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Building Resilient Project Portfolios In Emerging Economies: A Risk Management Framework For Public–Private Infrastructure Projects In Nigeria

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Abstract
Nigeria faces a large infrastructure deficit and a history of fragile public-private partnership (PPP) portfolios. A narrative review was conducted to examine how internationally recognized risk-management frameworks can inform portfolio-level decisions for Nigerian PPPs. Evidence was sourced from peer-reviewed studies, regulatory manuals, and financial reports between 2019 and September 2025. Four themes surfaced: alignment of risk governance structures with the International Organization for Standardization (ISO) 31000 and the Project Management Institute's practice guide; procurement quality and risk-allocation efficiency; financing architecture, foreign-exchange (FX) exposure, and local-currency depth; and climate and environmental, social, and governance (ESG) integration. Survey evidence indicates that Nigerian practitioners view unstable government, limited PPP experience, and financial availability as the top risk factors. A sovereign wealth-backed guarantor (InfraCredit) has mobilized roughly ₦205 billion (≈US$436 million) for nineteen projects and extended bond tenors to twenty years, while Nigeria's federal green-bond program raised about ₦75.69 billion between 2017 and mid-2025, with the largest issuance (₦50 billion) earmarked for climate-resilient infrastructure. FX risk guidance from multilateral institutions emphasizes local-currency financing, natural hedging, and explicit indexation. The review synthesizes practical reforms that could strengthen portfolio resilience without inflating transaction costs.

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I. Introduction

Infrastructure projects in emerging economies often fail to deliver intended benefits because of fragmented risk governance, inadequate financing structures, and susceptibility to macroeconomic shocks. Risk management refers to the systematic identification, assessment, allocation, and monitoring of uncertainties that can affect objectives; portfolio resilience denotes the capacity of a set of projects to absorb shocks and continue

delivering services at acceptable levels. The International Organization for Standardization (ISO) 31000:2018 standard promotes principles such as integration with decision-making, inclusivity, and continuous improvement, and it recommends a structured process of establishing context, identifying risks, analyzing and evaluating them, and treating, monitoring, and communicating risks (1,2). The Project Management Institute's 2024 practice guide extends these concepts to portfolios, programs, and projects by linking risk activities to enterprise governance and emphasizing tailoring across management levels (3).

Nigeria's PPP ecosystem is anchored by the Infrastructure Concession Regulatory Commission (ICRC) and the Bureau of Public Procurement (BPP). The 2007 Public Procurement Act mandates competitive bidding and transparency, stipulating that procurement decisions must be based on value for money and must comply with budgetary appropriations (4). The Nigerian Sovereign Investment Authority (NSIA) administers the Nigeria Infrastructure Fund (NIF), which allocates around 50 % of sovereign wealth assets to domestic infrastructure projects across sectors such as power, transportation, and agriculture (5). Despite these institutional pillars, the infrastructure gap remains severe; the National Integrated Infrastructure Master Plan (NIIMP) sought to raise infrastructure stock from 20–25 % of gross domestic product to at least 70 % by 2043 (6). According to a Vanguard news report (2024), Nigeria's infrastructure needs are about US$2.3 trillion through 2043. (7). The World Bank's Private Participation in Infrastructure (PPI) database shows that Nigeria recorded investment commitments of US$133 million across three PPP projects in 2023 (8), a modest figure relative to regional peers.

Fragmented risk governance, FX-denominated liabilities, and uneven risk allocation persist. Survey work among Nigerian construction professionals highlights political instability, inadequate PPP experience, and limited financing as the most salient risks (9), while the ICRC's PPP Manual emphasizes that misaligned risk allocation increases contract costs and reduces value for money (10). Portfolio-level data on delivery performance and climate resilience are sparse, and foreign-currency exposures remain high because many project loans are denominated in US dollars.

This review synthesizes evidence on how global risk-management frameworks can inform portfolio-level reforms for Nigerian PPPs, with implications for broader Nigerian infrastructure development. We contribute to the literature by: (1) adapting ISO 31000 and PMI frameworks to Nigerian institutional contexts, (2) identifying specific mechanisms through which local-currency financing can reduce portfolio vulnerability, and (3) proposing measurable indicators for tracking PPP resilience in emerging African economies.

