

Breaking the capability trap: Human capital mediation in public sector resource utilisation

Peter Leonard Daka

pldaka@yahoo.com

University of Zambia

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ABSTRACT

Public sector organisations in developing economies persistently experience gaps between strategic resource allocation and operational performance outcomes. This is a paradox that conventional accounting and management control frameworks have struggled to explain. In the Defence Sector of Zambia (DSZ), this disconnect is particularly acute: despite formal adoption of the Balanced Scorecard (BSC) through the Public Sector Reform Programme, the DSZ continues to experience 18% budget underspending, 22% procurement irregularities, and 25% project delays. This study examines why strategic resource allocations fail to achieve operational efficiency in public sector Performance Management Systems (PMS), focusing on human capital bottlenecks in the DSZ. It pursues three objectives: to examine the relationship between strategic resource guidance, resource allocation, and resource utilisation efficiency; to empirically validate the mediating role of human capital development; and to formally model and estimate the parameters of a capability trap. A sequential explanatory mixed-methods design was employed, combining quantitative survey data (n=135 senior DSZ officers, 82% response rate) with 21 in-depth key informant interviews, framed by dynamic capabilities theory, the resource-based view, and institutional theory. Spearman's rank correlation and thematic analysis were applied to quantitative and qualitative data respectively, with integration achieved through joint displays. The Human capital deficits create a capability trap in which low implementation capacity undermines resource utilisation ($M=3.24$, $SD=1.03$). The trap is formally modelled as $H_{t+1} = H_t + \alpha(R_t - \delta H_t) - \beta I_t$, with empirically estimated parameters ($\alpha=0.18$, $\delta=0.15$, $\beta=0.12$) confirming the DSZ operates in a borderline trap condition ($0.18 < 0.27$). Human capital development shows a significantly stronger correlation with resource utilisation efficiency ($\rho=0.524$) than direct resource allocation ($\rho=0.312$), empirically confirming its mediating role. The findings demonstrate that human capital is the critical mechanism linking strategic resource allocation to operational performance and that resource underutilisation in the DSZ is primarily a capability, rather than a resource, problem. The study concludes that strengthening implementation capacity is essential for improving public sector performance. It recommends institutionalising protected training budgets (3–5% of personnel costs), capability dashboards to monitor deployment efficiency, and accountability frameworks that measure implementation capacity alongside financial compliance. These recommendations have broader relevance for performance management reforms in defence, healthcare, education, and local government in developing economies.

Keywords: Balanced Scorecard Implementation, Capability Trap; Dynamic Capabilities; Human Capital Development; Performance Management Systems; Resource Utilisation

I. INTRODUCTION

Public sector accounting reforms increasingly emphasise performance-based resource allocation as a mechanism for improving service delivery and institutional efficiency. Yet persistent gaps between budgetary compliance and operational effectiveness suggest deeper systemic constraints that technical reforms alone cannot resolve (Ohemeng, 2021; Goddard & Mkasiwa, 2016). In defence sectors, where resource allocation carries national security implications, this disconnect is particularly consequential. The Defence Sector of Zambia (DSZ) provides a revealing context: despite the formal adoption of Performance Management Systems (PMS) through the 1993 Public Sector Reform Programme (PSRP), the sector continues to experience significant budget underspending (18%), procurement irregularities (22% of contracts), and project delays (25%) (Office of the Auditor General, 2021; Ministry of Finance and National Planning, 2023).

This study asks a central question: Why do well-structured strategic resource allocations fail to translate into efficient operational resource utilisation within defence-sector PMS? The disconnect between strategic plans and operational execution represents a significant challenge for public sector accounting and management control systems (Arnaboldi et al., 2016). While previous research has examined technical aspects of PMS implementation, less attention has been paid to the relationship between resource management processes and human capital development in resource-constrained environments (Goddard & Mkasiwa, 2016). This gap is particularly pronounced in defence contexts in developing economies, where institutional pressures to adopt reform frequently exceed investments in capability required to operationalise those reforms (Parker, 2020).

These resource-capability dynamics extend beyond defence to include healthcare systems in sub-Saharan Africa facing similar training deficits and resource rigidity; education sectors where teacher rotation mirrors military turnover; and local governments struggling with mismatches between technical system implementations and human capital development (Ahyaruddin & Akbar, 2018; Brown, 2021). The DSZ, therefore, provides both a critical empirical site and a gateway to broader public sector reform.

1.1 Statement of the Problem

The DSZ's persistent performance gaps, characterised by 18% budget underspending, 22% procurement irregularities, and 25% project completion delays, cannot be explained solely by inadequate resource allocation (Office of the Auditor General, 2021; Ministry of Finance and National Planning, 2023). Strategic plans consistently receive funding, yet operational performance remains below institutional expectations. The fundamental question is not whether resources are allocated but whether the human capital required developing them effectively is systematically developed and sustained. Prior scholarship has identified related problems without resolving this mechanism. Moynihan and Pandey (2010) highlighted implementation deficits as correlates of PMS failure. However, their analysis remained descriptive rather than mechanistic. Van Dooren et al. (2015) attributed performance gaps to measurement system decay over time, and Pollitt (2013) to compliance substituting for substantive improvement, but neither produced a formal dynamic model linking human capital parameters to resource utilisation outcomes. In the African context, Goddard and Mkasiwa (2016) documented resource-capability mismatches in Tanzanian public institutions, and Brown (2021) recorded BSC implementation failures in East African defence organisations, yet both stopped short of formalising the mediating mechanism or estimating its operative parameters. The absence of such a mechanism-based, formally modeled, and empirically validated explanation constitutes the research gap this study addresses. The practical urgency of this gap is compounded by the Zambian political economy: five-year electoral cycles disrupt policy continuity; copper export dependence (approximately 70% of foreign exchange earnings) creates fiscal volatility that disproportionately erodes training budgets; and IMF structural adjustment conditionalities (2018-2022 Extended Credit Facility) imposed PFM reforms without corresponding capability development investments (Ministry of Finance, 2017). These contextual dynamics exacerbate the resource-performance disconnect at the heart of this inquiry.

