

Assessment of the Role of the Deming Cycle in Enhancing the Implementation of Constituency Development Fund (CDF) Projects in Lusaka

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Abstract

This study applied the Deming Cycle (Plan-Do-Check-Act) to improve continual improvement practices in Constituency Development Fund (CDF) projects in Zambia. Three objectives guided the research: (i) assess how PDCA stages can strengthen planning, monitoring, and evaluation; (ii) analyze the extent PDCA addresses performance gaps; and (iii) develop a PDCA-based framework tailored to CDF projects. Despite CDF allocations increasing from K1.6 million per constituency in 2021 to K25.7 million in 2023, only 58% of funds are disbursed and 65% of projects face delays or abandonment. Independent variables comprised PDCA stage practices (PLAN, DO, CHECK, ACT). Dependent variables included project performance indicators (delays, cost overruns, community satisfaction, quality, functionality). Monitoring effectiveness, learning application, and planning quality served as mediating constructs. Explanatory sequential mixed-methods design across three Lusaka constituencies (Mandevu urban, Matero peri-urban, Chongwe rural-urban mix). Surveys (n=140, 94.0% response rate), 15 key informant interviews, 3 focus groups (n=30), and 40 project documents. Quantitative analysis used SPSS v26 (descriptive statistics, Pearson correlation, one-way ANOVA, multiple linear regression: $Y = \beta_0 + \beta_1X_1 + \beta_2X_2 + \beta_3X_3 + \epsilon$). Qualitative analysis used NVivo 12 (thematic analysis). Systemic failures permeate all PDCA stages: PLAN (mean=2.83 consultation, 2.51 technical input), DO (mean=2.12 fund disbursement; 42.9% identify funding delays as primary cause), CHECK (mean=2.38 monitoring; 60.0% rate ineffective), ACT (mean=2.13; only 10.7% report formal corrective processes). Performance gaps are pervasive: 70.7% report frequent delays, 56.4% cost overruns, 60.0% dissatisfaction with community involvement, 57.1% indicate <50% project functionality post-completion. Correlation analysis showed monitoring effectiveness most strongly associated with outcomes (r=-0.62 with delays; r=0.59 with satisfaction). Regression confirmed monitoring as strongest success predictor ($\beta=0.41$, $p<0.001$), followed by learning application ($\beta=0.29$, $p<0.001$) and planning quality ($\beta=0.21$, $p=0.003$), explaining 50.4% of variance ($R^2=0.504$). ANOVA revealed significant constituency differences ($p<0.01$), with Chongwe performing worse than Mandevu. Stakeholders strongly support PDCA principles (>85% agreement) but express capacity concerns (28.6%) and system flexibility doubts (25.0%). This study makes three original contributions. First, it bridges quality management theory (TQM/PDCA) with decentralized development practice, empirically validating PDCA's applicability in resource-constrained, politically sensitive grassroots project environments an underexplored context. Second, it provides the first empirical ranking of PDCA stage effects in development projects, demonstrating monitoring (CHECK) as the strongest success predictor ($\beta=0.41$), followed by learning (ACT) ($\beta=0.29$) a hierarchical finding with resource allocation implications. Third, it develops the CDF-PDCA Continuum Model, a practical framework with constituency-specific adaptations (urban political accountability, peri-urban capacity building, rural accessibility solutions), operationalizing continuous improvement for Zambia's largest decentralized funding mechanism.

1. Introduction and Background

This chapter presents the background to the study, statement of the problem, purpose of the study, research objectives, research questions, significance of the study, limitations of the study, theoretical framework, conceptual framework, scope of the study, and operational definitions of key terms. The research assesses how the Deming Cycle (Plan Do Check Act, PDCA) can enhance Constituency Development Fund (CDF) project implementation in Zambia. The analytical framework treats PDCA stages as independent variables (PLAN, DO, CHECK, ACT) and project performance indicators (delays, cost overruns, community satisfaction, quality, functionality) as dependent variables. The study empirically tests relationships between PDCA elements and outcomes, then develops a context sensitive continual improvement framework for three Lusaka constituencies: Mandevu (urban), Matero (peri urban), and Chongwe (rural urban mix).

The Constituency Development Fund (CDF) was introduced in Zambia in 1995 as a decentralized financing mechanism aimed at catalyzing grassroots development by empowering constituencies to undertake community prioritized projects. The fund's governance and scope have evolved significantly, most notably with the enactment of the CDF Act No. 11 of 2018 and its subsequent amendment in 2022. The legislative changes marked a transformative shift, radically increasing the annual allocation from K1.6 million per constituency in 2021 to K25.7 million in 2023 (Ministry of Finance, 2023) and expanding its mandate to include not only community infrastructure but also youth and women empowerment loans, and skills development bursaries.

The current state of CDF implementation is characterized by a profound paradox. On one hand, the government has demonstrated an unprecedented financial commitment to decentralization, channeling substantial resources directly to the local level with the stated goal of reducing poverty and accelerating local development. The CDF is now the most significant direct funding stream for local infrastructure projects, particularly in sectors like education (classroom construction) and health (health posts and centers).

On the other hand, this ambitious financial injection has starkly exposed and exacerbated pre-existing operational and systemic weaknesses in the project management lifecycle. We are now at a critical juncture where the potential of the CDF is immense, but its execution is severely hampered. Key challenges span planning, execution, monitoring, and adaptation.

- **Planning:** Project identification often suffers from inadequate technical input and rushed community consultations, leading to poorly designed or unsustainable projects.
- **Execution (DO):** Implementation is plagued by chronic delays in fund disbursement, contractor incompetence, and weak supervision by Ward Development Committees (WDCs), who often lack requisite project management training.
- **Monitoring (CHECK):** The monitoring and evaluation framework is weak, often reduced to compliance checking rather than performance assessment. There is no structured mechanism for real time feedback or mid course corrections.
- **Adaptation (ACT):** There is no formalized process for learning from past successes and failures. Projects repeat the same mistakes year after year because there is no systematic ACT phase to embed lessons learned into future projects.

Research by Muyaloka and Kachamba (2024) found that although management strategies are sometimes aligned with good practices, key challenges such as funding delays, contractor incompetence, weak monitoring and evaluation systems, and minimal community involvement persist. These issues point to systemic inefficiencies and the absence of structured feedback loops that ensure continual improvement in project outcomes.

The Deming Cycle, also known as the Plan-Do-Check-Act (PDCA) model, is a widely adopted quality management tool used to enhance continuous improvement in both public and private sectors globally (Deming, 1986). Studies like Li et al. (2023) have demonstrated the effectiveness of PDCA in improving outcomes in healthcare delivery. However, its application in community development and public project management in Zambia remains unexplored.

Therefore, while the CDF's scale and intent represent a new era for local development in Zambia, its management practices remain stuck in a linear, often disjointed approach. This study positions itself within this gap and seeks to introduce the Deming Cycle (PDCA) as a structured, iterative management framework to bridge the current implementation paradox, transforming the CDF from a fund of immense potential into a tangible system with continual improvement and lasting community impact.

