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# Peculiar Barriers to the Implementation of Performance-Based Road Contracts in Emerging Economies: A Ghana Case Study.

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**ABSTRACT**
Contracts play a crucial role in shaping the quality, efficiency, and longevity of infrastructure projects. Conventional input-based contracts frequently lead to inefficiencies, increased costs, and early deterioration. Performance-Based Road Contracts (PBRCs) offer a results-focused alternative, yet they encounter implementation challenges in emerging economies. Although current research highlights the advantages of PBRC, there is a paucity of empirical evidence addressing the specific barriers in this context. This study examines the challenges to PBRC implementation in Ghana, aiming to inform more flexible contract governance and policy reforms. A cross-sectional design was used to explore expert views in Ghana's road sector. Data were gathered from 62 experts purposively sampled through a structured questionnaire designed based on existing literature. Mean ranking and one-sample t-tests were used to identify and evaluate the relative severity barrier hindering PBRC implementation. The analysis identified currency depreciation and price volatility (80.6%), a rising debt burden (77.4%), and a weak business climate with restricted access to finance (75.8%) as the primary constraints. Other significant obstacles comprised macroeconomic risks (72.6%), corruption (67.7%), weaknesses in contract enforcement (64.5%), and gaps in institutional capacity (61.3%). Skills shortages, high technology costs, and procurement risks were significant barriers. While political and governance instability barriers were ranked lower, they still held contextual importance. The findings emphasize the necessity for financial stabilization mechanisms, robust institutions, and enhanced governance frameworks to foster the scalability and resilience of PBRC in Ghana and comparable emerging economy settings. This study provides empirical evidence that enhances theoretical understanding and guides practical policy interventions for road infrastructure delivery in resource-limited environments.
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**Keywords**: Procurement, Performance-Based Road Contract, Sustainability, Principal-Agent Theory, Institutional Theory, Road Asset Management, Emerging Economies, Barriers.
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**Originality of Study:** This study presents an expert-driven evaluation of the barriers encountered in implementing PBRC within a emerging economy context. It shifts the discourse from the general benefits of PBRC in advanced economies to an empirical identification and ranking of specific barriers that constrain the implementation of PBRC in resource-limited settings

## INTRODUCTION:

Traditionally, road contracts have relied mainly on input-based procurement, meaning contractors are paid for work done according to specified quantities. This approach enables governments to closely monitor materials and processes; however, it has drawn criticism for inefficiency, budget overruns, and poor project outcomes. Often, contractors focus on meeting minimum technical standards rather than ensuring long-term durability or performance of roads. According to the World Bank, such contracts encourage constant maintenance interventions, frequent renegotiations, and higher project costs, which ultimately reduce value for money (Ogita et al., 2023). In some cases, input-based contracts have led to rapid deterioration of road networks shortly after completion, forcing governments into expensive cycles of repair (Nyoagbe & Evdorides, 2025). Research also suggests that traditional methods fail to align contractor incentives with broader development goals, resulting in projects that might meet technical standards but are not sustainable in practice (Sultana et al., 2012). Consequently, there is a growing demand for alternative approaches to managing road contracts due to the limitations of conventional models.

Performance-Based Road Contracts (PBRC) represent a shift in road contract management, especially for developing economies seeking greater cost efficiency and sustainability. PBRCs pay contractors based on road quality and performance rather than input quantities, making contractors more responsible for long-term maintenance. Studies show that PBRCs can save 15% to 40% compared to traditional contracts through improved resource utilization, reduced waste, and proactive

maintenance. These savings increase with longer-term contracts, as preventive care reduces the need for significant maintenance interventions (Ogita et al., 2023). PBRCs also transfer maintenance risk to contractors, encourage predictable budgeting, and improve financial planning for public agencies, ultimately supporting better fiscal management and infrastructure quality (Calahorra-Jimenez & Poythress, 2024).

Evidence from developed economies suggests that PBRC can deliver high-quality road networks at lower costs while mitigating numerous hazards that typically hinder successful road management. Reported savings from PBRCs, compared to conventional unit-price contracts, have been substantial across different contexts: 20% in Alberta, Canada; between 10% and 40% in Australia; 15% to 35% in Brazil; 20% to 40% in Estonia; 30% to 40% in Holland; 15% to 38% in New Zealand; 20% to 40% in Norway; 18% in Finland; and 10% to 15% in the United States (Pakkala et al., 2007). These results illustrate the potential of PBRC to enhance value for money and ensure sustainable road maintenance when implemented under conducive institutional and technical conditions.

Notwithstanding these evident benefits, it is widely reported that the implementation of PBRC continues to pose difficulties, especially in developing nations (Nyoagbe & Evdorides, 2025; Selviaridis & Wynstra, 2015; Yang et al., 2023). The Central Asia Regional Economic Cooperation, (2017) reported that these primary constrains generally include restricted institutional and technical capacities, insufficient market competition, contractor unfamiliarity with outcome-based methodologies, and challenges in precisely measuring performance criteria. Consequently, whereas PBRC has achieved success in numerous developed nations, the implementation of same proves to be problematic for emerging economies.