1.2 Research Objectives

- i. To examine the relationship between strategic resource guidance, resource allocation, and resource utilisation efficiency in the DSZ.
- ii. To empirically validate the mediating role of human capital development in the resource-performance relationship.
- iii. To formally model and estimate the parameters of the capability trap and derive policy interventions to break it.

II. LITERATURE REVIEW

2.1 Theoretical Review

This study integrates three complementary theoretical perspectives to explain the capability trap. Each theory contributes a distinct explanatory lens, and together they generate the formal propositions that structure the empirical analysis.

2.1.1 Resource-Based View (RBV)

The Resource-Based View holds that organisational resources constitute the primary source of sustained competitive advantage (Barney, 1991; Peteraf & Barney, 2022). Resources that are valuable, rare, inimitable and non-substitutable (VRIN) generate performance differentials across organisations. Applied to public sector settings, RBV predicts that greater strategic resource allocation should translate directly into superior performance outcomes. However, RBV typically assumes that implementation capacity exists at sufficient levels to deploy allocated resources, an assumption that fails in resource-constrained public institutions where human capital is systematically underdeveloped (Goddard & Mkasiwa, 2016). The present study extends RBV by treating human capital not merely as a resource but as the conversion mechanism without which other resources remain inert — formalised in Proposition 1.

2.1.2 Dynamic Capabilities Theory (DCT)

Dynamic Capabilities Theory extends RBV by focusing on an organisation's ability to integrate, build, and reconfigure resources in response to changing environments through sensing, seizing, and transforming meta-capabilities (Teece et al., 1997, 2022; Teece, 2007). Whereas RBV explains performance at a point in time, DCT accounts for performance trajectories over time, making it especially relevant for explaining the persistence of implementation failures across repeated reform cycles. In the DSZ context, the absence of sustained training investment prevents the development of the dynamic capabilities necessary to adapt BSC implementation to shifting operational

priorities. Organisations trapped in compliance routines lose the sensing and seizing capabilities that drive performance improvement, the dynamic process captured in the human capital evolution equation, formalised in Proposition 2.

2.1.3 Institutional Theory (IT)

Institutional Theory examines how external legitimacy pressures shape organisational practices through coercive, mimetic, and normative isomorphism (DiMaggio & Powell, 1983; Bromley & Powell, 2022). In the public sector, coercive isomorphism, where governmental and donor pressures mandate formal adoption of performance management systems, explains why organisations adopt BSC frameworks despite lacking the implementation capacity to operationalise them (Ahyaruddin & Akbar, 2018). The Zambian case exemplifies this dynamic: the PSRP mandated BSC adoption while simultaneously reducing the training investments that would make it functional. Institutional pressure (formalised through the β parameter) thus actively diverts human capital from implementation to compliance activities, suppressing net capability growth even when resource allocation is nominally adequate, formalised in Proposition 3.

2.1.4 Theoretical Integration and Propositions

The three theories converge on a common explanatory structure: resource allocation (RBV) creates the potential for performance; dynamic capabilities (DCT) determine whether that potential is realised over time; and institutional pressures (IT) systematically erode the human capital required to activate that potential. Three explicit propositions connect this integrated framework to the capability trap model parameters: Proposition 1 (Resource-Based View). Greater strategic resource allocation (R_t) will be positively associated with resource utilisation efficiency (P_t), but this relationship will be substantially mediated by the level of human capital (H_t) available to deploy those resources. Proposition 2 (Dynamic Capabilities Theory). The strength of human capital mediation will depend on conversion efficiency (α), such that organisations with higher α will exhibit stronger resource-performance links over time. Proposition 3 (Institutional Theory). Coercive institutional pressures (β) will weaken the resource-performance relationship by diverting human capital from implementation to compliance activities, reducing net human capital growth even when resource allocation is adequate.

2.2 Empirical Review

2.2.1 Resource Allocation and Utilisation Efficiency

Public sector resource management literature extensively documents the challenges of translating budgetary allocations into operational effectiveness (Lavertu & Moynihan, 2012; Arnaboldi et al., 2016). Performance Management Systems represent a significant evolution in public sector accounting, shifting focus from input control to outcome measurement (Modell, 2019). The Balanced Scorecard has gained prominence as a multidimensional framework linking financial and non-financial measures (Kaplan & Norton, 1996; Nørreklit et al., 2022); however, implementation success varies considerably, with developing economies facing distinct challenges (Goddard & Mkasiwa, 2016).

Traditional public financial management emphasises compliance and control, often at the expense of operational flexibility. Goddard & Mkasiwa (2016) found that bureaucratic procurement processes in Tanzanian public institutions created significant delays between resource allocation and deployment. Saim and Traore (2025) documented how rigid budget categories prevented adaptive resource reallocation in Egyptian government agencies. Lavertu and Moynihan (2012) demonstrated that performance management reforms in the United States federal government improved information use but not necessarily operational outcomes, particularly where human capital constraints persisted. Despite this extensive documentation of resource-utilisation disconnects the precise mediating mechanism through which human capital translates allocation into outcomes remained underspecified prior to the present study.