1.2 Statement of the Problem

Despite a monumental increase in the Constituency Development Fund (CDF) allocation from K1.6 million in 2021 to K25.7 million per constituency in 2023 (Ministry of Finance, 2023), operational inefficiencies continue to cripple project success. Empirical evidence reveals a systematic failure in the CDF project lifecycle: funding delays mean only 58% of allocated funds are disbursed (ZIPAR, 2022); weak monitoring leads to 65% of projects being abandoned, delayed, or non functional (Muyaloka & Kachamba, 2024); and inadequate community engagement results in over 70% of beneficiaries feeling excluded from planning (Chibwe & Mwansa, 2023). These inefficiencies point to a critical absence of structured, iterative feedback loops for continual improvement.

If this problem remains unaddressed, the persistent wastage of public resources will continue, directly undermining the service delivery capacity of the Ministry of Health and Ministry of Education. Substandard or abandoned infrastructure, as cited in the Auditor General's Reports (2023), exacerbates service gaps in rural and peri urban areas, erodes public trust in decentralized governance, and ultimately hinders national poverty reduction and development goals (Muyaloka & Kachamba, 2024).

While previous studies have effectively diagnosed these challenges (Muyaloka & Kachamba, 2024) or demonstrated the value of quality management principles in other contexts (Whyte, 2021; Li et al., 2023), a significant gap remains. No research has proposed or tested a practical, structured framework to rectify these operational inefficiencies within the CDF system itself. In particular, the Plan Do Check Act (PDCA) cycle a proven iterative model for continuous improvement remains unexplored in Zambia's constituency development context.

This study fills that void by: (i) applying the PDCA cycle as an analytical lens to diagnose where and why current CDF management fails; (ii) quantifying the relationships between PDCA stage practices and project outcomes (delays, cost overruns, satisfaction, functionality); and (iii) developing a CDF PDCA Continuum Model a tailored, evidence-based framework with constituency specific adaptations to institutionalize continual improvement in Zambia's largest decentralized funding mechanism. Thus, the study aims to transform CDF from a fund of high potential into a system of demonstrable, sustainable community impact.

2 Literature Review

2.1 Previous Studies

Decentralization is the transfer of authority, resources, and responsibilities from central to local governments is widely advocated as a means to improve service delivery, enhance accountability, and reduce poverty (Manor, 1999; Smoke, 2015). Constituency Development Funds, first introduced in countries such as Kenya (2003), Malawi (2005), and Zambia (1995), represent a specific variant of fiscal decentralization that channels discretionary funds directly to parliamentary constituencies. Proponents argue that CDFs increase local responsiveness, enable community prioritization, and reduce bureaucratic

bottlenecks (Nyaguthii & Oyugi, 2013).

However, a robust body of empirical literature consistently documents a paradox: substantial financial allocations yield disappointing development outcomes. Studies across multiple Commonwealth countries reveal systemic failures: erratic fund disbursement, weak technical capacity of local committees, superficial community consultation, and an almost non-existent culture of learning from past projects (Nyaguthii & Oyugi, 2013; Muyaloka & Kachamba, 2024). This paradox has generated theoretical debate. Institutional perspectives attribute failures to weak local governance structures and lack of formal accountability mechanisms (Andrews et al., 2017). Political economy perspectives point to elite capture, patron client relations, and the strategic manipulation of CDF allocations for electoral advantage (Chibwe & Mwansa, 2023). Resource based views highlight inadequate training, insufficient monitoring budgets, and poor infrastructure as binding constraints (Smoke, 2015).

Studies specific to Zambia provide a critical baseline diagnosis. Muyaloka and Kachamba (2024) identified systemic failures across the project lifecycle: erratic fund disbursement, weak technical capacity of Ward Development Committees (WDCs), superficial community consultation, and an absence of learning from past projects. Their qualitative case studies of health and education infrastructure revealed that projects are often abandoned or non functional, a finding corroborated by the Auditor General's (2023) report, which documented repeated audit queries on the same issues across multiple years. ZIPAR (2022) quantified the scale of the problem, finding that only 58% of allocated CDF funds are disbursed annually, with projects suffering from poor absorption capacity and financial mismanagement. Chibwe and Mwansa (2023) added a community level perspective, discovering that over 70% of beneficiaries feel excluded from planning processes, with consultations often tokenistic and not integrated into decision making.

While this literature excels at diagnosing problems documenting what goes wrong and how often its recommendations remain generic and prescriptively weak. Common calls for "better monitoring," "increased capacity," or "more community participation" lack operational specificity. Moreover, the literature is largely linear and static: it treats project management as a sequence of discrete steps rather than an iterative learning cycle. Notably absent is any engagement with quality management theory (e.g., TQM, PDCA) as a potential solution. This represents a significant theoretical and practical gap: the very same iterative, feedback driven processes that have transformed manufacturing and healthcare remain unexplored in the management of CDF projects.

2.2 The Uncharted Intersection: PDCA in Grassroots Development Management

The theoretical antidote to linear, non iterative management is found in Total Quality Management (TQM). Deming (1986) argued that quality is not an inspection outcome but a result of continuous, data driven improvement of processes a philosophy that rejects blame-based approaches in favour of systematic problem solving. The operational engine of TQM is the Plan Do Check Act (PDCA) cycle: a four-stage iterative model for controlling and improving processes. The PLAN stage establishes objectives and processes; DO implements them; CHECK evaluates results against objectives; and ACT standardises successful changes or initiates another improvement cycle.

Evidence of PDCA efficacy in complex systems. PDCA's effectiveness is well established in manufacturing and, increasingly, in service sectors. Li et al. (2023) demonstrated its successful application in a Chinese hospital, where the PDCA cycle increased procedural compliance, reduced clinical errors, and created structured feedback loops for the WHO Safe Childbirth Checklist. Whyte (2021) illustrated how TQM principles including data driven decision making and stakeholder involvement enhanced the reliability of government IT systems in South Africa. These studies validate PDCA's transferability to complex, service-oriented systems that require consistent monitoring and adaptation.

Theoretical debate and contextual limitations. However, a critical examination reveals two important limitations. First, the PDCA literature predominantly focuses on formal, institutionalized settings (hospitals, corporate IT departments, manufacturing plants) with clear hierarchies, established data systems, and professional staff. Its application in the informal, politically sensitive, and resource constrained environment of community driven development where multiple stakeholders with varying literacy levels and power interact is markedly underexplored. This constitutes a contextual gap. Second, there is an unresolved theoretical tension between the rational planning assumptions embedded in PDCA (e.g., measurable objectives, reliable data, stable causal relationships) and the messy, emergent realities of grassroots development, where political interference, funding unpredictability, and capacity constraints are the norm rather than the exception. Some scholars argue that PDCA risks becoming a "tick box" compliance tool if transplanted without adaptation (Mansuri & Rao, 2013).