As a result, although PBRC has received considerable attention as a robust technique in road asset management contracts, its success is context-dependent and multidimensional. Prior studies on performance-based road contracts have predominantly focused on illustrating their financial efficacy, risk-sharing advantages, challenges and technical attributes across diverse international settings (Dagba & Dagba, 2019; Nyoagbe & Evdorides, 2025; Sultana et al., 2012; Tseng & Yang, 2024). However, these studies often rely on descriptive, observational, and review methodologies that outline contextual factors, dangers, and implementation considerations for PBCs in developed and some emerging economies.

Moreover, although these studies have enhanced our comprehension of the economic and operational benefits of PBRCs, limited empirical evidence exists regarding the contextual issues that hinder their implementation in emerging economies. Notably, in Ghana, even though PBRC has been introduced in some notable road contracts in the Brong Ahafo, Northern Region and Upper West Regions, current research has predominantly focused on the evaluation of PBRC project performance, providing limited empirical evidence regarding the specific impediments that hinder scalability (Mariswe, 2019). This study addresses this gap by evaluating the specific peculiar barriers that hinder the implementation of PBRCs in Ghana, thereby providing empirical insights and policy-relevant recommendations to enhance road sector governance in Ghana.

## Theoretical underpinning: Principal-Agent and Institutional Theories

### *Principal-Agent Theory*

The principal-agent theory provides a framework for understanding the relationship between a principal, who delegates authority, and an agent, who receives that authority (Thiel, 2016). This theory examines the conditions under which agents act in their principals' best interests, with particular attention to agency loss when their interests diverge or when principals lack insight into the actions of agents (Thiel, 2016). In the context of this study, principal-agent theory helps explain delegation within contractual partnerships, where a principal (typically a government or public agency) appoints an agent or contractor to provide road services for the public benefit (Chang, 2014). The central issue is the potential misalignment of incentives, exacerbated by information gaps and difficulties in monitoring agent behavior.

Within the PBRC framework, tying payments to performance outcomes, rather than just task completion, seeks to better align contractor incentives with quality and sustainability. However, agents may exploit supervision weaknesses to prioritize their own interests over project goals. Contractors aiming to maximize profits might overlook preventive maintenance, particularly if they perceive monitoring as insufficient. Information asymmetry, where contractors have greater knowledge of road conditions and maintenance costs than government agencies, may further skew outcomes. These risks are heightened in emerging economies, where governments often lack the technological and financial capacity for rigorous oversight. Corruption intensifies these challenges; collusion between officials and contractors undermines accountability and distorts incentives (Sultana et al., 2012). Principal-agent theory thus illuminates both the efficiency advantages of PBRCs and the factors—such as weak institutional frameworks—that can impede these benefits.

### *Institutional Theory*

The institutional theory offers a comprehensive perspective on the systemic factors that can hinder the implementation of Performance-Based Road Contracts (PBRCs). This theory explains how institutions are established and how they influence organizational behavior (Amenta & Ramsey, 2010). It asserts that

organizations must adhere to established rules and requirements to gain support and be regarded as legitimate actors. Institutions, comprising regulative, normative, and cultural-cognitive dimensions, provide stability and meaning within social systems (Amenta & Ramsey, 2010). These dimensions encompass both formal regulations and informal conventions, as well as the organizational capacities that guide contract design and execution.

Successful PBRC implementation relies on solid institutional frameworks for regulation, procurement management, and stakeholder trust. In emerging economies, weak institutions, including inadequate legal systems, bureaucratic inefficiencies, and corruption, hinder contract enforcement and execution (Shou et al., 2016; Bai et al., 2016). Limited technical capacity in road agencies and cultural resistance to performance-based contracts further hinder progress. For instance, Ghana struggles to adapt global best practices due to procurement challenges, a shortage of skilled contractors, and political interference. Institutional theory highlights the fact that PBRC adoption involves both technical and governance issues.

This dual theoretical position is especially pertinent for Ghana, where PBRC pilots have demonstrated both potential advantages and notable challenges. From a Principal-Agent perspective, contractors may not meet performance standards due to inadequate oversight or possible collusion. From an Institutional Theory perspective, systemic flaws, such as weakly enforced procurement regulations and insufficient technical expertise, allow these agency issues to persist. Theoretically, this study acknowledges that the peculiar challenges to PBRC implementation in emerging economies cannot be resolved merely by redesigning contracts; they necessitate comprehensive institutional reforms to enhance accountability, transparency, and competence.

**Understanding of Performance-Based Road Contract (PBRC)**

Since the late 1990s, PBRCs have seen significant growth in both developed and developing countries, providing an alternative to traditional input-based models (Calahorra-Jimenez & Poythress, 2024). In contrast to traditional contracts, PBRCs directly associate contractor payments with the attainment of specific performance indicators, rather than the amount of inputs utilized (Wirahadikusumah et al., 2015). This model establishes clear performance standards without dictating the methods or timing for task execution (Ogita et al., 2023). PBRCs are comprised of three key dimensions: performance specification, risk allocation, and incentive mechanisms. These elements collectively outline the structure of responsibilities and rewards (Selviaridis & Wynstra, 2015). Performance in this context refers to the requirements for specifying, measuring, evaluating, and reporting performance. Incentives relate to the payment structure regarding rewards and/or penalties. For risks, consider the risk of transferring from the owner to the contractor, given that the payment and reward/disincentives are tied to the contractor's performance (Calahorra-Jimenez & Poythress, 2024). Figure 1 below captures these dimensions, providing a framework for understanding how PBRCs reshape accountability and efficiency in road management.