2.2.2 Human Capital as Mediator in Performance Management Systems

The role of human capital in accounting change and PMS implementation has received increasing scholarly attention. Järvinen (2016) found that successful accounting innovations required not only technical training but also conceptual understanding and change management capabilities. Ahyaruddin and Akbar (2018) demonstrated in Indonesian local governments that technical capacity significantly mediated the relationship between performance measurement system design and organisational outcomes, a finding that directly anticipates the mediating role examined here. Ohemeng (2021) documented in Ghana how human capital deficits undermined performance management initiatives, generating compliance without operational improvement.

In defence contexts, human capital development faces additional structural challenges due to hierarchical command structures and mandatory rotation policies (Parker, 2020). Brown (2021) found that military personnel rotation systematically undermined BSC implementation continuity in African defence organisations, as trained officers were transferred before their skills could be institutionalised. Similar challenges have been observed across public sectors:

healthcare organisations experience comparable staff rotation effects, and educational institutions face knowledge retention failures when trained administrators rotate roles (Ohemeng, 2021). These studies collectively establish human capital as a critical mediating variable but do not provide a formal parameterised model of the mediating mechanism, the contribution this study makes.

2.2.3 Capability Trap Modelling and Intervention Design

The capability trap concept originates in organisational learning and systems dynamics theory. Sterman (2000) identified capability traps as situations where short-term production pressures systematically crowd out process improvement investment, creating self-reinforcing cycles of underperformance. Repenning and Sterman (2002) extended this to show how improvement initiatives fail when delivering current output prevents organisations from investing in better processes, a dynamic they termed capability-reinforcing and capability-eroding feedback loops.

The present study extends this concept to public sector PMS, where the driving mechanism is not production pressure but compliance-capability tension: coercive institutional pressures to adopt reform systems divert the human capital needed to operationalise those systems. The capability trap manifests through four mechanisms: resource-performance disconnects, where resources fail to generate expected outcomes due to insufficient human capital; compliance-capability tensions, where institutional pressures prioritise compliance over capability-building; depreciation effects, where human capital erodes through turnover and skill obsolescence at rates exceeding replenishment; and self-reinforcing feedback, where poor performance triggers increased oversight rather than increased capability investment. Existing studies document these symptoms but do not formally model the dynamic or estimate the parameters that determine whether an organisation escapes or remains trapped. This study fills that gap.

III. METHODOLOGY

3.1 Research Design

This study employed a sequential explanatory mixed-methods design (Creswell & Plano Clark, 2018), whereby quantitative data were collected and analysed first to identify patterns and correlations, followed by qualitative data to explain and contextualise those patterns. This design was selected because the capability trap mechanism requires both quantitative measurement of implementation gaps and qualitative understanding of the causal processes generating those gaps. The research was conducted between January 2024 and September 2025.

3.2 Study Area

The study was conducted within the Defence Sector of Zambia (DSZ), comprising three services: the Zambia Army (headquartered in Lusaka), the Zambia Air Force (Lusaka Air Base), and the Zambia National Service (Ndola). The DSZ formally adopted the Balanced Scorecard as its performance management framework following the 1993 Public Sector Reform Programme, making it one of the earliest African defence organisations to implement a formal PMS. Operational units span all ten provinces of Zambia, creating a geographically distributed implementation challenge.

The Zambian political economy introduces several contextually important factors directly relevant to the capability trap. First, electoral cycles of typically five years frequently disrupt policy continuity, as incoming administrations often restructure priorities mid-implementation cycle. Second, Zambia's high dependence on copper exports (approximately 70% of foreign exchange earnings) creates fiscal volatility that disproportionately affects training budgets: during the 2015-2016 copper price collapse, DSZ training budgets fell 43% while operational budgets fell only 12% (Ministry of Finance, 2017) — a precise illustration of the depreciation mechanism. Third, the 2018-2022 IMF Extended Credit Facility imposed public financial management reforms as conditionalities without corresponding resources for the capability development required to operationalise them, exemplifying the institutional pressure mechanism (β). These contextual factors make the DSZ a theoretically and empirically significant site for studying the capability trap. Ethical approval was granted by the University of Zambia Research Ethics Committee [HSSREC IRB 0000464]. Command authorisation was obtained from: Zambia Army (Letter Trg 308/1, 16 April 2024); Zambia Air Force (Letter HQ/AF 1950/11/AD, 30 September 2024); and Zambia National Service (Letter HQ ZNS/TRG/23).

3.3 Target Population

The target population comprised 217 senior officers of the Defence Sector of Zambia holding positions with direct responsibility for resource planning, budget management, performance management implementation, or operational command at the rank of Major or equivalent and above. This population was identified through official establishment lists obtained from each of the three-service headquarters. Eligibility criteria required a minimum of three years in the current position to ensure adequate familiarity with PMS processes, budget cycles, and operational resource

management. This decision-making cadre represents the stratum whose human capital most directly mediates the resource-performance relationship under investigation, making it the theoretically appropriate population for testing the capability trap model.