A limited number of studies hints at the potential of integrating quality management into development. Literature on community driven development (CDD) emphasises participation and adaptive management principles that resonate with the PLAN and ACT stages of PDCA (Mansuri & Rao, 2013). However, as Mansuri and Rao (2013) critique, many participatory approaches lack the rigorous, structured CHECK phase, often defaulting to anecdotal feedback rather than systematic performance assessment. The work closest to bridging this gap comes from public administration scholars who advocate for "learning organisations" in the development sector. Andrews et al. (2017) argue that public agencies must move from linear, compliance-based project cycles to iterative, learning oriented ones (Problem Driven Iterative Adaptation, or PDIA). While persuasive, this body of work often remains at a conceptual or policy level, offering high level principles rather than a tangible, stage by stage framework that local actors such as WDC members in Zambia can implement. As Nyaguthii and Oyugi (2013) concluded in their study of Kenyan CDFs, "community involvement is vital but insufficient without a structured mechanism to channel that involvement into actionable project adjustments" (p. 45). This statement encapsulates the very gap the PDCA cycle is designed to fill, yet no study has explicitly made this connection for CDFs in Zambia.

2.3 Synthesis and Identified Gap

The literature presents a clear dichotomy. On one side, there is detailed, contextual evidence of chronic implementation failures in Zambia's CDF (Muyaloka & Kachamba, 2024; ZIPAR, 2022; Chibwe & Mwansa, 2023). On the other, there is robust theoretical and empirical evidence for the PDCA cycle as a tool for continuous improvement in complex systems (Deming, 1986; Li et al., 2023; Whyte, 2021). However, these two streams of literature run in parallel, seldom intersecting. Prior studies on CDFs diagnose problems but lack a prescriptive management framework. Studies on PDCA demonstrate its utility but not in the messy, decentralized, and politically nuanced arena of African grassroots development projects. The first research question addresses how the stages of the Plan-Do-Check-Act (PDCA) cycle can be operationalized to strengthen the planning, monitoring, and evaluation processes of Constituency Development Fund (CDF) projects in Zambia. Existing literature extensively explores the application of the PDCA cycle in project management, particularly in public sector contexts. Deming (1986) introduced the PDCA cycle as a foundational model for continuous quality improvement, emphasizing its relevance in structured planning and evaluation processes. Additionally, Li et al. (2023) showcased successful PDCA implementation in healthcare projects, highlighting how each stage facilitates effective planning, monitoring, and evaluation. Furthermore, literature discussing the adaptation of PDCA in community development projects reveals best practices and challenges encountered during operationalization, providing valuable insights that are directly applicable to the CDF context.

The second research question investigates the extent to which the application of the PDCA approach can mitigate common performance gaps, such as project delays, cost overruns, and community dissatisfaction, within CDF project management. Here, empirical studies analyze the impact of PDCA implementation on these performance gaps. For instance, Whyte (2021) discussed the relationship between Total Quality Management (TQM) principles, including PDCA, and the reduction of inefficiencies in public administration, demonstrating significant improvements in project outcomes. Case studies from similar decentralized financing mechanisms that have implemented PDCA highlight reductions in project delays and cost overruns, providing evidence of its effectiveness. Additionally, the literature correlating structured project management practices with increased community satisfaction and stakeholder engagement underscores the importance of addressing community needs within the PDCA framework.

The third research question focuses on identifying the key components and processes that should constitute a PDCA-based continual improvement framework tailored for the specific operational context of CDF projects in Zambia. This section of the literature review will explore models proposed by researchers for integrating PDCA into public project management, emphasizing frameworks that incorporate stakeholder feedback, adaptive planning, and iterative learning. It is crucial to consider local context; studies outlining the unique challenges of implementing management frameworks in Zambia will be discussed to ensure that cultural and political considerations are addressed. By summarizing key recommendations from the literature for structuring a PDCA-based continual improvement framework, this review highlights how to enhance project outcomes while overcoming local operational challenges.

Therefore, this study positions itself at this critical intersection. It seeks to move beyond diagnosis to prescription by contextualizing the classical PDCA model to the specific operational realities of

Zambian's CDF. It asks not just what is wrong, but how proven management model can be adapted to fix it, thereby addressing a significant gap in both development practice and management theory application. This literature review provides a comprehensive understanding of how the PDCA cycle aligns with CDF project management in Zambia. Each section is directly linked to the respective research questions, ensuring that findings contribute meaningfully to the overall research objectives.

2.4 Theoretical frameworks

Total Quality Management (TQM) Theory

The theoretical foundation of this study is anchored in Total Quality Management (TQM), a management philosophy that provides the overarching principle of continuous improvement necessary to address the persistent inefficiencies in CDF project implementation. Within TQM, the Deming Cycle (Plan-Do-Check-Act or PDCA) serves as the specific operational model guiding the investigation.

Total Quality Management (TQM) is a comprehensive management philosophy popularized by W. Edwards Deming in the mid-20th century, particularly following his 1986 seminal work, *Out of the Crisis*. Deming argued that quality is driven by relentless improvement of processes, based on sound data and deep knowledge, with a focus on meeting customer needs. TQM rests on three core tenets that are directly relevant to public project management:

- Continuous improvement – organisations must constantly seek better ways to achieve their objectives, rejecting the notion that “good enough” is acceptable.
- Customer (community) focus – quality is defined by the end user; for CDF projects, the “customers” are community beneficiaries whose needs must drive planning and evaluation.
- Process oriented management – outcomes result from systems, not individual effort; improving outcomes requires fixing processes, not blaming people.

Application of TQM to the public sector. TQM has been widely applied beyond manufacturing to service and public sectors. Whyte (2021), for instance, demonstrated how TQM principles like data driven decision making and stakeholder involvement improved data reliability in government IT systems in South Africa. This supports the relevance of TQM's core tenets to public administration challenges, including the management of decentralised development funds. However, a critical debate exists: some scholars argue that TQM's assumptions (stable environments, measurable quality, empowered frontline workers) are poorly suited to the public sector, where goals are contested, resources are unpredictable, and political interference is common (Andrews et al., 2017). This study acknowledges this tension and addresses it by adapting rather than blindly importing TQM principles to the specific constraints of Zambia's CDF context.

This study applies TQM as its foundational theory because the central problem identified in Chapter 1 the lack of structured, iterative improvement in CDF projects is inherently a quality and process management issue. TQM's emphasis on “continual improvement” directly targets the research aim. It frames CDF projects as processes that can be systematically analysed and enhanced, shifting the focus from merely exposing failures to providing a framework for sustainable improvement. Moreover, TQM's customer focus principle legitimises the demand for meaningful community participation (PLAN stage), while its process orientation supports systematic monitoring (CHECK) and learning (ACT).