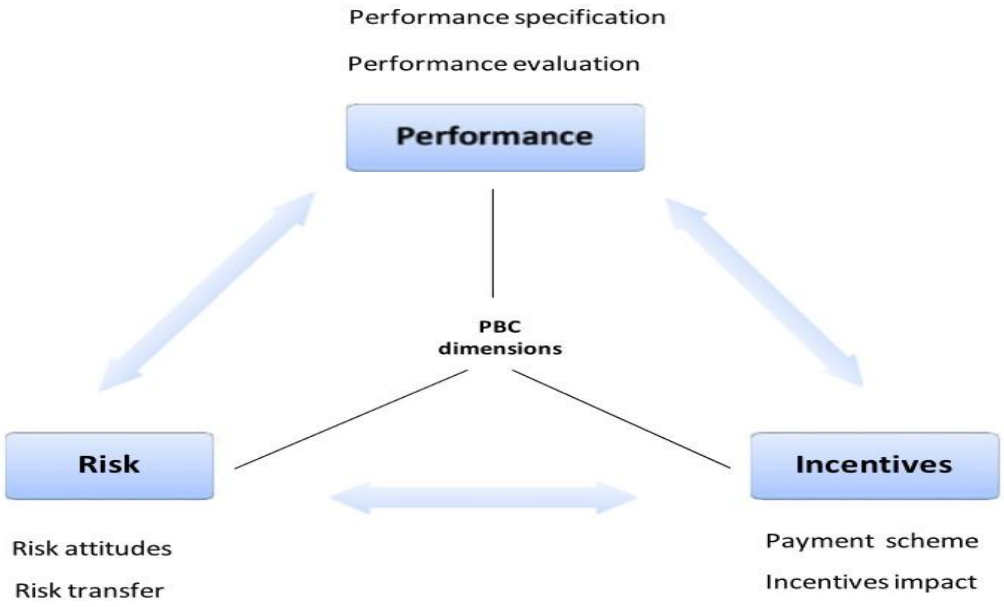


***Figure 1. The three dimensions of the performance-based contract model (Selviaridis & Wynstra, 2015)***

**Related empirical literature**

As earlier mentioned, studies in both emerging and developed economic contexts have reported many benefits associated with the PBRC approach, including cost savings, reduction of labor requirements for government staff, improved road conditions, greater road user satisfaction, and mechanisms for financing longer-term maintenance programs (Calahorra-Jimenez & Poythress, 2024; Ogita et al., 2023; Schoenmaker & de Bruijn, 2016; Sultana et al., 2012; Tseng & Yang, 2024). However, there are also challenges associated with its implementation. Selviaridis and Norrman (2015) explored the key challenges of adopting, designing, and managing performance-based contracts (PBCs) for advanced logistics services, as seen by providers. Key PBRC adoption challenges included aligning customer and provider goals and incentives, as well as their views on risk and reward sharing. Contract design challenges center around the definition and weighting of performance metrics, designing performance monitoring systems that consider service co-production effects to help improve customer relationships, and designing incentives with appropriate intensity levels. Contract management challenges include fostering provider proactivity, addressing changes in terms of processes and resource investments, ensuring the perceived fairness of designed incentives, and redesigning contracts to allow for win-win relationship outcomes.

Nyoagbe and Evdorides (2025) compared traditional input-based road contracts with performance-based road contracts (PBRCs) across multiple countries. They found that PBRCs generally offer greater fiscal discipline and long-term savings of 15%-40% due to preventive maintenance and outcome-focused resource allocation. Traditional contracts, by contrast, often result in inefficiency and cost overruns. However, transitioning to PBRCs can be challenging because of limited institutional capacity, vague metrics, insufficient oversight, and small contractor markets—issues especially pronounced in low-resource areas. Similarly, Calahorra-Jimenez and Poythress (2024) noted that in California, performance-based contracts yield cost savings, better service quality, and reduced agency risk but require training, mindset shifts, stronger trust between agencies and contractors, and present risks of system abuse.

Dagba and Dagba (2019) assessed procurement strategies and contract management practices and how they affect performance of road construction projects in Ghana. The study found that competitive and restricted tendering give value for money because they had the lowest coefficient of variation when compared to the other attributes for road construction. In Taiwan, Yang et al. (2023) highlighted the key challenges and develop key coping strategies (KCSs) in urban road management. Among the identified KCSs, attracting good contractors to participate, setting appropriate performance indicators and thresholds, enhancing the professional ability of the authority staff, and establishing PBRC bidding template documents were found to be the most valuable strategies. The challenges included the limited competence of contractors and the professional abilities of the government and public agencies oversee project. Schoenmaker and de Bruijn (2016) in determining how to achieve as much as possible of the expected advantages PBRC while limiting the possible disadvantages found that road agencies should focus on the process of interaction of the main actors involved, rather than the performance measurement systems itself. The agencies should adjust their governance to the degree of certainty. Thus, PBRC requires an informed and knowledgeable principal.

