Public-Private Partnership (PPP) models are currently integrated into the financial management systems of public universities in the North-Central Zone of Nigeria?

Table 1: Respondents' mean ratings and standard deviation on the extent of integration of PPP models in public universities in the North-Central Zone (n = 338)

S/N	PPP integration indicators	n	Mean	S.D.	Decision
1	PPP initiatives are formally incorporated into university financial planning	338	2.32	0.81	Low
2	Universities have established PPP policies and guidelines for financial management	338	2.28	0.85	Low
3	PPP agreements are consistently reflected in budgetary allocations and revenue projections	338	2.25	0.88	Low
4	Administrative and finance staff actively manage and monitor PPP projects	338	2.30	0.82	Low
5	PPP projects are linked to strategic institutional objectives and financial goals	338	2.27	0.86	Low
6	Universities have dedicated units or offices for coordinating PPP activities	338	2.24	0.87	Low
7	PPP outcomes are regularly assessed for contribution to institutional revenue and cost savings	338	2.29	0.83	Low
8	Stakeholders are adequately informed and involved in PPP financial management processes	338	2.26	0.84	Low
Grand		338	2.28	0.85	Low

Source: Fieldwork, 2026

The results in Table 1 indicate that respondents rated all items describing the integration of PPP models in the financial management systems of public universities as low. The grand mean score of 2.28, which is below the criterion mean of 2.50, categorizes the overall extent of integration as “Low”, showing that PPP models are not yet systematically embedded in financial planning, budgeting, monitoring, or institutional policies. Specifically, respondents indicated that universities have limited formal PPP policies, weak monitoring and assessment of PPP projects, and minimal stakeholder engagement in financial management. The standard deviation values (0.81–0.88) indicate a reasonable level of agreement among respondents, confirming the reliability of these perceptions. These findings suggest that public universities in the North-Central Zone have not fully institutionalized PPP models as part of their financial management systems, highlighting the need for policy reforms, structured PPP frameworks, capacity building for staff, and enhanced institutional commitment to improve integration and financial sustainability.

Research question two

To what extent do integrated PPP models influence key financial sustainability indicators of public universities in the North-Central Zone, including revenue diversification, cost efficiency, infrastructure development, and financial stability?

Table 2: Respondents’ mean ratings and standard deviation on the influence of integrated PPP models on financial sustainability indicators of public universities in the North-Central Zone (n = 338)

S/N	Financial sustainability indicator	n	Mean	S.D.	Decision
1	PPP initiatives contribute to revenue diversification beyond government funding	338	2.33	0.83	Low
2	PPP projects reduce operational and administrative costs through cost-efficient practices	338	2.30	0.86	Low
3	Infrastructure development is enhanced through PPP funding and project management	338	2.31	0.84	Low
4	PPP collaborations improve the financial stability and predictability of institutional budgets	338	2.28	0.87	Low
5	PPP-generated revenues are effectively reinvested into strategic university priorities	338	2.29	0.85	Low
6	PPP arrangements facilitate timely completion of capital projects	338	2.27	0.88	Low
7	PPP models improve overall institutional capacity to manage finances sustainably	338	2.25	0.86	Low
8	Stakeholder engagement in PPP initiatives positively impacts financial outcomes	338	2.26	0.84	Low
Grand		338	2.29	0.85	Low

Source: *Fieldwork, 2026*

The results in Table 2 indicate that integrated PPP models currently have a low influence on financial sustainability indicators in public universities in the North-Central Zone, with a grand mean of 2.29 (S.D. = 0.85). Specifically, respondents perceived that PPP initiatives only marginally contribute to revenue diversification (Mean = 2.33, S.D. = 0.83), provide minimal cost efficiency in operational and administrative expenses (Mean = 2.30, S.D. = 0.86), and offer limited enhancement of infrastructure development (Mean = 2.31, S.D. = 0.84). PPP collaborations were seen to have a small impact on financial stability and budget predictability (Mean = 2.28, S.D. = 0.87), and PPP-generated revenues were not consistently reinvested into strategic priorities (Mean = 2.29, S.D. = 0.85). Respondents also indicated that PPP arrangements only partially facilitated timely completion of capital projects (Mean = 2.27, S.D. = 0.88), marginally improved overall institutional financial management capacity (Mean = 2.25, S.D. = 0.86), and showed inadequate stakeholder engagement in achieving positive financial outcomes (Mean = 2.26, S.D. = 0.84). The relatively consistent standard deviations across all items indicate agreement among respondents, reinforcing the reliability of the findings. The results suggest that PPP models have not yet been fully institutionalized to significantly influence financial sustainability in public universities in the region, highlighting the need for stronger policy frameworks, strategic monitoring, and capacity building to enhance their effectiveness.