3.4 Sampling Procedures and Sample Size

3.4.1 Quantitative Phase

Stratified random sampling was employed to ensure proportional representation across the DSZ's three services (Zambia Army, Zambia Air Force, Zambia National Service) and four functional domains (Operations, Logistics, Training, and Finance/Administration). Stratification was applied because functional role was expected to determine both resource management exposure and human capital development experience. The Yamane (1967) formula was applied to determine the minimum required sample from a population of $N=217$ at 95% confidence and a 5% margin of error: $n = N/(1+N(e^2)) = 217/(1+217(0.0025)) \approx 140$ officers. The target was adjusted to 135 to account for anticipated non-response. An a priori power analysis using G*Power (Faul et al., 2009) confirmed that $n=118$ suffices to detect a medium effect size ($f^2=0.15$) with $\alpha=0.05$ and power=0.80 for a five-predictor regression model. The achieved sample of $n=135$ (82% response rate) exceeded this minimum threshold, providing adequate statistical power.

3.4.2 Qualitative Phase

Heterogeneous purposive sampling was employed to select 21 key informants, deliberately maximising variation across rank, service branch, and functional role to ensure the widest possible range of perspectives on performance management implementation. Informants comprised service commanders ($n=3$), planning directors ($n=5$), budget officers ($n=4$), training coordinators ($n=4$), and operational commanders ($n=5$). This composition ensured coverage of both strategic and operational perspectives on the resource-performance relationship. Sampling continued until thematic saturation was achieved.

3.5 Data Collection Instruments and Procedures

Quantitative data were collected using a structured survey instrument comprising validated 5-point Likert scales (1=strongly disagree to 5=strongly agree). The instrument measured three primary constructs: Resource Utilisation Efficiency (six items, Cronbach's $\alpha=0.85$), Human Capital Development (three items, $\alpha=0.79$), and Strategic Resource Guidance (four items, $\alpha=0.82$). Sample items included: "Resources allocated in strategic plans are deployed promptly for operational needs" and "Personnel receive adequate training in performance data analysis and interpretation." The instrument was piloted with 12 officers not included in the final sample to test item clarity and internal consistency, and minor wording adjustments were made before full administration.

Qualitative data were collected through semi-structured interviews lasting 45-60 minutes per session, conducted between August and September 2025. Interview questions explored resource management practices, human capital development systems, PMS implementation experiences, and participants' perceptions of the barriers between resource allocation and utilisation. All interviews were conducted in English, audio-recorded with participant consent, and transcribed verbatim.

3.6 Data Analysis

3.6.1 Quantitative Analysis

Quantitative data were analysed using IBM SPSS Statistics 27. Descriptive statistics (means, standard deviations, coefficients of variation) characterised construct distributions. Spearman's rank correlation (ρ) was selected for bivariate analysis given the ordinal nature of Likert-scale data. Two complementary strategies addressed common method variance (CMV): procedural remedies applied during data collection (separating predictor and outcome items, varying response formats, assuring respondent anonymity); and the statistical marker variable technique (Lindell & Whitney, 2001), which yielded a marker correlation of $r^M=0.09$. Key correlations remained stable after partialling (ρ adjusted=0.51 vs unadjusted $\rho=0.524$), confirming CMV did not materially bias findings. Harman's single factor test, as a supplementary robustness check extracted 38.7% variance on a single factor which is well below the 50% threshold (Podsakoff et al., 2012). To address potential endogeneity between human capital and resource utilisation, three analytical strategies were employed:

Temporal sequencing analysis of archival training expenditure and performance records (2020-2023) to establish precedence; A distance-from-headquarters proxy sensitivity check, which found that units further from headquarters reported systematically lower training access ($\rho=0.49$, $p<0.001$), consistent with the capability trap mechanism and Qualitative process tracing, providing the strongest support, with 76% of interviewees explicitly describing how capability constraints preceded and caused performance shortfalls rather than the reverse.

3.6.2 Qualitative Analysis

Qualitative data were analysed thematically following Braun and Clarke's (2006) six-phase framework: familiarisation with the data, generation of initial codes, searching for themes, reviewing themes, defining and naming themes, and producing the final analysis. NVivo 12 facilitated data management, coding, and audit trails. Trustworthiness was established through member checking, in which coded summaries were returned to 87% of participants who validated their accuracy, and inter-rater reliability was assessed through independent coding by a research assistant, yielding a Cohen's kappa coefficient of $\kappa=0.72$, indicating substantial agreement.

Integration: Following separate quantitative and qualitative analyses, integration was achieved through joint displays juxtaposing statistical findings with explanatory interview extracts (Guetterman et al., 2015). Meta-inferences were drawn by integrating quantitative correlational patterns with qualitative causal explanations, guided by the capability trap framework.

3.7 Parameter Estimation

The four model parameters were empirically estimated using rigorous triangulated measurement procedures. Conversion efficiency (α) was estimated from comprehensive training expenditure records (2022-2024), departmental performance evaluations, and pre/post-training assessments of 87 officers, yielding $\alpha=0.18$ [95% CI: 0.14-0.22]. Depreciation rate (δ) was estimated from personnel rotation records (2021-2024) and knowledge retention tests administered to 112 officers following rotation, yielding $\delta=0.15$ [95% CI: 0.12-0.18]. Institutional pressure impact (β) was derived from systematic analysis of performance audit reports (2022-2025) and structured interviews, yielding $\beta=0.12$ [95% CI: 0.09-0.15]. Resource deployment efficiency (γ) was estimated from procurement completion records and budget execution reports, yielding $\gamma=0.76$ [95% CI: 0.72-0.80].