## Methodology

### Research Design and Setting

This study utilized a cross-sectional research design, collecting data from a specific group of individuals at one point in time to capture their perceptions and experiences (Spector, 2019). This design effectively facilitates the examination of opinions of different participants on a subject, enabling a systematic assessment of various perspectives from various backgrounds. The research setting was Ghana's road sector. This setting was chosen because Ghana with funding support from the World Bank and European Union had recently piloted the implemented PBRC, providing a relevant context to explore challenges related to their execution.

### Sample size and sampling strategy

The research involved 62 experts from various fields of road construction, including road engineers, procurement officers, road project consultants, and academics among other stakeholders. This size is methodologically robust, as previous studies support that the minimum sample size for various analyses typically necessitates at least 50-100 observations (Memon et al., 2020), whereas expert-based surveys attain reliability with 60–80 participants (Manyara et al., 2024). As a result, a sample size of 62 falls within the recommended limits for expert-based studies.

A purposive sampling strategy was employed to select participants with the specific expertise required to achieve the study's objectives. As in the case of this study, this method is ideal for professional settings where the focus is on the significance and depth of knowledge, rather than random representation (Campbell et al., 2020). This was to ensure that its findings were rooted in practical, sector-specific experience, which enhanced both validity and relevance.

### Data Collection Method

A structured questionnaire served as the primary tool for data collection, created from a review of existing literature on PBRC and refined through discussions with sector specialists. The instrument comprised two parts: demographic details (including years of professional experience, institutional affiliation, and area of expertise) and a series of closed-ended questions assessing perceived obstacles to implementing PBRCs. The items were

categorized by key themes such as institutional, financial, technical, and political barriers. Responses were collected using a five-point Likert scale enabling a quantitative analysis of expert opinions.

The data was collected electronically through a secure online survey platform. This approach was chosen to achieve a reduced logistical costs, and enable prompt responses from participants across various domains. Before administration, the questionnaire was tested with six experts who were not part of the final study, and their feedback helped improve clarity and content validity. Participants were assured of confidentiality and anonymity, and informed consent was secured prior to their involvement.

## Data Analysis

Data analysis was conducted using the Statistical Package for the Social Sciences (SPSS, version 28). Descriptive statistics such as means, frequencies, percentages and standard deviation were used to summaries the demographic characteristics of the respondents and evaluate their perceptions of barriers to PBRC implementation. Mean ranking was utilized to enhance the analysis, allowing for a structured prioritization of the most significant barriers based on their relative severity. Additionally, one-sample t-tests were performed to assess the statistical significance of perceived barriers compared to a neutral benchmark, thereby validating their practical relevance in the implementation context. Figure 1 provides a summary of the methodology.