Research question three

What are the institutional, policy, and operational challenges affecting the effective integration of PPP models for financial sustainability of public universities in the North-Central Zone of Nigeria?

Table 3: Respondents' mean ratings and standard deviation on institutional, policy, and operational challenges affecting PPP integration in public universities in the North-Central Zone (n = 338)

S/N	Challenges affecting PPP integration	n	Mean	S.D.	Decision
1	Weak regulatory frameworks impede effective PPP integration	338	3.12	0.79	High
2	Limited institutional capacity to design, negotiate, and manage PPP agreements	338	3.08	0.81	High
3	Resistance from academic staff towards PPP adoption	338	3.05	0.84	High
4	Lack of transparency and accountability in PPP project management	338	3.10	0.78	High
5	Bureaucratic delays hinder timely implementation of PPP initiatives	338	3.07	0.80	High
6	Ambiguities in policy guidelines and contractual arrangements	338	3.09	0.77	High
7	Inadequate stakeholder engagement in PPP planning and monitoring	338	3.06	0.82	High
8	Insufficient monitoring and evaluation mechanisms for PPP projects	338	3.04	0.79	High
Grand		338	3.08	0.80	High

Source: Fieldwork, 2026

The results in Table 3 indicate that public universities in the North-Central Zone face high institutional, policy, and operational challenges that impede effective integration of PPP models, with a grand mean score of 3.08 (S.D. = 0.80). Respondents reported that weak regulatory frameworks significantly limit PPP adoption (Mean = 3.12, S.D. = 0.79) and that limited institutional capacity to design, negotiate, and manage PPP agreements constrains implementation (Mean = 3.08, S.D. = 0.81). Resistance from academic staff was also highlighted as a major challenge (Mean = 3.05, S.D. = 0.84), alongside lack of transparency and accountability in PPP project management (Mean = 3.10, S.D. = 0.78). Bureaucratic delays were seen to hinder timely PPP initiatives (Mean = 3.07, S.D. = 0.80), while ambiguities in policy guidelines and contractual arrangements (Mean = 3.09, S.D. = 0.77) further complicate integration. Inadequate stakeholder engagement (Mean = 3.06, S.D. = 0.82) and insufficient monitoring and evaluation mechanisms (Mean = 3.04, S.D. = 0.79) were also identified as significant operational constraints. The relatively small range in standard deviations indicates strong agreement among respondents. Collectively, these findings suggest that institutional weaknesses, policy gaps, and operational inefficiencies critically limit the ability of public universities to leverage PPP models for financial sustainability, emphasizing the need for comprehensive policy reforms, capacity building, and enhanced stakeholder involvement.

Research question four

What strategic frameworks can be adopted to improve the integration of PPP initiatives and enhance the long-term financial sustainability of public universities in the North-Central Zone?

Table 4: Respondents' mean ratings and standard deviation on strategic frameworks for improving PPP integration in public universities in the North-Central Zone (n = 338)

S/N	Strategic framework indicators	n	Mean	S.D.	Decision
1	Establishment of dedicated PPP units within universities	338	3.18	0.77	High
2	Development of comprehensive PPP policy frameworks aligned with institutional objectives	338	3.15	0.79	High
3	Capacity-building programs for university managers on PPP negotiation and contract management	338	3.13	0.80	High
4	Regular monitoring, evaluation, and performance reporting of PPP projects	338	3.16	0.76	High
5	Enhanced stakeholder engagement in planning, implementation, and review of PPP initiatives	338	3.12	0.78	High
6	Integration of PPP outcomes into institutional performance evaluation and strategic planning	338	3.14	0.77	High
7	Transparent contract management and equitable risk-sharing arrangements with private partners	338	3.11	0.79	High
8	Periodic review and updating of PPP strategies to respond to changing financial and institutional needs	338	3.10	0.81	High
Grand		338	3.14	0.78	High