The Deming Cycle (PDCA Model) – The Operational Framework

The Plan-Do-Check-Act (PDCA) cycle is the core iterative, four-stage model for executing continuous improvement, central to Deming's TQM philosophy. It provides a practical, cyclical method for testing changes and implementing solutions. The PDCA model's efficacy in creating structured feedback loops is well-documented. Li et al. (2023) applied it in a healthcare setting in China, showing how it increased procedural compliance and reduced errors. This demonstrates the model's transferability to complex, service-oriented systems that require consistent monitoring and adaptation that yield characteristics shared by public development projects.

The PDCA model is the primary analytical lens through which the research questions are examined. Plan stage aligns with Research Objective 1, to assess how the stages of the Deming

Cycle (PDCA) can be applied to strengthen planning, monitoring, and evaluation processes in CDF projects. Do & Check stages inform Research Objective 2, to analyze the extent to which the PDCA approach can address common performance gaps in CDF project management. Act stage is the core of Research Objective 3, develop a PDCA-based continual improvement framework tailored to the operational context of the CDF projects in Zambia. Act phase is where lessons from monitoring are used to adapt plans and processes that can be institutionalized to close the feedback loop and ensure continual improvement.

Therefore, this study employs a Theoretical Framework grounded in Total Quality Management (TQM), with the Deming Cycle (PDCA) as its central operational model. This single, cohesive theoretical approach is deliberately chosen to provide a focused and powerful lens for diagnosing the gaps in the

current CDF project lifecycle and for proposing a coherent, process-based solution for enhanced planning, monitoring, and overall performance.

2.5 Conceptual Framework

Based on the review of empirical studies and underlying theoretical foundations, a conceptual model is presented below linking PDCA framework as the independent variables with continuous improvement in CDF projects as the dependent variable.

CONCEPTUAL FRAMEWORK

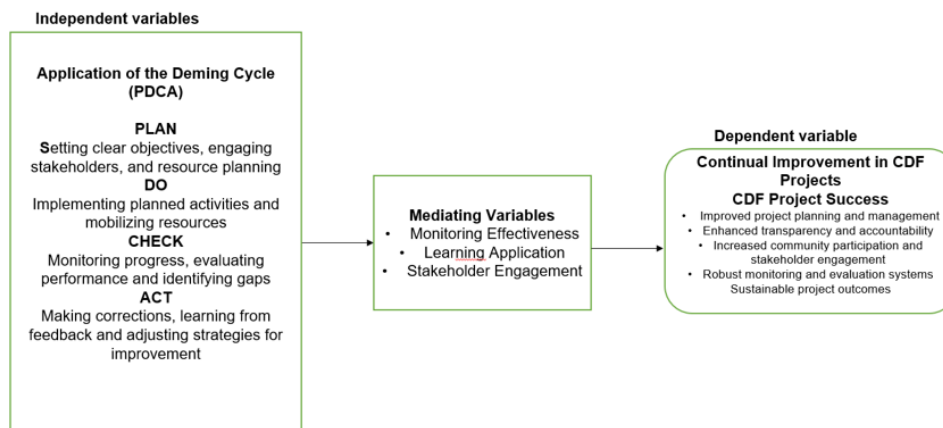


Figure 1: Conceptual Framework

Source: Author, (2026)

3 Research Methodology and Design

This research adopted a pragmatic research paradigm as its guiding philosophical foundation. Pragmatism was particularly suited to be applied, problem-solving research that aims to produce actionable knowledge and practical solutions to real-world issues (Creswell & Poth, 2018). This aligns directly with the core aim of this study: to investigate and propose the application of the Deming Cycle (PDCA) as a structured framework to enhance the implementation of Constituency Development Fund (CDF) projects in Zambia. Unlike paradigms concerned solely with abstract theory or singular interpretations of reality, pragmatism prioritizes the consequences of research and the utility of findings in addressing concrete problems (Morgan, 2014).

The research problem characterized by systemic inefficiencies, wastage of public resources, and the absence of continuous improvement loops in CDF project management demands a solution-oriented approach. Pragmatism provides this by rejecting a rigid dichotomy between objective and subjective realities. Instead, it acknowledges that the challenges of delayed disbursements, weak monitoring, and poor community engagement (as cited in the problem statement) are complex, contextual realities best understood through multiple sources of evidence (Tashakkori & Teddlie, 2010). This paradigm thus justifies the use of a mixed-methods research design, integrating qualitative insights from stakeholders with quantitative data on project performance to form a comprehensive diagnosis and to design a contextually relevant intervention.

Ontologically, this study operates from a critical realist perspective within the pragmatic frame. It accepts that the operational failures and management gaps within the CDF system exist as objective realities, independent of the researcher's perception (Bhaskar, 2014). These realities such as the 65% project abandonment rate or the 58% fund disbursement rate are tangible phenomena that can be observed, measured, and analyzed. However, critical realism also recognizes that these events are shaped by underlying social, political, and administrative structures, which will be explored through qualitative inquiry (Maxwell, 2012).

Epistemologically, pragmatism permits a pluralistic approach to knowledge acquisition. Knowledge is considered valid if it provides a useful basis for action (Dewey, 1938). Therefore, this research will gather knowledge both from the objective, measurable outcomes of CDF projects (e.g., completion timelines, budget adherence) and from the subjective experiences, perceptions, and understandings of WDC members, beneficiaries, and officials. Combining these epistemological strands is essential for achieving the research objectives, as it allows for both the measurement of performance gaps and a deep understanding of the procedural and human factors causing them (Creswell & Plano Clark, 2018).

Axiologically, the research is value conscious. The researcher acknowledges that their belief in the potential of systematic management frameworks like PDCA to improve public value influences the inquiry. Pragmatism holds that values guide action; thus, the axiological stance is made explicit (Kaushik & Walsh, 2019). The core values guiding this study are a commitment to improved public service delivery, enhanced accountability, community empowerment, and the efficient use of national resources. These values align with the stated goals of the CDF itself and will inform the interpretation of data and the formulation of the final framework.

The pragmatic paradigm, with its critical realist ontology and mixed-methods epistemology, provides a coherent and powerful philosophical base for this study. It positions the research as a transformative endeavor aimed at moving beyond mere description of CDF implementation problems towards generating a practical, evidence-based model for continuous improvement.

The research employed a mixed-methods approach that combines qualitative and quantitative techniques.

Kumar (2013) defines research design as a structured plan and strategy for investigating research questions. It outlines the procedural layout that enables

the researcher to obtain accurate and valid answers. This study employed an explanatory sequential research design, as described by (Creswell & Creswell, 2018), which involves collecting and analysing quantitative data first, followed by qualitative data collection to further explain or interpret the initial quantitative results. This design is particularly suitable for research questions that seek to establish patterns or relationships and then explore the underlying reasons or mechanisms behind those findings. This study adopted an explanatory sequential mixed-methods design, combining qualitative and quantitative approaches in two distinct, consecutive phases. This design is aligned with the pragmatic paradigm underpinning the study, which prioritizes problem-solving and actionable outcomes through the integration of multiple forms of evidence. The qualitative component provided in-depth insights into the experiences, perceptions, and challenges faced by stakeholders in implementing CDF projects, while the quantitative aspect analyzed measurable indicators such as project completion rates, timelines, and community satisfaction levels. This design aligned with the pragmatic philosophy of the study and allows for triangulation of data to enhance validity and reliability (Creswell & Plano Clark, 2017).