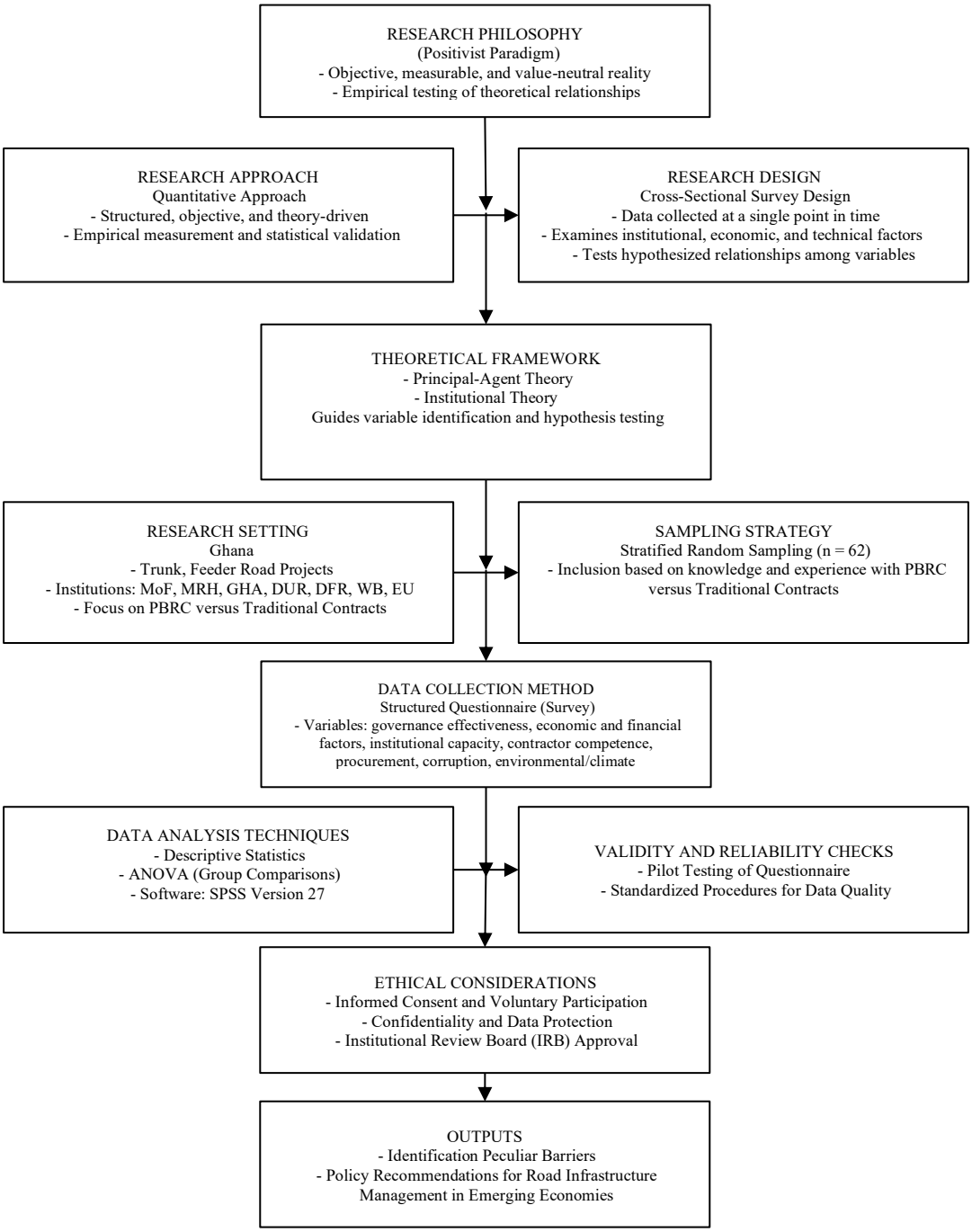


**Figure 2. Schematic diagram of the research methodology**

Result

**Demographic profile of respondents**

As seen in Table 1, 80.6% of respondents were male and 19.4% were female. In terms of their organizational positions 54.8% of respondents were mid-level managers and 35.5% top-level managers. By proportion, fewer respondents were in low-level management (3.2%), consultants (1.6%), and grievance redress officials (3.2%). With 75.8% possessing a Master's degree and 12.9% holding a bachelor's degree, respondents' educational level is considered high. 6.5% held doctorates, while 4.8% were chartered accountants. Most respondents were professionals with extensive experience. 27.4% have 16–20 years of experience, and 21% have 21–25 years, indicating a strong institutional knowledge base.

**Table 1: Demographic profile of respondents**

| Variable | Category | Frequency (n=62) | Percentage (%) |
|---|---|---|---|
| Gender | Male | 50 | 80.6 |
| | Female | 12 | 19.4 |
| | Total | 62 | 100 |
| Position | Middle level management | 34 | 54.8 |
| | Top level management | 22 | 35.5 |
| | Low level management | 2 | 3.2 |
| | Consultant | 1 | 1.6 |
| | Top level management, but resigned | 1 | 1.6 |
| | Grievance Redress Officer | 2 | 3.2 |
| | Total | 62 | 100 |
| Education Level | Master's Degree | 47 | 75.8 |
| | Bachelor's Degree | 8 | 12.9 |
| | Doctor of Philosophy (PhD) | 4 | 6.5 |
| | Chartered Accountant | 3 | 4.8 |
| | Total | 62 | 100 |
| Years of Experience (Q1.5) | 0 – 5 years | 7 | 11.3 |
| | 6 – 10 years | 8 | 12.9 |
| | 11 – 15 years | 9 | 14.5 |
| | 16 – 20 years | 17 | 27.4 |
| | 21 – 25 years | 13 | 21.0 |
| | 26 or more years | 8 | 12.9 |
| | Total | 62 | 100 |
| Knowledge of PBCs (Q1.6) | Low | 10 | 16.1 |

| Variable | Category | Frequency (n=62) | Percentage (%) |
|---|---|---|---|
| | Medium | 22 | 35.5 |
| | High | 20 | 32.3 |
| | Very High | 10 | 16.1 |
| | Total | 62 | 100 |

**Descriptive Statistics of Barriers Affecting PBRC Implementation in Ghana**

Table 2 presents the descriptive statistics regarding the challenges mentioned by respondents as affecting the operationalization of PBRC in Ghana. The results highlight a complex mix of economic, institutional, and governance-related difficulties that can significantly undermine the sustainability of PBRC models.

The most obvious single difficulty implied was price instability and currency devaluation (80.6%). This refers to the vulnerability of long-term contracts to inflationary and exchange rate risks which can destabilize the financial stability required for PBRC operation. Directly related, increasing debt burdens (77.4%) and macroeconomic risks (72.6%) signify system fiscal instability that limits governments from honoring contractual obligations and yielding stable funding streams.

Institutional and business environment constraints were also mentioned very strongly. Unfavorable business environment and inaccessible finance (75.8%) were significant issues, particularly to local contractors who face constraints in accessing funds in order to perform. Similarly, corruption (67.7%) and contract enforcement weaknesses (64.5%) point to governance failures that undermine accountability and transparency. Capacity was also an issue. Institutional capacity constraints and a declining public sector machinery (61.3%) were cited by respondents as the drivers that keep efficient contract management and oversight under check, along with a shortage of skills or lack of adequate skilled human resources (59.7%). Additionally, high cost of new technology (58.1%) and risks inherent in procurement (56.5%) also add to inefficiencies, holding back innovation and value-for-money delivery of projects.

