

Saturation warfare and the African defence capability trap: Doctrinal implications of the mosaic–saturation nexus for Sub-Saharan military establishments

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ABSTRACT

This paper examines the doctrinal implications of the saturation-mosaic paradigm for Sub-Saharan African military establishments and proposes the African Asymmetric Doctrinal Adaptation Framework as a contextually viable model for asymmetric doctrinal modernisation within resource-constrained environments. A qualitative systematic analytical review was conducted, drawing on open-source operational intelligence, peer-reviewed literature, and policy documents. Systematic searches of Google Scholar, JSTOR, and EBSCO (2000–2026) were complemented by grey literature from Centre for Strategic and International Studies, RAND, the Hudson Institute, and the Soufan Center. A comparative case study approach was applied, selecting the Defence Force of Zambia (DFZ) as the primary analytical reference case on the basis of its representativeness of mid-tier Sub-Saharan African military establishments. The empirical foundation rests on three verifiable operational cases: the Houthi Ansar Allah Red Sea campaign (2023–2026), the Iranian Revolutionary Guard Corps/Houthi proxy operations including the Abqaiq-Khuras attack (2019); and the 2026 Iran–US–Israel conflict. Data were coded inductively against three analytical constructs: Critical Implementation Gradient (CIG), Planning-Execution Gap, and Resource Sovereignty. The paper establishes three principal findings. First, saturation warfare and Mosaic Defence doctrine operate at distinct analytical levels, the operational tactic and the strategic architecture, and conflating them produces fundamental misidentification of both the threat and the required response. Second, the conventional counter-saturation response is structurally inaccessible to Sub-Saharan African military establishments; Zambia's 2023 defence allocation of approximately USD 231 million represents less than 21% of the cost of a single Patriot PAC-3 battery (SIPRI, 2024; IISS, 2024). Third, the mosaic's core organizational insight, distributed resilience as a substitute for technological superiority, is paradoxically more accessible to African establishments, particularly given Africa's geographic depth and existing civil-military networks. The AADAF provides a three-dimensional framework, Structural Resilience by Design, Cost-Asymmetric Deterrence, and Resource Sovereignty Recovery, through which Sub-Saharan African military establishments can pursue meaningful doctrinal adaptation within the constraints of the African Defence Capability Trap. This study concludes that saturation warfare and mosaic defence operate at distinct analytical levels and that the conventional counter-saturation response is structurally inaccessible to Sub-Saharan military establishments due to the African defence capability trap. It is recommended that African militaries adopt the African asymmetric doctrinal adaptation framework, leveraging distributed resilience, cost-asymmetric deterrence, and resource sovereignty recovery to achieve meaningful doctrinal modernisation within resource constraints.

Keywords: Asymmetric Adaptation; African Defence Capability Trap; Critical Implementation Gradient; Mosaic Defence Doctrine; Planning-Execution Gap; Resource Sovereignty, Saturation Warfare

I. INTRODUCTION

The emergence of cost-asymmetric, high-volume strike warfare as a viable doctrine for technologically inferior actors represents one of the most consequential doctrinal shifts of the contemporary era (Krepinevich, 2009; Biddle, 2004). Since October 2023, Houthi Ansar Allah forces operating from Yemen have demonstrated, in sustained live operations, that low-cost Unmanned Aerial Systems (UAS) and ballistic missiles employed in saturation patterns can impose economically unsustainable operational burdens on some of the world's most advanced naval forces (Centre Strategic and International Studies[CSIS], 2024; Watling & Reynolds, 2023; RAND Report 2025). By February 2026, the doctrinal architecture sustaining this capability, Iran's Decentralised Mosaic Defence (DMD), had been validated at the state level in the conflict involving Iran, the United States, and Israel (Hudson Institute, 2026; Soufan Center, 2026). For military strategists globally, these events constitute converging doctrinal proof of concept. For African defence establishments, they constitute a warning whose implications have yet to be systematically engaged (Omach, 2010; Lotze & Kasumba, 2020).

The strategic resilience demonstrated by both the Houthi campaign and Iran's operations is not attributable to technological superiority. It is attributable to a fully theorised military doctrine: the DMD, within which saturation warfare functions as the primary operational strike instrument (Monnappa, 2026; O'Donoghue et al., 2021). Together, the mosaic architecture and the saturation tactic constitute a strategic model that challenges the foundational premises of Western operational doctrine, the Clausewitzian centre of gravity, the doctrine of decisive battle, and the logic of

rapid dominance, and validates a paradigm that technologically inferior actors can adapt and adopt (Schelling, 1966; Biddle, 2004). Shah (2026) traces Iran's evolution from static deterrence to offensive asymmetric compellence through a saturation architecture that exploits cost-exchange asymmetry, an evolution whose operational logic has since been validated empirically across multiple theatres.