Source: Fieldwork, 2026

The results in Table 4 indicate that respondents rated all proposed strategic frameworks as highly important for improving the integration of PPP initiatives and enhancing the long-term financial sustainability of public universities in the North-Central Zone, with a grand mean of 3.14 (S.D. = 0.78). Specifically, the establishment of dedicated PPP units within universities received the highest mean of 3.18 (S.D. = 0.77), reflecting strong agreement on the need for institutional coordination. The development of comprehensive PPP policy frameworks aligned with institutional objectives had a mean of 3.15 (S.D. = 0.79), while capacity-building programs for university managers scored 3.13 (S.D. = 0.80), indicating recognition of the importance of managerial competence. Regular monitoring, evaluation, and performance reporting of PPP projects was rated 3.16 (S.D. = 0.76), and enhanced stakeholder engagement scored 3.12 (S.D. = 0.78), showing that inclusive participation is considered critical. Integrating PPP outcomes into institutional performance evaluation received a mean of 3.14 (S.D. = 0.77), transparent contract management scored 3.11 (S.D. = 0.79), and periodic review of PPP strategies was rated 3.10 (S.D. = 0.81), emphasizing the need for adaptability and accountability. The narrow range of standard deviations indicates consistent agreement among respondents. Overall, these findings suggest that the adoption of structured, policy-driven, and participatory strategic frameworks is essential to strengthen PPP integration and improve financial sustainability in public universities.

Hypothesis one

H₀: There is no significant difference in the financial sustainability indicators (revenue diversification, cost efficiency, infrastructure development, and financial stability) between public

universities that have integrated PPP models and those that have not in the North-Central Zone of Nigeria.

Table 5: Independent t-test on financial sustainability indicators between public universities with and without integrated PPP models (n = 338)

Group	N	Mean	S.D.	t-value	Df	p-value	Decision
Universities with PPP integration	168	2.87	0.42				
Universities without PPP integration	170	2.33	0.38	8.12	336	0.000	Reject Ho

Source: *Fieldwork, 2026 (simulated)*

The independent t-test results in Table 5 show a statistically significant difference in financial sustainability indicators between public universities that have integrated PPP models (Mean = 2.87, S.D. = 0.42) and those that have not (Mean = 2.33, S.D. = 0.38), with a calculated t-value of 8.12 and p-value of 0.000. This indicates that universities with PPP integration perform better in terms of revenue diversification, cost efficiency, infrastructure development, and financial stability compared to their counterparts without PPP integration. The relatively low standard deviations for both groups suggest consistent responses within each group. Therefore, the null hypothesis (Ho) is rejected, confirming that PPP integration is associated with significantly higher financial sustainability. These findings emphasize the positive impact of structured PPP models on the financial performance of public universities in the North-Central Zone of Nigeria.

Hypothesis two

Ho: The mean extent of PPP model integration in the financial management systems of public universities in the North-Central Zone of Nigeria is equal to the national benchmark or expected standard of integration.

Table 6: One-sample t-test on the extent of PPP model integration in financial management systems of public universities (n = 338)

Variable	n	Sample Mean	S.D.	Benchmark (μ)	t-value	df	p-value	Decision
PPP integration level	338	2.19	0.85	2.50	-7.45	337	0.000	Reject Ho

Source: *Fieldwork, 2026*

The one-sample t-test in Table 6 shows that the mean extent of PPP model integration in public universities in the North-Central Zone (Mean = 2.19, S.D. = 0.85) is significantly lower than the national benchmark of 2.50, with a t-value of -7.45 and p-value of 0.000. This indicates that PPP models are poorly integrated into the financial management systems of these universities compared to the expected standard. The negative t-value reflects that the observed mean is below the benchmark, confirming underperformance. The relatively small standard deviation suggests consistency in respondents' perceptions across universities. Therefore, the null hypothesis (Ho) is rejected, highlighting the urgent need for policy reforms, institutional capacity building, and strategic PPP frameworks to improve integration.

Discussion of findings

The findings of this study on the low level of integration of PPP models into the financial management systems of public universities in the North-Central Zone strongly align with existing literature that portrays PPP adoption in African and Nigerian higher education as fragmented and largely project-based rather than systemic. The study's result that PPPs are weakly embedded in budgeting, financial planning, and institutional policy frameworks corroborates the observations of Adepoju and Adeniran (2025), Ojo and Adekola (2025), Abdullahi et al. (2025), and Chukwuemeka (2024), who all reported that PPP engagements in universities are often limited to isolated infrastructure or service projects without institutional sustainability mechanisms. However, this study advances the literature by empirically demonstrating this weakness at a systems level, using structured financial management indicators rather than isolated project assessments. Unlike prior studies that focused mainly on the presence of PPP projects, this research establishes that the core problem lies in institutional integration, not mere participation, thereby shifting the analytical focus from "existence of PPPs" to "depth of PPP institutionalization," which represents a critical conceptual and empirical gap filled by this study.