II. Methods

Searches were conducted in Scopus, Web of Science, ABI/INFORM, ASCE Library, IEEE Xplore, and EconLit, along with regulatory sources (ICRC, BPP, and NSIA), the Federal Ministry of Finance/NIIMP, the World Bank's PPI database, and the African Development Bank's PPP framework. The time window prioritized documents from 2019 to 26 September 2025, with older standards and laws included for historical context. Keywords combined concepts such as "PPP risk allocation," "portfolio risk management," "ISO 31000," "PMI risk management," "Nigeria PPP," "local currency infrastructure finance," "FX risk," "green bond," "resilience," and "procurement." Only English-language materials were reviewed, excluding abstracts, letters, and editorials unless they clarified methodological issues. Studies were selected based on the topical relevance, design soundness, recency, and clarity of outcomes, with a preference for comparative or validated measures. Information from a snowball of references and hand-searched regulatory documents was also incorporated. A narrative synthesis was conducted; no systematic review procedures or meta-analytic techniques were applied.

III. Results

Evidence is grouped into four comparative themes, adapting global risk management frameworks to Nigerian PPP practice. Figure 1 provides a conceptual overview of how ISO 31000 and PMI processes align with the Nigerian PPP lifecycle and stakeholder roles. Table 1 summarizes comparative evidence across studies. Figure 2 presents a decision pathway showing when portfolio-level risk decisions should be made across the PPP lifecycle.

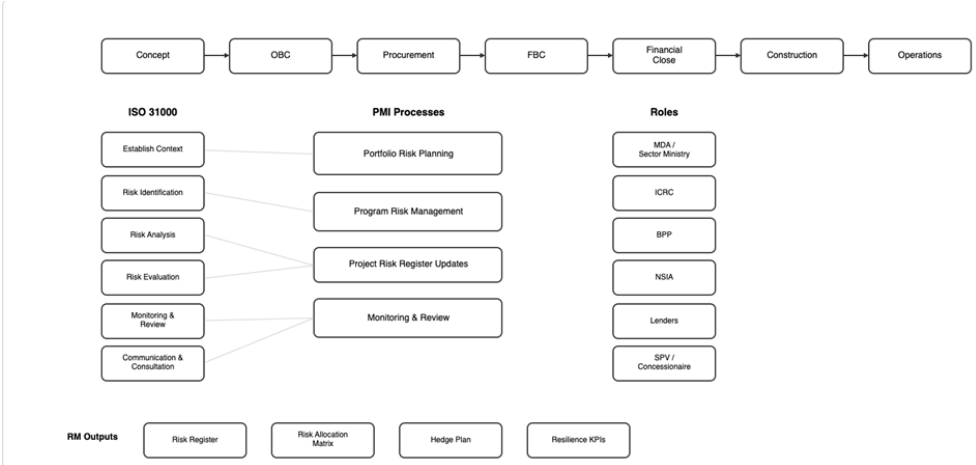

Figure 1. Integrated risk-governance stack for Nigeria PPPs linking ISO/PMI processes to lifecycle, roles, and outputs.

Risk Governance Alignment (ISO/PMI ⇄ Nigeria PPP institutions)

Comparators: Portfolio-level risk policies and registers versus project-level practices; alignment of the PPP Manual and BPP processes with ISO/PMI principles. Nigerian project manuals emphasize allocating risks to the party best able to manage them (10). However, a survey conducted by Ibrahim et al. indicates that only 24% of the invited professionals responded, reflecting the early development of risk governance (9). Although Nigeria's PPP Manual requires MDAs to maintain and regularly update project-level risk registers, publicly available performance reports are not disclosed, and broader FOI compliance is low; consequently, there is limited public evidence of portfolio-wide risk registers or their currency (11). Boundary conditions include sector variation (power projects often receive greater regulatory scrutiny) and divergent capacity between federal and state PPP units.