Finally, structural and context risks, such as political and governance uncertainty, conflict, and violent extremism (53.2%), unfavorable initial PBRC experience (48.4%), and climate vulnerability (45.2%), reflect the more universal development challenges that underlie infrastructure projects in fragile economies.

**Table 2. Descriptive statistics of peculiar barriers to PBRC implementation in Ghana**

| Variable | Frequency (n) | Percentage (%) |
|---|---|---|
| Currency depreciation and price volatility | 50 | 80.6 |
| Climbing debt burden | 48 | 77.4 |
| Weak business climate and lack of access to finance | 47 | 75.8 |
| Macroeconomic risk | 45 | 72.6 |
| Corruption | 42 | 67.7 |
| Weaknesses in contract enforcement | 40 | 64.5 |
| Financial management risks during implementation | 39 | 62.9 |
| Institutional capacity and failing public sector machinery | 38 | 61.3 |
| Skills gap or inadequate skilled human resource | 37 | 59.7 |
| High cost of new technology | 36 | 58.1 |
| Procurement risks | 35 | 56.5 |

| Variable | Frequency (n) | Percentage (%) |
|---|---|---|
| Political and governance risk, conflict and violent extremism | 33 | 53.2 |
| Weak initial PBC experience | 30 | 48.4 |
| Climate vulnerability | 28 | 45.2 |

*Note. Frequencies reflect respondents who rated each challenge as "Likely" or "Very Likely" (Likert 4–5). Percentages are based on valid item responses.*

**Rank Challenge Label**

Table 3 presents the ranked mean scores of the main obstacles to the application of PBRC in emerging economies. The ranking shows the comparative seriousness and perceived importance of each obstacle as assessed by respondents. The results indicate that macroeconomic and financial risks predominate, reflecting the structural fragility of most developing nations' infrastructure sectors.

The most prominent difficulty revealed was currency depreciation and price volatility (M = 4.10, SD = 1.19), showcasing the dire risk of exchange rate volatility and inflationary pressures on long-term contract performance. Following closely is the increasing debt burden (M = 4.00, SD = 1.16), which forebodes fiscal austerity that limits government capacity to fund road projects and support performance payments. Poor business climate and lack of access to finance (M = 3.93, SD = 1.11) also contribute to these issues, as contractors, especially local contractors, struggle to mobilize the finance needed for contract execution. Macroeconomic risk (M = 3.84, SD = 1.13) and corruption (M = 3.72, SD = 1.25) were also highly ranked challenges, reflecting systemic instability and governance inefficiencies that undermine transparency and trust in PBRC processes. Institutional and operational challenges, such as weaknesses in contract enforcement (M = 3.57, SD = 1.31) and financial management risk during implementation (M = 3.55, SD = 1.11), also indicate the need for stronger regulatory and oversight systems. Institutional capacity weaknesses (M = 3.52) and skills deficiencies (M = 3.51) denote persistent human and bureaucratic resource limitations. In contrast, high technology costs (M = 3.50) and procurement risk (M = 3.48) denote structural inefficiencies and cost barriers to project innovation. Governance and political risk (M = 3.47), absence of initial PBRC experience (M = 3.43), and climate vulnerability (M = 3.08) were ranked lower but remain significant contextual drivers.

**Table 3. Ranked challenge label**

| Ranked | Challenge label | M | SD | 95% CI for M |
|---|---|---|---|---|
| 1 | Currency depreciation and price volatility | 4.10 | 1.19 | [3.80, 4.40] |
| 2 | Climbing debt burden | 4.00 | 1.16 | [3.71, 4.29] |
| 3 | Weak business climate and lack of access to finance | 3.93 | 1.11 | [3.66, 4.21] |
| 4 | Macroeconomic risk | 3.84 | 1.13 | [3.56, 4.12] |
| 5 | Corruption | 3.72 | 1.25 | [3.40, 4.03] |
| 6 | Weaknesses in contracts enforcement | 3.57 | 1.31 | [3.24, 3.90] |
| 7 | Financial management risk during implementation | 3.55 | 1.11 | [3.27, 3.83] |

| Ranked | Challenge label | M | SD | 95% CI for M |
|---|---|---|---|---|
| 8 | Institutional capacity and failing public sector machinery | 3.52 | 1.16 | [3.22, 3.81] |
| 9 | Skills gap or inadequate skilled human resource | 3.51 | 1.23 | [3.20, 3.82] |
| 10 | High cost of new technology | 3.50 | 1.16 | [3.21, 3.79] |
| 11 | Procurement risks | 3.48 | 1.13 | [3.20, 3.77] |
| 12 | Political and governance risk, conflict and violent extremism | 3.47 | 1.33 | [3.14, 3.80] |
| 13 | Weak initial Performance-Based Contract experience | 3.43 | 1.27 | [3.11, 3.75] |
| 14 | Climate vulnerability | 3.08 | 1.14 | [2.80, 3.37] |