3.8 Ethical Considerations

This study was conducted in accordance with established ethical principles governing social science research. Ethical approval was obtained from the University of Zambia Research Ethics Committee (HSSREC IRB 0000464) prior to data collection. Institutional authorisation was secured from all three DSZ service commanders. Participation was entirely voluntary: all respondents and interviewees provided informed written consent, were advised of their right to withdraw at any time without consequence, and were assured of anonymity and confidentiality. Survey data were de-identified at the point of collection. Interview excerpts are cited using participant codes (e.g., Int SQ01) rather than identifying information. Data are stored securely at the Copperbelt University and will be retained for a minimum of five years following publication.

IV. FINDINGS & DISCUSSIONS

4.1 Findings

4.1.1 Resource Guidance to Allocation

The descriptive statistics depicted in Table 1 reveal a performance paradox central to the capability trap: Strategic Resource Guidance attracts the highest mean score ($M=3.88$, $SD=0.82$). This indicates that the DSZ possesses strong planning processes that effectively direct resource allocation, yet Resource Utilisation Efficiency receives the lowest mean score ($M=3.24$, $SD=1.03$). This confirms that strategic clarity does not translate into operational effectiveness. Human Capital Development shows the highest variability ($CV=33.8\%$), indicating deeply inconsistent capacity development across the organisation. This finding directly anticipates the mediating mechanism.

Table 1

Descriptive Statistics for Key Constructs

Construct	Mean	SD	CV (%)	Cronbach's α
Resource Utilisation Efficiency	3.24	1.03	31.8	0.85
Human Capital Development	3.16	1.07	33.8	0.79
Strategic Resource Guidance	3.88	0.82	21.1	0.82

Source: Author's Survey Data, 2026. Note: $n=135$ senior officers; CV = Coefficient of Variation ($SD/Mean \times 100$). Construct validity based on internal consistency and content validity established through expert review.

The Individual item analysis depicted in Table 2 pinpoints the implementation barriers with precision. The lowest-scoring items are "timeliness of resource allocation" ($M=2.98$, $SD=1.12$) and "adequacy of specialised BSC training" ($M=3.02$, $SD=1.08$). These are both directly linked to the capability trap's depreciation and conversion mechanisms. The highest-scoring items are "clarity of strategic objectives" ($M=3.91$, $SD=0.80$) and "strategic plan guides resource allocation" ($M=3.85$, $SD=0.82$). This confirms the existence of strong planning processes but weak

implementation capacity. This is the defining signature of the capability trap. This finding is consistent with Arnaboldi et al. (2016) and Goddard and Mkasiwa (2016), who found that planning system quality does not directly, determine implementation outcomes in developing-economy public sector organisations.

Table 2

Mean Scores for Selected Individual Items

Item	Mean	SD
Timeliness of resource allocation	2.98	1.12
Adequacy of specialised BSC training	3.02	1.08
Flexibility of resource management processes	3.15	1.05
Project completion rate	3.18	0.98
Strategic plan guides resource allocation	3.85	0.82
Clarity of strategic objectives	3.91	0.80

Source: Author's Survey Data, 2026. Note: $n=135$; 5-point Likert scale (1=strongly disagree to 5=strongly agree).

4.1.2 Human Capital as Mediator

The Correlation analysis illustrated in Table 3 provides the core empirical evidence for the mediating role of human capital. The strong positive relationship between Strategic Resource Guidance and Resource Allocation ($\rho=0.635$, $p<0.001$) confirms that planning processes effectively direct resource flows. However, the correlation between Resource Allocation and Resource Utilisation Efficiency drops markedly to $\rho=0.312$ ($p<0.001$). This confirms implementation barriers. In contrast, Human Capital Development shows a substantially stronger correlation with Resource Utilisation Efficiency ($\rho=0.524$, $p<0.001$) and Performance Management Effectiveness ($\rho=0.487$, $p<0.001$). The differential between $\rho=0.524$ (human capital-utilisation) and $\rho=0.312$ (allocation-utilisation) empirically demonstrates that human capital is a more proximal determinant of utilisation outcomes than resource allocation itself. This is consistent with Proposition 1. This replicates and extends Ahyaruddin and Akbar's (2018) finding in Indonesian local government that technical capacity mediates PMS design-outcome relationships, here for the first time in a defence context with formally estimated parameters.

Table 3

Spearman's Rank Correlation Matrix

Variable	1	2	3	4	5
1. Strategic Resource Guidance	1.000				
2. Resource Allocation	0.635	1.000			
3. Resource Utilisation Efficiency	0.285	0.312	1.000		
4. Human Capital Development	0.246	0.318	0.524	1.000	
5. Performance Management Effectiveness	0.342	0.385	0.476	0.487	1.000

Source: Author's Survey Data, 2026. Note: $n=135$; all correlations significant at $p<0.001$. Bold value ($\rho=0.524$) highlights the key mediating correlation.

4.1.3 Capability Trap Parameter Estimation

The empirically estimated parameters ($\alpha=0.18$, $\delta=0.15$, $\beta=0.12$) place the DSZ in a borderline trap condition where conversion efficiency (0.18) narrowly fails to exceed the combined threshold of depreciation and institutional pressure (0.27). This borderline condition is theoretically significant. It indicates structural vulnerability to a sustained trap should training investment or rotation management deteriorates. The first longitudinal archival analysis (2020-2023) found that training budget reductions consistently preceded performance score declines by 12-18 months, consistent with the temporal sequencing predicted by the human capital evolution equation. These findings extend Sterman (2000) and Repenning and Sterman (2002) from private-sector production contexts to public-sector PMS, providing the first empirically estimated trap parameters in a developing-economy defence context.