Table 1. Comparative evidence on instruments and outcomes in Nigerian PPPs

Study (author-year)	Design & N	Population/Setting	Comparator	Outcome & Metric	Headline estimate (range/CI)	Follow-up	Notable limits
Ibrahim et al. 2006 (9)	Cross-sectional questionnaire survey; n = 36 (24 % response rate)	Nigerian construction professionals	Perceived importance of 61 risk factors and preferred risk allocation	Top risks: unstable government, inadequate PPP experience, finance availability; preferred allocation: political and site risks to public sector	Descriptive ratings; no CI reported	2006 (one-time survey)	Convenience sampling; small N; self-reported perceptions
InfraCredit 2023 Annual Report (12).	Descriptive corporate report; portfolio of 19 projects	Infrastructure companies financing with InfraCredit guarantees	Local-currency guaranteed bonds vs baseline availability	Raised ≈₦205 bn (≈US$436 m) in local-currency bonds; bond tenors extended to 20 years; oversubscription up to 65 %	Not applicable (no CI)	2017–2023	Corporate self-report; lacks comparator group
Ele et al. 2025 (13)	ARDL econometric analysis; time series (2017–2024)	Nigeria's capital expenditure and bond issuances	Effects of green, sukuk, development and savings bonds on	Green and sukuk bonds have significant positive short-run effects; all bond types show significant long-run positive effects; series III green bond	Coefficients not reported here (positive; no CI available)	2017–2024	Macro-level; lacks project-level granularity

Study (author-year)	Design & N	Population/Setting	Comparator	Outcome & Metric	Headline estimate (range/CI)	Follow-up	Notable limits
			capital expenditure	(₦50 bn) launched in June 2025			
World Bank PPI 2023 (8)	PPI database; descriptive statistics	Nigeria PPP projects closed in 2023	Nigeria vs regional peers	Investment commitments of US$133 m across 3 projects	Not applicable	2023	Limited sample; excludes domestic contracts not recorded in PPI
G20/World Bank 2024 Global Infrastructure Facility et al., 2024)	Policy report; synthesis of EMDE experience	Emerging markets & developing economies	Mechanisms to mitigate FX risk	Recommends local-currency financing, natural hedging, guarantees, indexation and rigorous public investment management to reduce currency mismatches	Not applicable	2024	Not Nigeria-specific; normative guidance

Procurement Quality and Risk-Allocation Efficiency

Comparators: standardized bidding processes with clear risk allocation matrices and dispute mechanisms versus bespoke contracts. The Public Procurement Act mandates competitive tendering and value for money (4), yet bespoke risk matrices often persist, leading to protracted negotiations and higher transaction costs. Survey results show that Nigerian practitioners favor allocating political and land-acquisition risks to the public sector while transferring construction and operational risks to private partners (9). Empirical analyses point to non-trivial overruns across contexts: a national highways study reports a minimum average cost escalation of 14% and time escalation of 188% (15), while a contemporary Abuja/FCTA portfolio shows mean cost overruns around 56–58%, with some locations >70% (16), and qualitative assessments attribute overruns to change orders, inadequate prequalification, and corruption. Bid cycle times vary widely, procurement timelines are long by international standards: World Bank benchmarking (as cited in a Nigeria-specific modeling study) puts procurement at ~660 days (≈21–22 months), with an empirical Nigeria estimate of ~646 days from contract notice to financial close (17,18). Scope changes are common in Nigerian public works: peer-reviewed studies report frequent client/consultant-initiated variations and link variation orders to time and cost escalation (19,20). A key bias hallmark is measurement error in change-order logs and self-reported cost data. Procurement efficiency varies between federal and state projects, as well as across different sectors, with power and transport projects experiencing longer negotiation periods.

Financing Architecture, FX Exposure and Local-Currency Depth

Comparators: Local-currency financing structures (e.g., naira-denominated bonds, InfraCredit guarantees, NSIA co-investment) versus hard-currency financing with FX exposure. The Nigeria Infrastructure Fund invests domestically and co-finances PPPs across sectors (5). InfraCredit, a sovereign wealth-backed guarantor, has facilitated local currency finance for nineteen infrastructure companies, raising about ₦205 billion (≈US$436 million) and extending bond tenors to twenty years, with issues oversubscribed by up to 65% (12). These guarantees mobilize pension funds and insurance companies and deepen the local debt market. Nigeria's sovereign green-bond program issued N10.69 billion in 2017, N15 billion in 2019 and a N50 billion bond in June 2025, bringing total green-bond issuance to roughly N75.69 billion (13); proceeds fund climate-resilient projects such as electric-vehicle infrastructure and water systems. Despite these innovations, most PPP loans remain denominated in foreign currency, exposing portfolios to currency mismatches. Multilateral guidance emphasizes seeking local currency financing, employing natural hedging (e.g., matching local currency revenues with local currency liabilities), and using guarantees, contractual indexation, and payment escalators to mitigate FX risks (14). Data on debt-service coverage ratios (DSCRs) and hedge ratios are scarce; lenders generally require DSCRs above unity, but no systematic reporting exists. In markets that rely on mini-perm structures, refinancing risk typically emerges around years 5–7, when short-tenor bank debt is designed to be taken out or repriced (21,22). Figure 2 illustrates the sequence of decision points that these instruments create throughout the PPP lifecycle.