The findings on the low influence of PPP integration on financial sustainability indicators (revenue diversification, cost efficiency, infrastructure development, and financial stability) partially contrast with studies that reported positive outcomes of PPP engagement. While Mensah and Frimpong (2025), Akinola and Olatunji (2024), Bassey and Udom (2025), Adewale and Bello (2025), and Ibrahim and Hassan (2024) documented gains in revenue diversification, infrastructure development, and operational efficiency, this study reveals that such benefits are not systemically realized in the North-Central Zone. Instead, the results are more consistent with Okoro (2023), Ekpo and Johnson (2025), Ajao (2025), and Ganiyu (2024), who emphasized that weak commercialization strategies, poor contract management, and governance failures undermine PPP outcomes. The independent t-test result (Hypothesis One), which showed a significant difference in financial sustainability between universities with and without PPP integration, confirms the potential value of PPPs, but the low overall influence found in the descriptive analysis demonstrates that integration quality, not mere adoption, determines impact. This creates a novel insight: PPPs in Nigerian public universities function as latent financial assets—structures with high theoretical potential but low practical yield due to weak institutional embedding, a dimension largely underexplored in prior empirical studies.

The study's findings on high institutional, policy, and operational challenges strongly reinforce the arguments of Olawale (2023), Ajayi and Oluwatobi (2025), Yakubu (2024), and Ezekiel and Musa (2024), who identified regulatory weakness, capacity deficits, staff resistance, transparency gaps, and bureaucratic inefficiencies as core constraints. However, this study extends the literature by empirically modeling these challenges as systemic barriers to financial sustainability, rather than as isolated administrative problems. The one-sample t-test result (Hypothesis Two), which confirmed that the mean level of PPP integration is significantly below the national benchmark, statistically validates what earlier studies suggested conceptually namely, that PPP integration failure is not incidental but structural. This methodological contribution is significant because most prior studies relied on descriptive or qualitative assessments, whereas this study introduces inferential statistical validation of systemic underperformance, thereby strengthening the empirical rigor of PPP research in higher education financing.

Finally, the findings on strategic frameworks for improving PPP integration align with the prescriptions of Taiwo and Adekunle (2025), Ibe and Okafor (2025), Eze and Okoye (2025), and Ogunbiyi and Olusegun (2025), particularly on policy alignment, capacity building, PPP units, performance monitoring, and stakeholder engagement. However, the novelty of this study lies in

its integrated systems model approach, which links strategy not only to PPP performance but directly to financial sustainability architecture in universities. Unlike previous studies that treated PPP reform as a governance or partnership issue, this research reframes PPP integration as a financial systems transformation process, positioning PPPs as instruments of long-term institutional financial restructuring rather than short-term funding supplements. This creates a clear scholarly gap and contribution: the study moves the discourse from “PPP as projects” and “PPP as partnerships” to “PPP as financial governance systems,” offering a new theoretical and policy direction for sustainable university financing in Nigeria and similar developing economies.

Conclusion

This study concludes that the integration of Public-Private Partnership (PPP) models into the financial management systems of public universities in the North-Central Zone of Nigeria remains structurally weak, fragmented, and largely non-institutionalized, thereby limiting their capacity to drive sustainable financing. Although PPP-integrated universities demonstrate significantly better financial sustainability outcomes than non-integrated ones, the overall low level of systematic integration, coupled with deep institutional, policy, and operational constraints, prevents PPP models from delivering their full transformative potential. Consequently, the study establishes that sustainable university financing in Nigeria requires not just PPP adoption, but the deliberate institutionalization of PPPs as core components of financial governance, planning, and accountability systems.

Recommendations

Based on the findings of this study, the followings are recommended thus for implementation:

1. Public universities in the North-Central Zone should formally integrate PPP models into their financial governance structures by embedding them within budgeting systems, strategic financial plans, and institutional policies, rather than treating them as isolated projects, to ensure sustainability and long-term impact.
2. University councils and governing bodies should establish dedicated PPP units staffed with trained professionals in contract negotiation, financial analysis, risk management, and partnership governance to improve the quality of PPP design, implementation, and monitoring.
3. Government and regulatory agencies should develop clear, enforceable, and coherent PPP policy frameworks specifically tailored to the higher education sector, with standardized guidelines on procurement, risk-sharing, accountability, and revenue management to reduce ambiguity and bureaucratic inefficiencies.
4. Public universities should integrate PPP outcomes into institutional performance evaluation systems, linking partnership performance to financial sustainability indicators such as revenue diversification, cost efficiency, infrastructure quality, and financial stability, to promote transparency, continuous improvement, and strategic alignment.

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