4.2 Qualitative Findings

The thematic analysis of 21 interview transcripts revealed two primary themes explaining the quantitative patterns: Human Capital Enablement Deficit and Systemic Resource Management Disconnects.

4.2.1 Theme 1: Human Capital Enablement Deficit

This theme emerged from 79% of participants ($n=17$), who identified training gaps as the primary implementation barrier. Three specific manifestations were identified.

Inadequate Technical Skills. Participants consistently reported insufficient analytical skills for interpreting performance data:

Int SQ01, 14 August 2025: *"We have modern budgeting systems, but officers are trained on manual procedures. The performance management system generates sophisticated data, but few officers can translate that into actionable insights. The training budget gets cut first during austerity measures."*

This directly corresponds to low conversion efficiency ($\alpha=0.18$) in the capability trap model and replicates Järvinen (2016) finding that technical training alone is insufficient without conceptual understanding.

Limited Change Management Capacity. Participants described resistance to data-driven decision-making:

Int SQ14, 11 September 2025: *"The culture shift from command-based to evidence-based decision-making requires more than technical training. We need change management skills to overcome resistance. When senior commanders do not see value in the data, the system becomes a compliance exercise."*

This institutional dimension is captured by the β parameter and validates Proposition 3: institutional pressure transforms PMS into a compliance instrument rather than a capability development mechanism.

High Turnover of Trained Personnel. Military rotation policies created acute continuity challenges:

Int SQ07, 19 August 2025: *"We invest in training officers who are then transferred to operational roles where they don't use these skills. Their replacements start from zero. We need institutional knowledge management, not just individual training."*

This directly corroborates the estimated depreciation rate ($\delta=0.15$) and mirrors Omondi-Ochieng (2021) finding that rotation policies systematically undermined BSC implementation in African defence organisations.

4.2.2 Theme 2: Systemic Resource Management Disconnects

This theme emerged from 71% of participants ($n=15$), who described bureaucratic processes that prioritised compliance over operational efficiency.

Procurement Delays.

Int SQ01, 11 September 2025: *"The procurement process averages 8 to 12 months from requisition to delivery. By then, operational needs have changed, but the budget remains locked in. The system rewards spending the budget rather than achieving outcomes. So we focus on documentation, not optimisation."*

Rigid Budgetary Categories.

Int SQ19, 29 August 2025: *"Funds are allocated in rigid categories that do not match operational realities. When priorities shift, we cannot reallocate without lengthy approval processes. Meanwhile, some accounts are underspent while others are depleted."*

This finding directly corroborates Saim and Traore (2025), who documented identical budget rigidity effects in Egyptian government agencies.

Expenditure-Focused Measurement.

Int SQ05, 17 September 2025: *"Performance audits focus on whether we spent according to plan, not whether that spending achieved results. This creates perverse incentives to prioritise budget execution over operational effectiveness."*

This evidence directly validates Proposition 3, confirming the diverting effect of institutional pressure ($\beta=0.12$) and extending Pollitt's (2013) compliance-substitution framework with empirical illustration from a Sub-Saharan defence context.

4.3 Integrated Analysis

The joint display analysis depicted in Table 4 reveals a consistent and theoretically coherent pattern: strong strategic resource guidance at the headquarters level deteriorates into inefficient operational implementation due to human capital gaps at unit level. This convergent evidence confirms the proposed capability trap where resources are allocated but cannot be effectively deployed; training investments are insufficient and inconsistent; and accountability systems measure compliance rather than capability development.

Table 4

Joint Display of Quantitative Findings and Qualitative Explanations

Quantitative Finding	Qualitative Explanation	Capability Trap Mechanism
Low resource utilisation efficiency ($M=3.24$, $SD=1.03$) despite high strategic guidance ($M=3.88$, $SD=0.82$)	"We have clear strategic priorities but lack operational flexibility to implement them when conditions change." (SQ05, 17 Sep 2025)	Rigid resource management systems prevent adaptive deployment.
High variability in human capital development ($CV=33.8\%$)	"Training is inconsistent across units. Some have well-trained staff; others	Uneven capability development creates implementation disparities ($\delta=0.15$).

	rely on outdated skills." (SQ14, 11 Sep 2025)	
Strong correlation between human capital and resource utilisation ($\rho=0.524$, $p<0.001$)	"Without analytical skills, officers cannot translate resource plans into operational decisions." (SQ01, 14 Aug 2025)	Human capital mediates the resource-performance relationship ($\alpha=0.18$).
Weak correlation between resource allocation and utilisation ($\rho=0.312$, $p<0.001$)	"The budget process and operational reality operate on different timelines." (SQ10, 29 Aug 2025)	Temporal disconnects between allocation and implementation confirms trap condition.

4.4 Discussion

The empirical findings provide convergent evidence consistent with the capability trap framework. The estimated parameter values ($\alpha=0.18$, $\delta=0.15$, $\beta=0.12$) place the DSZ in a borderline trap condition where conversion efficiency (0.18) narrowly fails to exceed the combined threshold of depreciation and institutional pressure (0.27). This borderline condition is theoretically significant: it indicates structural vulnerability to a sustained trap should training investment or rotation management deteriorates. By contrast, marginal improvements in training effectiveness or rotation management — sufficient to raise α above 0.27 — would break the trap condition entirely, underscoring the leverage available to targeted policy interventions.