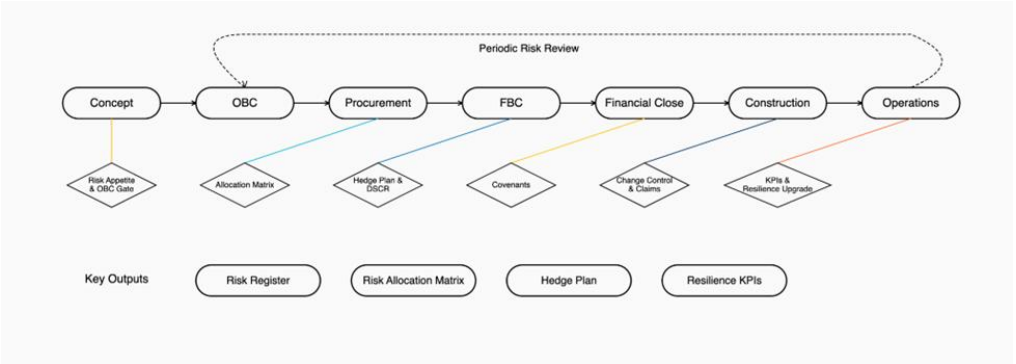

Figure 2. Decision pathway showing when portfolio-level risk decisions should be made across the PPP lifecycle

Climate and ESG Risk Integration into PPP Design and Operation

Comparators include climate-informed design standards, resilience key performance indicators (KPIs), and green-bond financing compared to conventional designs. Nigeria issued Africa's first sovereign green bond in December 2017 (Series I, ₦10.69 billion), according to the issuance documents from the Debt Management Office (23), and subsequently expanded the program to fund climate-resilient infrastructure (13). Studies indicate that green bonds and sukuk bonds positively influence government capital expenditure in the short run, while traditional bonds have a larger impact in the long run (13). However, climate-risk screening and resilience KPIs remain nascent in project preparation. The NIIMP recognizes climate risks in the power and transport sectors and proposes hazard-specific adaptation measures (7). Available metrics include climate-adjusted net present value, resilience capital-expenditure share, and ESG incident rates, but few projects report them. Data availability and hazard mapping resolution are key constraints; flood risk is better understood than heat or drought exposures, and differences exist between road and power projects. Nigeria's green bonds align with the African Development Bank's PPP strategic aims to mobilize sustainable finance, yet measuring adaptation outcomes remains challenging.

Comparative African PPP Performance

Nigeria's risk-management frictions mirror continent-wide patterns yet also reflect distinctive institutional and market conditions. South Africa operates a long-standing PPP regime anchored in National Treasury guidance and standardized contractual provisions; these codify risk-allocation templates, approval gates, and disclosure expectations, yielding a comparatively mature governance cadence (24,25). Kenya, by statute, embeds feasibility-stage risk analysis and fiscal-risk review within the PPP approval process, bringing risk identification and allocation earlier in the lifecycle. By contrast, Nigerian practice relies on a similar toolkit but exhibits more variation across procuring entities and stages.

Procurement tempo also differs. Regional benchmarking and country case material indicate that Nigeria's tender-to-financial-close interval often stretches toward 660 calendar days, with an econometric study estimating ~646 days under Nigerian conditions (17), whereas Kenya tends to move more quickly where feasibility-stage screening is institutionalized. The implication is not merely speed: earlier, rule-bound risk review reduces renegotiation risk and limits scope drift, which in turn improves the predictability of downstream financing (26–28).