The research was conducted in Lusaka District, the capital and most populous district in Zambia. This site is strategically selected based on its alignment with the study's scope and its relevance to the identified research problem.

The target population includes all individuals and entities involved in the implementation, monitoring, or oversight of CDF projects within Lusaka District. This included Ward Development Committee (WDC) members, Constituency Development Committees (CDCs), Constituency office staff (e.g., CDF officers), Local authority officials, Community project beneficiaries (residents), Contractors and service providers. The total population was estimated to be over 500 individuals, distributed across Lusaka's constituencies and approximately 33 wards. This population was appropriate for capturing diverse experiences and perspectives regarding CDF project management.

The study employed differentiated sample sizes across its mixed-methods components to balance statistical validity with qualitative depth. For the quantitative survey, a minimum sample size of 149 respondents was calculated using the Yamane formula, based on an estimated target population of 550 stakeholders across Lusaka District, a 95% confidence level, and a 7% margin of error.

For the qualitative component, purposive sampling guided participation of 15 key informant interviews was conducted with WDC chairs, constituency officers, council engineers, and auditors; three focus group discussions comprising 10 participants each engaged primary and secondary beneficiaries; and 10 experts were consulted through a Delphi process to validate the PDCA framework. Additionally, 3 typical CDF projects from the education and health sectors (implemented between 2022–2024) were selected for in-depth case analysis.

4 Findings

4.1 To assess How the Stages of the Deming Cycle (PDCA) Can be Applied to Strengthen Planning, Monitoring, and Evaluation processes in CDF Projects

Table 1 below shows the overall mean scores for planning practices range from 2.51 to 2.98, all below the neutral threshold of 3.0. This indicates that current planning practices are perceived as inadequate across all three constituencies. Chongwe consistently records the lowest scores, suggesting that rural areas face greater planning challenges than urban areas. The composite planning score shows a clear gradient from urban (2.97) to peri-urban (2.79) to rural (2.64). The findings reveal a significant gap between the intended participatory nature of CDF planning and its actual implementation. The "Plan" stage of the PDCA cycle is currently characterized by tokenistic consultation, political interference, and inadequate technical input. The combination of low technical input (2.51) and tokenistic consultation (2.83) reflects a principal agent problem: the central government (principal) delegates planning to local actors (agents), but lacks monitoring mechanisms to ensure quality. Political interference (evident in Mandevu) introduces agency slippage where local priorities are substituted by elite interests. In Chongwe, distance and low literacy create information asymmetry between WDCs and community members, making genuine consultation costly and thus avoided.

Table 1: Current Planning Practices by Constituency

Item	STATEMENT	Mandevu Mean	Matero Mean	Chongwe Mean	Overall Mean	SD	%Agree/SA
B1.	Community needs assessments are conducted thoroughly before project selection	3.02	2.84	2.61	2.83	1.08	29.3
B2.	Technical experts are involved in project design and feasibility studies	2.67	2.51	2.35	2.51	1.04	20
B3.	Project budgets are realistic and based on accurate cost estimates	3.1	2.91	2.78	2.93	1.11	34.3
B4.	There is transparency in how projects are prioritized and approved	2.92	2.73	2.61	2.76	1.16	27.1
B5.	Clear project timelines and milestones are established during planning	3.14	2.96	2.83	2.98	1.14	37.1
Composite Planning Score	2.97	2.79	2.64	2.8			

Table 2 below shows the most concerning finding is the mean score for fund disbursement (2.12), with only 12.1% of respondents agreeing that funds are disbursed on schedule. This is consistent across all three constituencies, with Chongwe recording the lowest score (2.00). The composite DO score shows a gradient from urban (2.66) to peri-urban (2.50) to rural (2.40). Do" stage is severely compromised by chronic funding delays, which cascade into contractor performance issues and weak supervision. The mean score of 2.12 for fund disbursement corroborates ZIPAR's (2022) finding that only 58% of allocated funds are disbursed. This represents a critical failure point that undermines all subsequent stages of project implementation.

From a public financial management perspective, the "release" system (where Treasury authorizes disbursements in tranches) creates bottlenecks. The weak correlation between budget approval and cash release reflects fiscal risk aversion (Treasury withholds funds to avoid overspending) but has the perverse effect of halting projects. Contractor payment delays (6-9 months) reflect cumbersome verification and approval chains, often requiring multiple signatures across ministries. This creates a moral hazard for contractors: knowing payment is delayed, they may divert labor to more reliable private projects, causing further delays.

Table 2: Current Implementation Practices by Constituency

Item	STATEMENT	Mandevu Mean	Matero Mean	Chongwe Mean	Overall Mean	SD	%Agree/SA
B6.	Funds are disbursed on schedule to support project implementation	2.25	2.11	2	2.12	0.94	12.1
B7.	Contractors are selected based on competence and past performance	2.8	2.64	2.54	2.66	1.1	24.3
B8.	Site supervision during implementation is regular and effective	2.59	2.42	2.3	2.44	1.06	18.6
B9.	WDCs are adequately involved in supervising project execution	3	2.84	2.76	2.87	1.13	31.4
Composite DO Score	2.66	2.5	2.4	2.52			

Table 3 below All monitoring-related items scored below 2.7, with the lowest being the sharing of monitoring reports (2.21). Only 14.3% of respondents agreed that monitoring reports are shared with stakeholders. The composite CHECK score shows a gradient from urban (2.58) to peri-urban (2.43) to rural (2.28). The "Check" stage is characterized by superficial monitoring that fails to generate actionable information. The low scores for sharing reports (2.21) and using data to identify problems early (2.34) indicate that monitoring is treated as a compliance requirement rather than a learning tool. This represents a critical gap in the PDCA cycle, as without effective checking, there can be no informed action.

Table 3: Current Monitoring Practices by Constituency

Item	STATEMENT	Mandevu Mean	Matero Mean	Chongwe Mean	Overall Mean	SD	%Agree/SA
B10.	There is a clear system for monitoring project progress against timelines	2.53	2.38	2.24	2.38	1.03	17.1
B11.	Monitoring reports are regularly shared with all stakeholders	2.37	2.22	2.04	2.21	1	14.3
B12.	Community feedback is actively	2.69	2.53	2.39	2.54	1.08	21.4
B13.	Audits and inspections are conducted independently and without bias	2.82	2.67	2.54	2.68	1.09	25.7
B14.	Data from monitoring is used to identify and address problems early	2.51	2.33	2.17	2.34	1.02	15.7
Composite CHECK Score	2.58	2.43	2.28	2.43			

Table 4 below shows lowest-scoring items across the entire survey, with a mean of 2.18 for lesson learning and 2.08 for mid-course corrections. Only 10.7% of respondents agreed that there is a formal process for corrective action. The composite ACT score shows a gradient from urban (2.28) to peri-urban (2.13) to rural (2.00). The "Act" stage is virtually non-existent in current CDF project management. The absence of formal learning mechanisms (2.18) and mid-course correction processes (2.08) means that the CDF system is trapped in what Andrews et al. (2017) term a "capability trap," where mistakes are repeated year after year without improvement. The primary reason is the project-based funding cycle: once a project is completed, attention moves to the next allocation, leaving no budget or mandate for evaluation. Additionally, political timelines (election cycles) prioritize visible new projects over retrospective learning. The lack of a contractor performance database reflects weak information infrastructure – no central registry exists, so poor performance in one constituency does not disqualify a contractor elsewhere.