**One-Sample *t*-Test Results**

Table 4 presents the one-sample t-test output to examine whether the mean ratings of the peculiar challenges impeding the implementation of PBRC were significantly greater than the neutral test point of 3 ("neither likely nor unlikely"). The findings clearly show that the respondents overwhelmingly view these challenges as being highly relevant and pressing. The results show that currency depreciation and price volatility are the most significant issues ($M = 4.10$, $t = 7.19$, $p < .001$), a gauge of overall concern about the destabilizing effects of variable exchange rates and inflation on contract stability. Similarly, an increasing debt burden ($M = 4.00$, $t = 6.76$, $p < .001$) and an unsatisfactory business climate and limited access to finance ($M = 3.93$, $t = 6.58$, $p < .001$) were significantly greater than the test value, indicating financial and institutional constraints to efficient PBRC implementation. Macro-level threats aside from corruption also indicated strong statistical significance. Macroeconomic risk ($M = 3.84$, $t = 5.83$, $p < .001$) and corruption ($M = 3.72$, $t = 4.44$, $p < .001$) were major obstacles, consistent with fiscal instability and governance problems of developing environments. Operational and institutional difficulties at the level of contract enforcement weaknesses ($M = 3.57$, $t = 3.36$, $p = .001$), risk in financial management during implementation ($M = 3.55$, $t = 3.83$, $p < .001$), and institutional capacity and failing public sector machinery ($M = 3.52$, $t = 3.46$, $p = .001$) were all significant statistically, suggesting inefficiency in institutions and systems has a direct effect on the reliability of contract outcomes. Finally, human resource skill gaps ($M = 3.51$, $t = 3.22$, $p = .002$) and the prohibitive cost of new technology ($M = 3.50$, $t = 3.41$, $p = .001$) also confirm that technical as well as cost factors continue to act as barriers to sustainable implementation.

**Table 4. One-Sample *t*-Test Results (Test Value = 3)**

| *M* | 95% CI [LL, UL] | *t* | *P* | (α = .05) | |
|---|---|---|---|---|---|
| Q57 – Currency depreciation and price volatility | 4.1 | 1.19 | [3.80, 4.40] | 7.19 | <.001 |
| Q55 – Climbing debt burden | 4.0 | 1.16 | [3.71, 4.29] | 6.76 | <.001 |
| Q56 – Weak business climate and lack of access to finance | 3.93 | 1.11 | [3.66, 4.21] | 6.58 | <.001 |
| Q54 – Macroeconomic risk | 3.84 | 1.13 | [3.56, 4.12] | 5.83 | <.001 |

| | | | | | |
|---|---|---|---|---|---|
| Q66 – Corruption | 3.72 | 1.25 | [3.40, 4.03] | 4.44 | <.001 |
| Q61 – Weaknesses in contracts enforcement | 3.57 | 1.31 | [3.24, 3.90] | 3.36 | 0.001 |
| Q65 – Financial management risk during implementation | 3.55 | 1.11 | [3.27, 3.83] | 3.83 | <.001 |
| Q58 – Institutional capacity and failing public sector machinery | 3.52 | 1.16 | [3.22, 3.81] | 3.46 | 0.001 |
| Q63 – Skills gap / inadequate skilled human resource | 3.51 | 1.23 | [3.20, 3.82] | 3.22 | 0.002 |
| Q62 – High cost of new technology | 3.5 | 1.16 | [3.21, 3.79] | 3.41 | 0.001 |

**Discussion**

This study identified and analyzed the barriers to implementing PBRC in Ghana. Relying on expert opinions, the findings indicated that the most significant constraints were currency depreciation and price volatility (80.6%), a rising debt burden (77.4%), and a weak business climate with restricted access to finance (75.8%). Other significant barriers included macroeconomic risks at 72.6%, corruption at 67.7%, weaknesses in contract enforcement at 64.5%, and gaps in institutional capacity at 61.3%. Respondent noted that skills shortages, high technology costs, and procurement risks also pose significant challenges to effective implementation. Additionally, political and governance instability also exist as contextually significant barrier however they are ranked lower.

These findings corroborate the broader trends observed in the literature. Prior studies had identified financial instability, restricted institutional capacity, and governance issues as significant obstacles to the implementation of PBRC in emerging economies contexts (Selviaridis & Norrman, 2015; Ogita et al., 2023; Nyoagbe & Evdorides, 2025). In the same vein, this study highlighted financial instability, currency depreciation, and climbing debt burden as significant constraints, reflecting similar findings in Latin America and parts of Asia, where macroeconomic volatility has affected long-term contractual agreements (Calahorra-Jimenez & Poythress, 2024). This structural vulnerability is not merely an operational challenge; it fundamentally disrupts the alignment of incentives between contracting parties, as highlighted by Principal–Agent theory. During times of fiscal instability, the government struggles to maintain consistent payment flows, which erodes contractors' trust and weakens the performance incentives crucial for PBRC models. Limited access to credit for local contractors in Taiwan and South Africa (Yang et al., 2023) worsens this misalignment by hindering their capacity to manage risk or invest in long-term maintenance. The dynamics indicate that PBRCs function effectively when fiscal stability underpins dependable commitments. Unlike developed regions with robust financial systems, Ghana's susceptibility to macroeconomic shocks heightens agency risks, disrupting contracts and explaining the underperformance of otherwise effective PBRC models.