Financing structures reflect domestic capital-market depth. As of December 31, 2024, Nigeria's domestic public debt stood at ₦74.38 trillion, exceeding the external component and signaling sizable Local Currency (LCY) absorption capacity (29). By comparison, Kenya's domestic public debt measured KSh 5.87 trillion at Q2 FY2024/25 (share of total public debt: 53.7%) (30), while Ghana's marketable domestic securities outstanding reached GH₵ 309.84 billion at the end of 2024 (31). South Africa's deeper rand markets support a higher share of local-currency financing in practice (32).

Contract design is relevant for currency risk. Nigeria's local-currency government bond market is larger than many regional peers, creating scope to extend naira-denominated project debt, particularly when paired with credit enhancement and portfolio-level investor pipelines. Kenya's experience with indexed tariffs in large renewables projects, such as Lake Turkana, demonstrates how contract design and partial risk guarantees can mitigate payment and FX-related exposures (33,34). Meanwhile, Ghana's Public-Private Partnership Act, 2020 (Act 1039), formalized fiscal/contingent-liability assessment and allowed for more explicit FX risk-sharing (35). For Nigeria, the comparative lesson is pragmatic: standardize allocation and dispute mechanisms, institutionalize earlier risk review, and scale local-currency instruments, reserving hedges and guarantees for measured residual exposures.

Table 2. Comparative PPP risk-governance & market metrics (Nigeria vs. peers, latest available)

Metric	Nigeria	Kenya	Ghana	South Africa
PPP procurement duration to award/FC (days)	**646** (modelled); **660** (benchmark) (17)	n/a	n/a	n/a
Domestic public debt (LCY stock/share)	**₦74.38 trn / 51.41%** (Dec 31 2024)	**KSh 5.87 trn / 53.7%** (Dec 2024) (36)	**GH₵ 309.84 bn** (26.3% of GDP, Dec 2024) (37,38)	n/a
Capital-market depth (AFMI 2024, Pillar 1; max=100) (32)	**57**	**38**	**46**	**100**
FX risk mitigation example	—	**ADF PRG (€20 m) – Lake Turkana** (33,34)	—	—

IV. Discussion

Operationalising ISO/PMI inside PPP Governance

ISO 31000 and the PMI practice guide emphasize establishing context, identifying risks, assessing and treating them, and continual monitoring (1–3). Translating these principles into Nigerian PPP governance requires portfolio-level artifacts: a national risk appetite statement, a unified risk register taxonomy, and scheduled risk challenge sessions at each lifecycle gate (concept, OBC, procurement, FBC, financial closure, construction, and operations). Aligning the ICRC manual and BPP processes with these artifacts would facilitate consistent escalation and oversight. Risk registers should be centralized and updated when projects move between gates, and independent risk challenge committees should include representatives from MDAs, ICRCs, BPPs, NSIAs, and lenders (Figure 1). Federal and state PPP units need capacity building in risk identification and scenario analysis, possibly supported by development partners.

Risk-Allocation Playbook for Nigerian PPPs

Efficient risk transfer requires standardized matrices covering demand, construction, operations and regulatory risks. The ICRC manual advocates allocating risks to the party best able to manage them (10), and survey evidence indicates that practitioners prefer assigning political and site risks to the public sector (9). A national playbook could define default allocations and provide model clauses for arbitration and dispute boards, reducing bespoke negotiations. Prequalification should assess bidders' financial capacity, technical expertise, and experience with risk management. Procurement law can be amended to mandate the publication of risk-allocation matrices and include timelines for bid evaluation and contract award. Dispute resolution mechanisms, mediation, adjudication, and arbitration should be embedded in contracts and harmonized with BPP procedures.

FX-Aware Financing and Local-Currency Deepening

Reducing FX exposure at the portfolio level demands deeper local-currency markets and risk-sharing instruments. InfraCredit's guarantees demonstrate how sovereign wealth–backed credit enhancement can mobilize pension funds and extend tenors (12). NSIA could expand co-investment programs and use viability-gap funding (VGF) to support projects with strong socioeconomic benefits but weak financial returns. Guidelines from multilateral institutions recommend local currency financing, natural hedging, and contractual indexation (14). For financing discipline, treat thresholds as illustrative guardrails rather than fixed rules: for low-risk, availability-style PPPs, public guidance often targets minimum ADSCRs around 1.15–1.20 (higher where revenue risk is borne). FX risk should be addressed first by reducing exposure (e.g., local-currency debt, domestic institutional investors) and then by mitigating the residual with appropriate instruments tested under downside scenarios (e.g., forwards/swaps, partial guarantees) (14,39). Availability-payment PPPs and partial risk/credit guarantees can attract private investors while limiting state contingent liabilities. Refinancing windows should be aligned with macroeconomic cycles, and currency risk should be modeled in the Outline and Final Business Cases.