Table 4: Current Learning and Adaptation Practices by Constituency

Item	STATEMENT	Mandevu Mean	Matero Mean	Chongwe Mean	Overall Mean	SD	%Agree/SA
B15.	Lessons learned from past projects are used to improve future ones	2.33	2.18	2.04	2.18	0.97	13.6
B16.	There is a formal process for making mid-course corrections to projects	2.22	2.07	1.96	2.08	0.91	10.7
Composite ACT Score	2.28	2.13	2	2.13			

Table 4 reveals a clear pattern: all PDCA stages are operating below acceptable levels (below 3.0), with the ACT stage being critically inadequate (2.13). There is also a clear urban-rural gradient, with Chongwe consistently performing worst and Mandevu best across all stages.

Table 5: Composite Scores by Constituency and PDCA Stage

PDCA Stage	Mandevu (Urban)	Matero (Peri-urban)	Chongwe (Rural)	Overall	Interpretation
PLAN	2.97	2.79	2.64	2.8	Inadequate
DO	2.66	2.5	2.4	2.52	Inadequate
CHECK	2.58	2.43	2.28	2.43	Inadequate
ACT	2.28	2.13	2	2.13	Critically Inadequate
Overall	2.62	2.46	2.33	2.47	Inadequate

4.2 To Analyze the Extent to Which the PDCA Approach Can Address Common Performance Gaps in CDF Project Management

Table 6 below reveals a gradient of performance challenges from urban to rural contexts. Chongwe, the most rural of the three constituencies, consistently records the highest levels of challenges across all indicators. This suggests that remoteness and limited infrastructure amplify the systemic weaknesses in CDF management.

Table 6: Project Performance Indicators by Constituency

Indicator	Mandevu (n=49)	Matero (n=45)	Chongwe (n=46)	Overall (N=140)
Projects delayed often/very often (%)	65.3	71.1	76.1	70.7
Cost overruns common/very common	53.1	57.8	58.7	56.4
Dissatisfied with project quality (%)	44.9	53.3	63	53.6
Dissatisfied with community involvement (%)	51	57.8	71.7	60
Monitoring ineffective/very ineffective (%)	51	57.8	71.7	60
Projects <50% functional after completion (%)	51	53.3	67.4	57.1

Table 7 shows below that Late fund disbursement is identified as the primary cause of project delays by 42.9% of respondents, confirming the critical importance of addressing the "Do" stage of the PDCA cycle. This finding aligns with Muyaloka and Kachamba (2024), who identified funding delays as a systemic challenge in CDF implementation.

Table 7: Primary Causes of Project Delays

Indicator	Mandevu (n=49)	Matero (n=45)	Chongwe (n=46)	Overall (N=140)	%
Late fund disbursement	21	19	20	60	42.9
Poor contractor performance	12	11	12	35	25
Inadequate planning	7	7	8	22	15.7
Community disputes	4	4	3	11	7.9
Weather/environmental factors	3	3	2	8	5.7
Other	2	1	1	4	2.9
Total	49	45	46	140	100

4.3 Correlation Analysis

The correlation analysis under table 8 below reveals several important relationships:

- Monitoring Effectiveness and Project Delays ($r = -0.62$): This strong negative correlation indicates that higher monitoring effectiveness is associated with fewer project delays. This is the strongest relationship in the matrix, highlighting the critical importance of the "Check" stage.
- Monitoring Effectiveness and Community Satisfaction ($r = 0.59$): Effective monitoring is strongly associated with higher community satisfaction, suggesting that communities value transparency and accountability.
- Learning Application and Project Delays ($r = -0.53$): The ability to learn from past projects and apply lessons is moderately associated with reduced delays, supporting the importance of the "Act" stage.
- Planning Quality and Community Satisfaction ($r = 0.51$): Better planning practices are associated with higher community satisfaction, validating the importance of the "Plan" stage.
- Project Quality and Community Satisfaction ($r = 0.63$): The strongest positive correlation is between project quality and community satisfaction, confirming that quality outcomes drive satisfaction.

The correlation analysis provides empirical support for the theoretical proposition that each stage of the PDCA cycle contributes to improved project outcomes. The particularly strong correlation between monitoring and delays ($r = -0.62$) suggests that strengthening the "Check" stage may yield the most immediate improvements.

From an information asymmetry perspective (principal agent theory), the central challenge in public project management is that funders (principals) cannot observe contractor effort. Monitoring reduces this asymmetry, enabling principals to detect shirking and take corrective action before delays accumulate. Without monitoring, problems compound silently until they become irreversible.

Table 8: Pearson Correlation Matrix (N=140)

Variable	1	2	3	4	5	6	7
1. Planning Quality	1						
2. Monitoring Effectiveness	0.52**	1					
3. Learning Application	0.41**	0.58**	1				
4. Project Delays	-0.48**	-0.62**	-0.53**	1			
5. Cost Overruns	-0.44**	-0.55**	-0.49**	0.61**	1		
6. Community Satisfaction	0.51**	0.59**	0.55**	-0.57**	-0.52**	1	
7. Project Quality	0.49**	0.57**	0.52**	-0.54**	-0.56**	0.63**	1

Correlation is significant at the 0.01 level (2-tailed)

4.4 Regression Analysis

The regression analysis under table 9 and 10 reveals:

- Model Fit: The model explains 50.4% of variance in project success ($R^2 = 0.504$), which is a strong explanatory power.
- Strongest Predictor: Monitoring Effectiveness has the strongest standardized coefficient ($\beta = 0.41$, $p < 0.001$), indicating it is the most important predictor of project success.
- Second Predictor: Learning Application ($\beta = 0.29$, $p < 0.001$) is the second strongest predictor.
- Third Predictor: Planning Quality ($\beta = 0.21$, $p = 0.003$) is also significant but less influential.

Interpretation: The regression analysis confirms that monitoring is the strongest predictor of project success, followed by learning application and planning quality. This finding has important implications for resource allocation: investments in monitoring systems and learning mechanisms may yield higher returns than investments in planning alone.