Weaknesses in institutional and governance frameworks show that concentrating only on technical contract design does not ensure effective performance. This study highlights the difficulties posed by inadequate contract enforcement, corruption, and the limited capacity of oversight bodies. These issues align with findings from other low-capacity states, hindering accountability and performance (Dagba & Dagba, 2019; Schoenmaker & de Bruijn, 2016). This finding can be interpreted through Institutional Theory which highlights the significance of both formal structures and informal norms in influencing implementation processes. From this institutional standpoint, the effectiveness of PBRC mechanisms in Ghana is hindered by insufficient institutional maturity, regulatory uncertainty, and fragmented accountability. Corruption undermines enforcement and leads to unreliable sanctions, which in turn erodes trust and predictability in contracting relationships—factors linked to increased moral hazard in Principal–Agent theory. The ongoing but reduced impact of political and climate risks highlights an institutional weakness that intensifies external shocks, threatening long-term infrastructure commitments. Unlike established institutional environments that encourage enforcement and mitigate political risk, Ghana's governance framework limits the implementation of PBRC principles. This insight indicate that the effectiveness of PBRCs in fragile economies relies not only on contract design but also on establishing the essential institutional and fiscal credibility needed for ongoing incentive alignment.

This finding addresses the empirical gaps in the literature by going beyond generalized accounts of PBRC benefits and the review based approach to empirically identify the contextual constraints that hinder their practical implementation in emerging economies, specifically Ghana. Although current research highlights the cost efficiency and risk transfer of PBRC, it falls short in detailing how specific macroeconomic, financial, and institutional factors interact to hinder its scalability in low-resource environments. The findings highlight the fact that fiscal volatility, weak credit systems, institutional fragility, and governance deficits are interconnected

structural forces that influence the incentive environment and operational logic of PBRCs in Ghana. Additionally, macroeconomic instability diminishes payment credibility and increases financing risks. Weak enforcement institutions weaken contract discipline, while governance failures diminish trust between the state and contractors, ultimately undermining performance incentives. This understanding enhances theory by refining Principal-Agent Theory to consider how unstable macroeconomic and institutional environments disrupt incentive alignment and increase agency costs. Moreover, this study offers a contextually grounded explanation for the uneven implementation of PBRC in Ghana, providing a sound foundation for road contract reform efforts.

## CONCLUSION

This study underscores the fact that the implementation of PBRC in developing economies is significantly shaped by macroeconomic instability, limited institutional capacity, governance challenges, and structural inefficiencies. The evidence shows that although PBRC holds great potential for cost efficiency, accountability, and innovation in road infrastructure delivery, its success depends not just on the design of contracts but also on the supportive institutional and economic context in which it operates. Specific barriers such as currency fluctuations, poor fiscal management, restricted financial access, corruption, and capacity limitations weaken the essential incentive frameworks that support PBRC. The findings confirm that shifting performance risk to private contractors is effective only when economic and institutional conditions support reliable enforcement and consistent financing. This highlights the importance of governance maturity and market stability as essential factors for effective risk allocation and incentive alignment within the Principal–Agent and Institutional Theory frameworks. The study reaffirms the need to enhance institutional frameworks, stabilize macroeconomic conditions, and improve oversight mechanisms to optimize the PBRC model in the road sector in Ghana and for that matter similar emerging economies. The absence of these essential reforms will limit the transformative potential of PBRC in improving infrastructure delivery in emerging economies contexts like in the case of Ghana.

## RECOMMENDATIONS

The findings establish a sound basis for focused policy and practice interventions to improve the implementation of PBRC in Ghana. From a policy standpoint, the finding suggests that prioritizing the strengthening of macroeconomic stability is essential to tackle currency volatility and debt burdens that undermine the credibility of long-term payment commitments. Creating reliable fiscal frameworks and ensuring consistent budget allocations would improve contract reliability and lower agency risks. Enhancing credit access for local contractors via state-backed guarantees, development finance institutions, or blended financing can alleviate financial barriers and encourage competitive involvement in PBRC projects. Reforming institutions should prioritize strengthening the capacity and independence of enforcement agencies to improve contract monitoring, evaluation, and enforcement. Enhancing procurement oversight, implementing transparent bidding systems, and ensuring regulatory accountability will strengthen trust and credibility in the contracting process. Moreover, creating a stable political and governance environment is essential for ensuring the policy certainty needed to maintain PBRCs

Practically, strategies for implementation should priorities operational and managerial changes to improve contract execution. Enhancing contractor capacity through technical training, skills transfer, and knowledge-sharing platforms can lead to better performance outcomes. Enhancing technological capabilities and digital procurement systems can enhance transparency and improve efficiency in contract management. Establishing regular performance audits and implementing data-driven monitoring frameworks can strengthen accountability and mitigate performance risks. Promoting joint ventures or consortia between local and international firms can strengthen local contractor capacity and facilitate knowledge sharing. Lastly, embedding PBRC implementation within a broader infrastructure governance framework—rooted in fiscal discipline, regulatory clarity, and transparent performance monitoring—will foster an environment conducive to sustained and effective contract outcomes.

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