Sub-Saharan African military establishments confront this shifting doctrinal landscape with severely constrained institutional capacity to respond. The majority of African states lack layered missile defence systems, strategic airlift capacity, and the defence Research and Development (R&D) infrastructure required to mount conventional counter-saturation responses (Liang et al., 2025; IISS, 2024). These deficits are not incidental; they are the systemic product of what this paper conceptualises as the African Defence Capability Trap (ADCT). This is a self-reinforcing cycle of structural constraints characterised by inadequate defence resource allocation, a Critical Implementation Gradient (CIG) between strategic policy and operational execution, persistent Planning-Execution Gaps in defence acquisition, and compromised Resource Sovereignty arising from external dependency (Daka, 2026).

This paper addresses a gap in the literature at the intersection of contemporary asymmetric warfare theory and African security studies: the absence of a systematic analytical framework for understanding what the saturation-mosaic paradigm means for African military establishments specifically and what forms of asymmetric doctrinal adaptation are available within the structural constraints the capability trap imposes (William, 2018; Koffi Annan International Peace Training Centre Report, 2020). The paper proposes that the core organisational insight of the mosaic, that distributed resilience can substitute for technological superiority, is paradoxically more accessible to African establishments than the conventional counter-saturation paradigm it challenges (Defence Advanced Research Projects Agency [DARPA], 2017; O'Donoghue et al., 2021).

1.1 Statement of the Problem

Effective military doctrine requires security establishments to maintain analytically rigorous, contextually grounded frameworks capable of interpreting and responding to emergent operational paradigms. When a doctrinal revolution occurs, particularly one validated under live combat conditions, the expectation is that defence institutions, including those in Sub-Saharan Africa, possess both the conceptual architecture and the institutional capacity to assess its strategic implications, adapt their doctrinal posture accordingly, and translate that adaptation into operationally viable responses (RAND Report, 2025).

The Houthi Ansar Allah Red Sea campaign, which commenced in October 2023 and continued through 2026, provides the most sustained empirical demonstration of the saturation-mosaic paradigm in contemporary operational history. Employing Samad-3 loitering munitions, Quds-1 cruise missiles, and Burkan ballistic missiles in coordinated multi-axis salvos against US Navy Aegis destroyers and carrier battle groups, Houthi forces-imposed cost-exchange ratios of between 40:1 and 200:1 against some of the most advanced naval air defence systems in existence (CSIS, 2024; Watling & Reynolds, 2023). The 2019 Abqaiq-Khuras attack on Saudi Aramco infrastructure, 18 drones and 7 cruise missiles achieving damage exceeding USD 500 million at an attack cost of approximately USD 15 million, provided an earlier and equally verifiable illustration of the same logic. The 2026 Iran-US-Israel conflict extended this paradigm to state-level multi-domain operations, demonstrating sustained operational capability following attempted leadership decapitation. Yet for Sub-Saharan African military establishments, these events confront a structural reality that renders conventional doctrinal adaptation inaccessible: the per-unit cost of a Patriot PAC-3 battery (\$1.1 billion) exceeds the entire annual defence budget of 38 Sub-Saharan African states (Institute for Strategic Studies (IISS), 2024).

The divergence between the ideal and the reality produces consequences of strategic gravity. In the absence of a contextually grounded doctrinal framework, African defence establishments remain analytically exposed to a threat paradigm they cannot counter through conventional means, institutionally trapped by governance deficits that preclude available adaptation pathways, and doctrinally inert in the face of a global military revolution actively reshaping the conditions of conflict. The scholarly literature has not produced a systematic analytical framework addressing these intersecting problems in combination (Omach, 2010; Lotze & Kasumba, 2020).

1.2 Research Objectives

This paper, therefore, aims to address this analytical gap by developing the AADAF-a systematic framework that simultaneously accounts for the doctrinal distinction between saturation warfare and the DMD architecture that sustains it, the structural constraints embedded in the ADCT, and the contextually viable pathways through which Sub-Saharan African military establishments can achieve meaningful doctrinal adaptation. Specifically the paper pursues the following objectives:

- i. To establish the conceptual distinction between saturation warfare as an operational tactic and DMD as a strategic doctrine grounded in verified operational cases, and to derive the analytical implications of this distinction for military establishments operating under resource constraints.

- ii. To analyse the structural characteristics of the ADCT and assess their constraining effect on both conventional counter-saturation responses and offensive doctrinal adaptation, with specific empirical application to the Defence Force of Zambia.
- iii. To propose the AADAF as a theoretically grounded, contextually appropriate, and empirically anchored model for Sub-Saharan African military establishments to navigate the doctrinal implications of the saturation-mosaic paradigm.