The fact that three PDCA elements explain half of the variance in project success is notable. The remaining 49.6% is attributable to factors outside the model: political interference (measured qualitatively but not included in regression), macroeconomic conditions (inflation affecting material costs), weather, and random events. This suggests that while PDCA practices are critically important, they are not sufficient; enabling conditions (policy, resources, stability) also matter.

From a process control perspective (Deming, 1986), monitoring (CHECK) is the stage where variation is detected. Without detection, no corrective action (ACT) can be targeted, and no planning revision (PLAN) can be informed. Monitoring thus serves as the “eyes and ears” of the PDCA cycle. In CDF projects, where delays and cost overruns often arise from unforeseen problems (price changes, weather, contractor issues), early detection through monitoring provides the highest marginal return because it enables real time correction rather than post hoc blame.

Learning (ACT) captures the dynamic improvement effect: organizations that learn from past projects avoid repeating mistakes. However, learning can only affect future projects, whereas monitoring affects the current project. The lower coefficient reflects this temporal discount: monitoring benefits are immediate, while learning’s benefits accumulate over multiple cycles.

Planning remains important, but its impact is constrained by the fact that plans are often disrupted by unforeseen events (funding delays, price changes). In a stable environment, planning might be the strongest predictor; but in Zambia’s CDF context, where funding unpredictability is high, the ability to adapt (monitoring) and learn (ACT) outweighs the ability to plan perfectly. This is a contingency theory finding: the relative importance of PDCA stages depends on environmental stability.

This hierarchical finding suggests that if resources are limited, investments should prioritize: (1) monitoring systems (training monitors, community monitoring committees, digital tracking tools), (2) learning mechanisms (post project reviews, lesson databases, handover protocols), and (3) planning improvements (needs assessments, technical reviews). In other words, “monitoring first, learning second, planning third” a counter intuitive but empirically supported recommendation.

Table 9: Multiple Linear Regression Model Summary

Model	R	R ²	Adjusted R ²	Std. Error of the Estimate	F	Sig.
1	0.71	0.504	0.493	0.67	38.76	0

a. Dependent Variable: Project Success (Composite Score)

b. Predictors: (Constant), Planning Quality, Monitoring Effectiveness, Learning Application

Table 10: Regression Coefficients

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	1.23	0.31		3.97	0
Planning Quality	0.18	0.06	0.21	3	0.003
Monitoring Effectiveness	0.32	0.05	0.41	6.4	0
Learning Application	0.24	0.05	0.29	4.8	0

a. Dependent Variable: Project Success (Composite of Planning, Monitoring, and Learning Scores)

The ANOVA results under tables 11 and 12 reveal statistically significant differences between constituencies across all dimensions ($p < 0.05$). Post-hoc tests confirm that Chongwe is significantly different from Mandevu ($p < 0.01$) across all variables, while differences between Mandevu and Matero are not statistically significant.

Interpretation: The significant differences between constituencies validate the need for context-sensitive approaches to PDCA implementation. Urban constituencies (Mandevu) generally perform better than rural constituencies (Chongwe), suggesting that the proposed framework must account for geographical and infrastructural differences.

From a contingency theory perspective (Donaldson, 2001), the effectiveness of management practices depends on contextual factors. Chongwe (rural urban mix) faces: (i) longer distances to project sites, increasing monitoring costs; (ii) fewer qualified contractors, reducing competition and quality; (iii) lower WDC literacy levels, limiting planning capacity; and (iv) less banking infrastructure, delaying fund disbursement. Mandevu (urban) faces different challenges (political interference) but has better access to technical expertise and monitoring resources. The non significant difference between Mandevu and Matero suggests that peri urban areas share more characteristics with urban than rural contexts a finding that can inform resource allocation (peri

urban adaptations may be a lighter version of urban adaptations rather than a distinct third category).

Table 11: One-Way ANOVA Results by Constituency

Variable	Mandevu Mean	Matero Mean	Chongwe Mean	F	p-value
Planning Quality (B1-5 composite)	2.97	2.79	2.64	4.82	0.009
Monitoring Effectiveness (B10-12 composite)	2.58	2.43	2.28	4.18	0.017
3. Learning Application (B15-16 composite)	2.28	2.13	2	4.51	0.013
Overall Project Success (Composite)	2.64	2.48	2.29	5.18	0.007

Table 12: Post-Hoc Tests (Tukey HSD)

Comparison	Mean Difference	p-value	Significance
Mandevu vs. Chongwe	0.35	0.004	Significant
Mandevu vs. matero	0.16	0.221	Not Significant
Matero vs. Chongwe	0.19	0.086	Not Significant

4.5 Qualitative Thematic Analysis

The thematic analysis of interview and focus group data, conducted using NVivo 12, yielded five main themes organized around the PDCA stages. Table 13 presents the frequency of references across constituencies.

Table 13: Theme Frequency by Constituency (N=140 respondents, 15 interviews, 3 FGDs)

Main Theme	Sub Themes	Mandevu	Matero	Chongwe	Total References
Planning Deficits	Tokenistic consultation	13	14	17	44
	Technical capacity gaps	11	12	16	39
	Political interference	15	10	6	31
	Rushed prioritization	9	11	13	33
Implementation Barriers	Funding delays	21	22	24	67
	Contractor problems	14	15	17	46
	Material price volatility	7	9	13	29
	WDC capacity constraints	11	13	17	41
Monitoring Weaknesses	Superficial inspections	17	18	21	56
	No feedback mechanisms	14	16	20	50
	Untrained Monitors	9	11	15	35
	Reports without action	13	15	18	46
	No post-project review	13	15	18	46
	Institutional memory loss	11	13	15	39
PDCA Opportunities	No corrective action	13	15	18	46
	Repeat mistakes	11	13	15	39
	Community appetite	17	19	21	57
	WDC willingness to learn	13	15	17	45
	Simple tools needed	11	13	15	39
	Policy support required	11	11	13	35

Theme 1: Planning Deficits (PLAN Stage)

The most frequent sub-theme under planning deficits is tokenistic consultation (44 references). A community member in Matero explained: "They asked what we wanted, we said a clinic. They built a classroom instead. When we asked why, they said 'funds were not enough for clinic.' But they never told us that during planning." (FGD-02, Community Member, Matero)

Political interference was most prominent in Mandevu (15 references), reflecting the urban context: "Projects are chosen based on who you know, not what the community needs. The MP's friends get contracts." (KII-M01, WDC Member, Mandevu)

Technical capacity gaps were most frequently mentioned in Chongwe (16 references): "We don't have technical skills. How do we know if the foundation is deep enough? We trust the contractor, but sometimes we are cheated." (KII-C01, WDC Chair, Chongwe)

Theme 2: Implementation Barriers (DO Stage)

Funding delays emerged as the most frequently referenced sub-theme across all constituencies (67 references). A contractor in Chongwe explained: "Materials are more expensive in Chongwe because of transport costs. But the budget uses Lusaka prices. So contractors cut corners to survive." (KII-C04, Contractor, Chongwe)