Climate-Resilient Portfolios

Integrating climate and ESG risks into PPP portfolios requires hazard screens, resilience KPIs and sustainable financing instruments. Nigeria's green-bond program raised approximately ₦75.69 billion between 2017 and mid-2025, financing adaptation and mitigation projects, including electric-vehicle and water

infrastructure (13). Project-preparation guidelines should include climate risk assessments (e.g., flood maps, heat projections) and estimate resilience CAPEX as a percentage of total cost. Resilience KPIs, such as climate-adjusted net present value, CAPEX share, and ESG incident rate, should be tracked during operations. Green bonds and sukuk bonds have been shown to boost capital expenditure (13), suggesting that climate-linked finance can mobilize resources quickly. The **AfDB PPP Strategic Framework (2021–2031)** sets PPP priorities across enabling environments, project preparation, and financing; **adaptation and climate-resilience** are explicitly prioritized in the Bank's **Climate Change & Green Growth Strategy (2021–2030)**, so **PPP pipelines should mainstream adaptation co-benefits** drawing on that climate strategy (40). Data gaps remain significant, especially for state-level projects and sectors such as housing and telecommunications.

Implications for Development Banks, Engineering–Procurement–Construction (EPC) Firms, and PPP Consultants

Development finance institutions can strengthen portfolio resilience by adopting and standardizing a national risk-appetite statement and risk-register taxonomy.

Gate reviews should be instituted at each lifecycle stage, with independent risk challenge committees convened on a quarterly basis.

Lenders and investors should calibrate minimum DSCR thresholds (e.g., >1.15 for two consecutive quarters) and hedge ratios (e.g., ≥80 % hedged exposure) and embed these covenants in financing agreements.

InfraCredit-style guarantees and partial credit/risk guarantees should be scaled to encourage local-currency bonds and extend tenors beyond fifteen years (12).

Bespoke risk matrices that increase transaction costs should be de-implemented; standard clauses for risk allocation and dispute resolution can shorten negotiations. Climate screens need to be stratified by hazard class (e.g., floods, heat stress, sea-level rise) and tied to green-bond eligibility (13).

Transaction-cost discipline is essential: procurement cycles should be time-bounded, and contract management should include transparent change-order logs. Capacity gaps at the state level require targeted training for PPP units, EPC risk teams and lenders.

Future Recommendations

Comparative evaluations of standardized versus bespoke risk allocation matrices should be commissioned using quasi-experimental designs, such as difference-in-differences, to estimate effects on cost and schedule variance, claims frequency, and contract disputes. Procurement reforms, such as requiring published risk-allocation matrices and prequalification scoring, should be pilot-tested and evaluated after at least twenty-four months. Stress tests on financing structures should model FX depreciation and refinancing risk; the outcomes should include DSCR stability, hedge ratio compliance, refinancing success, and ESG incident rates. Sector-stratified analyses (power, transport, water) are needed to capture heterogeneity. Reporting standards should require the publication of risk registers (with sensitive data redacted), risk allocation matrices, KPI dashboards, and climate risk assessments; these should be shared on the World Bank's PPI platform. Coordination among regulators (ICRC, BPP, and NSIA), lenders, and development partners is essential to developing a credible data pipeline and fostering knowledge exchange.

V. Conclusion

Aligning Nigeria's PPP portfolios with globally recognized risk-management frameworks can strengthen resilience and unlock investment. The evidence examined indicates that risk governance is still fragmented, procurement practices are inconsistent, and foreign exchange exposure is significant; however, innovations like InfraCredit guarantees and green bonds illustrate the potential of local currency finance and climate-linked instruments. Adopting standardized risk allocation matrices, deepening local currency markets, and embedding climate resilience metrics at the portfolio level could yield the highest near-term returns. A national PPP risk-allocation playbook accompanied by a KPI dashboard could provide a practical next step for regulators and development partners.

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