The weak correlation between resource allocation and utilisation ($\rho=0.312$) compared to the stronger correlation between human capital and utilisation ($\rho=0.524$) empirically confirms human capital's mediating role, consistent with Proposition 1 and replicating Ahyaruddin and Akbar (2018) in a new context. Qualitative evidence of self-reinforcing feedback, poor performance triggering increased oversight rather than increased training, demonstrates the trap's self-sustaining nature, validating the dynamic mechanism proposed by Repenning and Serman (2002) and extending it to public sector PMS.

For accounting theory, these results highlight the need to reconceptualise organisational resources to explicitly include human capability as a determinant of resource deployment efficiency. Traditional public financial management frameworks that measure only financial resource flows are inherently incomplete: they cannot capture the capability-performance relationship that this study demonstrates is the primary mediator of PMS outcomes. The capability dashboard framework proposed in Table 6 offers an accounting innovation that remedies this gap by making implementation capacity visible and measurable alongside financial compliance.

4.5 Cross-Sectoral Applications

To illustrate the framework's potential cross-sectoral reach, this section draws on secondary administrative data from published sector reports and supplementary interviews with 12 officials who had transferred from the DSZ to healthcare, education, and local government roles. These illustrative applications are exploratory; sector-specific parameter estimates carry wider confidence intervals than the DSZ primary estimates and should be interpreted as indicative rather than confirmatory.

In the healthcare sector, the capability trap manifests through high nurse turnover ($\delta\approx 0.22$) and inadequate analytical training ($\alpha\approx 0.14$), resulting in only 38% of allocated resources translating to improved health outcomes (Zambia Ministry of Health, 2022). In the education sector, teacher transfers average 17% annually in rural districts while training reaches only 43% of administrators. In local government, the Local Government Association of Zambia (2023) reported that only 31% of local authorities effectively utilised performance management systems despite 87% receiving implementation resources. Comparative parameter estimates across all four sectors (Table 5) reveal a consistent pattern: no sector meets the escape condition $\alpha > \delta + \beta$, with the DSZ closest to the threshold and local government furthest.

Table 5

Comparative Parameter Estimates Across Zambian Public Sectors

Parameter	Defence Sector	Healthcare Sector	Education Sector	Local Government
α (Conversion Efficiency)	0.18 [0.14–0.22]	0.14 [0.11–0.17]	0.16 [0.12–0.20]	0.13 [0.09–0.17]
δ (Depreciation Rate)	0.15 [0.12–0.18]	0.22 [0.18–0.26]	0.17 [0.14–0.20]	0.19 [0.15–0.23]
β (Institutional Pressure)	0.12 [0.09–0.15]	0.15 [0.11–0.19]	0.13 [0.10–0.16]	0.17 [0.13–0.21]
γ (Deployment Efficiency)	0.76 [0.72–0.80]	0.68 [0.63–0.73]	0.72 [0.67–0.77]	0.64 [0.59–0.69]
Trap Condition ($\alpha > \delta + \beta$)	Borderline (0.18 vs 0.27)	Not met (0.14 vs 0.37)	Not met (0.16 vs 0.30)	Not met (0.13 vs 0.36)

Source: Primary DSZ data (Author's Survey Data, 2026); healthcare data from Ministry of Health Performance Management System Assessment ($n=87$); education data from Ministry of Education Performance Evaluation ($n=93$); local government data from Local Government Association of Zambia (2023, $n=76$). Cross-sectoral estimates are exploratory and should be interpreted as illustrative.

V. CONCLUSIONS & RECOMMENDATIONS

5.1 Conclusions

This study demonstrates that resource utilisation inefficiencies in defence sector performance management systems stem not from inadequate allocation but from human capital deficits that create a self-reinforcing capability trap. The formal model $H_{t+1} = H_t + \alpha (R_t - \delta H_t) - \beta I_t$, empirically validated with DSZ data across 135 survey respondents and 21 key informants, identifies the operative mechanism: when conversion efficiency ($\alpha=0.18$) fails to exceed the combined effects of depreciation ($\delta=0.15$) and institutional pressure ($\beta=0.12$), human capital declines despite resource investment. The DSZ operates in a borderline trap condition, confirming structural vulnerability. Cross-sectoral analysis suggests that the trap condition characterises all four Zambian public sectors examined, with no sector currently meeting the escape threshold $\alpha > \delta + \beta$.

For accounting and public administration theory, these results establish three contributions. First, the capability trap provides a mechanism-based explanation for the performance gap that descriptive and correlational prior studies have documented but not explained. Second, the formal parameterisation of the trap ($\alpha, \delta, \beta, \gamma$ framework) creates a measurable and actionable model that public sector organisations can apply and monitor. Third, the study demonstrates that traditional public financial management systems are structurally incomplete: by measuring only financial resource flows without capturing implementation capacity, they generate perverse incentives that actively reinforce the trap. Breaking the capability trap is simultaneously an accounting challenge, a human capital management imperative, and an institutional reform agenda.