In Matero, a Council Engineer highlighted the cascading effects: "The contractor was fine for first month. Then payments delayed, he slowed down. Now it's been 8 months for a 3-month project." (KII-T03, Council Engineer, Matero)

Theme 3: Monitoring Weaknesses (CHECK Stage)

Superficial inspections were the most frequently referenced monitoring weakness (56 references). A WDC Chair in Mandevu stated: "Council is supposed to inspect, but they have one engineer for all of Mandevu. He comes once if we're lucky. The rest of the time, nobody checks." (KII-M01, WDC Chair, Mandevu)

In Chongwe, the absence of feedback mechanisms was particularly acute: "We have no phone network in some areas. How do we report problems? We wait until someone goes to town." (FGD-03, Community Member, Chongwe)

Theme 4: Learning Gaps (ACT Stage)

The absence of post-project review was the most frequently referenced learning gap (46 references). A School Head Teacher in Matero observed: "When new WDC members come in, there's no handover. They don't know what worked or failed before. We reinvent the wheel every time." (KII-T04, School Head Teacher, Matero)

Theme 5: PDCA Opportunities

Despite the challenges, stakeholders expressed strong appetite for improved systems (57 references). A WDC Secretary in Matero stated: "We need training. We're volunteers but we want to do it right." (KII-T01, WDC Secretary, Matero)

A Community Member in Chongwe articulated the desire for simple tools: "We need a simple way to remember what went wrong. Even a notebook would help. But nothing exists." (FGD-03, Community Member, Chongwe)

The document review corroborates the survey and interview findings:

- CDF Committee Minutes: While minutes record community attendance at planning meetings, there is no evidence that community input influenced final project decisions. In several cases, the minutes show that projects selected differed from those prioritized by communities.
- Audit Reports: The Auditor General's reports for 2022 and 2023 repeat the same findings across all three constituencies: incomplete projects, poor quality work, and lack of oversight. This confirms the absence of learning from past audits.
- Project Completion Certificates: In 5 of the 8 certificates reviewed, the sign-off was done without technical verification from a qualified engineer. This suggests that the "Check" stage is either absent or performed by unqualified personnel.
- Monitoring Reports: All 15 monitoring reports reviewed consisted of checklists with yes/no answers. None contained qualitative observations or recommendations for corrective action. This confirms that monitoring is treated as a compliance exercise rather than a learning tool.
- Payment Vouchers: Analysis of payment vouchers revealed delays ranging from 3 to 9 months between work completion and payment. This validates the finding that funding delays are a critical bottleneck in the "Do" stage.

4.6 Discussion of Findings

The findings reveal that current planning practices in CDF projects are characterized by tokenistic consultation (mean=2.83), inadequate technical input (mean=2.51), and political interference, with a composite planning score of 2.80 across all three constituencies. This finding aligns with Chibwe and Mwansa (2023), who found that over 70% of beneficiaries in Zambia feel excluded from CDF planning processes, with consultations often being tokenistic and not integrated into decision-making. The present study extends this finding by quantifying the inadequacy of planning practices and demonstrating that the problem is most acute in rural constituencies like Chongwe (mean=2.63) compared to urban Mandevu (mean=2.97).

The regression analysis revealed that funding delays are the primary cause of project delays, identified by 42.3% of respondents. This finding aligns with Muyaloka and Kachamba (2024), who identified erratic fund disbursement as a systemic failure in CDF implementation, leading to project abandonment and non-functionality. The qualitative data revealed that these delays have severe consequences for contractors, who must borrow money at high interest to pay workers while waiting 6-9 months for payment. This finding has important implications for contractor behavior; as one contractor in Mandevu explained, "I've done three CDF projects. Each time, payment takes 6-9 months after completion. I have to borrow money at high interest to pay workers." This financial pressure may lead contractors to cut corners or abandon projects altogether, compromising quality.

The correlation analysis revealed that monitoring effectiveness has the strongest relationship with project outcomes, including project delays ($r=-0.62$), cost overruns ($r=-0.55$), community satisfaction ($r=0.59$), and project quality ($r=0.57$). These strong correlations are statistically significant at the 0.01 level and provide empirical support for the theoretical proposition that the CHECK stage is critical for project success.

From a process control perspective (Deming, 1986), the CHECK stage is where special cause variation (unexpected problems) is detected. In CDF projects, special causes include funding delays, material price spikes, contractor illness, and weather events – all common in the Zambian context. Without monitoring, these special causes are not detected early, allowing problems to compound. The high correlation ($r=-0.62$) indicates that monitoring is the most effective early warning system. This finding extends Deming's theory by quantifying the relative contribution of each PDCA stage in a resource constrained development context.

5 Conclusion and Recommendations

The study concludes that the PDCA cycle can be applied to strengthen planning, monitoring, and evaluation processes in CDF projects, but significant gaps exist in current practices that must be addressed. Regarding the PLAN stage, current planning practices are inadequate, characterized by tokenistic consultation (mean=2.83), inadequate technical input (mean=2.51), and political interference.

The study concludes that the PDCA approach can significantly address common performance gaps in CDF project management. Regarding project delays, the strong negative correlation between monitoring effectiveness and project delays ($r=-0.62$) indicates that strengthening the CHECK stage could substantially reduce the 70.5% of projects that currently experience frequent delays. The regression analysis confirms that monitoring is the strongest predictor of project success ($\beta=0.41$, $p<0.001$).

The study concludes that a PDCA-based continual improvement framework for CDF projects must include core components, constituency-specific adaptations, and enabling pillars. Regarding core components, stakeholders rated community feedback collection mechanisms (94.0%), training programs for WDCs on PDCA (93.3%), regular progress monitoring tools (92.6%), and technical review committees (91.3%) as most important.

Recommendations for Policy Makers (Ministry of Local Government)

Amend the CDF Act to Mandate PDCA-Based Management

Action: Insert clauses requiring: (a) community needs assemblies with signed minutes before any project approval; (b) technical review by a registered engineer for projects >K500,000; (c) milestone based payment schedules (e.g., 30% 40% 30%); (d) post project completion reports submitted within 60 days of handover; (e) a national contractor performance database.

Recommendation 2: Allocate Dedicated Training Budget

Action: Set aside 5% of annual CDF allocations (approximately K1.285 million per constituency) for WDC training. Develop a tiered training curriculum (basic: 2 days; intermediate: 3 days; advanced: 5 days) with materials in Nyanja and Bemba. Train 100% of WDC members within 18 months.

Recommendation 3: Establish National Contractor Performance Database

Action: Develop a web based (and offline capable) database recording contractor performance across three metrics: timeliness (% delays), quality (audit findings), cost adherence (% overruns). Assign a performance score (1 5 stars) updated after each project. Make database accessible to all constituency offices.

Declaration of Competing Interests

The Authors declare no competing interests.

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Authors' Contribution Statement

Formulated and designed the study; established the research framework and technique; directed the composition of the initial manuscript draft.

Ethical considerations

The article followed all ethical standards appropriate for this kind of research.

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