5.2 Recommendations

The findings of this study point to a coherent and mutually reinforcing reform agenda for public sector performance management in the Defence Sector of Zambia and comparable developing-economy institutions. The most foundational requirement is the integration of resource planning and capability development as inseparable components of a single budgeting process. Strategic resource guidance in the DSZ is demonstrably strong — planning clarity scores were the highest-rated construct ($M=3.88$) — yet this planning strength translates poorly into operational outcomes precisely because the capability to deploy resources is treated as a background assumption rather than a planned and funded investment. Every capital programme and operational budget should be assessed for its human capital implications before approval, with training and knowledge management costs treated as non-negotiable implementation prerequisites rather than optional supplementary activities. Budget cycle regulations should be amended to require departments to demonstrate capability readiness before major resource allocations are released.

A closely related imperative is the statutory protection of training budgets from fiscal volatility. The empirical evidence from the DSZ is unambiguous: training budgets are the first casualty of austerity, falling 43% during the 2015-2016 copper price collapse while operational budgets fell only 12%. This disproportionate erosion directly suppresses conversion efficiency (α), pushing the DSZ deeper into the trap condition at precisely the moment fiscal pressure intensifies. The Ministry of Finance and National Planning should establish a statutory minimum training allocation of no less than 3% of total personnel costs, rising to 5% for organisations undergoing active PMS reform cycles. This protection should be embedded in the Medium-Term Expenditure Framework and, where appropriate, in Public Finance Management Act regulations, signalling that capability investment carry the same fiscal inviolability as salary expenditure. The phased Capability Dashboard implementation framework (Table 6) provides the Ministry with a structured 12-month pathway for operationalising this commitment across government.

Public sector accountability architecture must evolve beyond expenditure compliance to encompass implementation capacity. The finding that 71% of qualitative participants described accountability systems as rewarding budget execution rather than operational outcomes reflects a deeply entrenched measurement paradox: organisations are held responsible for spending their allocations, not for the capability with which they do so. This study recommends the adoption of capability dashboards that complement traditional financial reports with real-time indicators of training effectiveness ratios, knowledge retention indices, compliance burden measures, and resource deployment velocity. As detailed in Table 6, implementation can begin with an Excel-based prototype requiring fewer than two hours per week of data collection, before scaling integrated management information systems. The Public Service Commission of Zambia should amend performance audit frameworks to require that implementation capacity indicators appear alongside standard financial compliance metrics in all annual performance reviews.

Personnel rotation, a structural feature of military and many civil public service organisations, must be managed as a knowledge management challenge with measurable depreciation consequences rather than as a routine administrative exercise. The empirically estimated depreciation rate of $\delta=0.15$ means that approximately 15% of accumulated analytical and systems capability is lost per rotation cycle, a loss that closely tracks interview evidence of trained officers being transferred before their knowledge could be institutionalised. The DSZ and comparable organisations should develop formal knowledge management protocols: standardised performance management handover documentation requiring outgoing officers to produce written operational knowledge transfers; structured mentoring arrangements pairing outgoing and incoming officers for a minimum of three months during transition; and centrally managed digital knowledge repositories, accessible across service branches, that preserve institutional learning independently of individual posting cycles. These interventions directly target the δ pathway in the capability trap model, reducing the depreciation rate toward, and ideally below, the escape threshold.

Finally, future research should prioritise longitudinal designs with multiple measurement points to establish formal causal directionality in the capability trap — an inference this study's cross-sectional design could approximate through temporal sequencing and process tracing, but not definitively confirm. Comparative studies across healthcare, education, and local government in Zambia and peer developing-economy contexts would test the generalisability of the $\alpha > \delta + \beta$ escape condition. Policymakers evaluating cross-sectoral reform programmes should commission sector-specific capability trap assessments before designing reform architectures, ensuring that the capability infrastructure is in place before systems go live. This sequencing, capability first, system second, represents the fundamental inversion of prevailing public sector reform practice that this study's evidence compels.

Source: Author's Analysis of Survey and Interview Data, 2026.

Declaration of Interest

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Appendix I**Capability Dashboard Implementation Framework****Table 6***Structured Implementation Framework for Capability Dashboards*

Phase	Timeline	Key Activities	Deliverables	Success Criteria
1. Diagnostic Assessment	Months 1–2	Baseline measurement of α , δ , β , γ ; skills audits; process mapping; data source inventory	Capability gap report; parameter baseline document; data availability matrix	Parameter baselines established; ≥ 3 critical gaps identified; 80% data sources mapped
2. Dashboard Design	Months 3–4	Select core metrics (Training Effectiveness Ratio, Knowledge Retention Index, Compliance Burden Measure, Resource Deployment Velocity); design alert system; develop user personas	Dashboard blueprint; metric calculation protocols; visual mockups; alert threshold definitions	Design approved by stakeholders; all metrics have clear calculation methods; user personas cover $>90\%$ of intended users
3. Technical Implementation	Months 5–6	System integration assessment; Excel prototype development; data collection automation; role-based access; validation procedures	Functional dashboard prototype; data collection templates; user access matrix; system documentation	Prototype captures all core metrics; data collection <2 hours weekly; functions without external IT support
4. Pilot Deployment	Months 7–9	Pilot unit selection; user training (3–5 days); bi-weekly review meetings; early win documentation; challenge identification	Trained user cohort; meeting minutes with action items; challenges log; early wins report	$>80\%$ pilot users trained; ≥ 6 review meetings completed; ≥ 3 early wins documented
5. Evaluation and Scaling	Months 10–12	Effectiveness assessment; user feedback; dashboard refinement; scaling plan development; resource projection	Evaluation report; refined dashboard; organisation-wide implementation plan; resource requirement document	User adoption $>75\%$; decision influence $>50\%$; deployment velocity improved by 15%; scaling plan approved