1.3 Research Questions

- i. What distinguishes saturation warfare as an operational tactic from the DMD as a strategic doctrine, and what are the doctrinal implications of this distinction for militaries constrained by resource scarcity?
- ii. How do the structural characteristics of the ADCT, specifically the CIG, planning-execution gap, and compromised resource sovereignty, constrain African military responses to the saturation-mosaic paradigm?
- iii. What framework can guide Sub-Saharan African military establishments toward asymmetric doctrinal adaptation that is institutionally viable within the constraints of the capability trap?

II. LITERATURE REVIEW

2.1 Theoretical Review

2.1.1 Critical Implementation Gradient

Developed by Daka (2025a, 2025b) from empirical research on the Defence Force of Zambia, the Critical Implementation Gap conceptualises the gradient of institutional difficulty between the formal articulation of strategic policy and its operational execution. The CIG is not reducible to a resource deficit; it is a governance phenomenon in which the mechanisms for translating policy intent into operational capacity are systemically weak. As a theoretical construct, the CIG predicts that African military establishments will face compounding institutional barriers, procurement irregularities, command integration failures, and technical absorption deficits that render policy-level aspirations for doctrinal modernisation structurally unachievable through conventional pathways. In the context of this paper, the CIG explains why the existence of African Union and Southern Africa Development Community doctrinal frameworks for collective security has not translated into operationally viable counter-saturation capacity (African Union Commission [AUC], 2015; Omach, 2010).

2.1.2 Planning-Execution Gap

The Planning-Execution Gap (PEG) identifies the temporal and qualitative distance between force development planning cycles and the operational delivery of intended capabilities (Daka, 2025a). In the African defence context, the PEG is characterised by extended acquisition timelines of five to ten years, contract irregularities, and sustainment deficits that prevent even approved capability programmes from reaching operational deployment (Lotze & Kasumba, 2020; Omach, 2010). Applied to the saturation-mosaic challenge, the PEG Gap establishes why conventional doctrinal responses are not merely unaffordable but also institutionally undeliverable within the tempo of contemporary doctrinal change: the Houthi campaign evolved from improvised strike operations in 2023 to sustained state-proxy saturation architecture within twenty-four months. This is a rate of change that five-to-ten-year African defence procurement cycles are constitutively unable to match (CSIS, 2024).

2.1.3 Resource Sovereignty

Resource Sovereignty, as theorised by Daka (2025a), identifies the threshold below which external dependency, in the form of donor conditionality, tied-aid equipment, and imported sustainment chains, compromises the institutional autonomy required for effective doctrinal innovation. The construct does not posit autarky as a strategic ideal; it instead operationalises the minimum level of procurement diversification and indigenous doctrinal capacity required for a military establishment to determine its own strategic orientation. Resource Sovereignty has direct explanatory value for the paradox this paper examines: the states most in need of asymmetric doctrinal adaptation are precisely those whose procurement dependency on Western-aligned suppliers embeds conventional doctrinal orientations that are least suited to the saturation-mosaic environment (Liang et al., 2025; IISS, 2024).

These three constructs collectively constitute the African Defence Capability Trap, the overarching theoretical architecture of this paper, when combined with the quantitative fiscal baseline established by 2024 Stockholm International Peace research Institute [SIPRI] and IISS (2024) data. They do not function as independent variables in a correlational design; rather, they serve as structured analytical lenses for diagnosing the institutional conditions that determine whether, and under what pathway, Sub-Saharan African military establishments can achieve meaningful doctrinal adaptation in the saturation-mosaic era. The AADAF proposed in Section 6.5 is directly derived from the diagnostic application of these three constructs.

Complementing the CIG, Planning-Execution Gap, and Resource Sovereignty constructs, this paper draws theoretically on Schelling's (1966) deterrence-compellence framework to interpret Iran's doctrinal evolution; on O'Donoghue et al.'s (2021) distributed kill-chain analysis to anchor the mosaic's organisational logic; and on Jabareen's (2009) methodology for systematic conceptual framework development to validate the AADAF as an analytically rigorous model rather than a normative prescription.

2.2 Empirical Review

2.2.1 The Saturation-Mosaic Paradigm in Contemporary Conflict

Empirical analyses of contemporary asymmetric conflict have increasingly documented the operational viability of high-volume, cost-asymmetric strike warfare, yet the literature frequently blends the operational tactic with the underlying strategic architecture. The 2019 Abqaiq-Khuras attack on Saudi Aramco infrastructure provided the first major empirical validation of saturation effects, demonstrating that coordinated salvos of low-cost drones and cruise missiles could inflict disproportionate economic damage against fixed strategic assets (Watling & Reynolds, 2023). This paradigm was subsequently operationalised at a sustained, strategic level during the Houthi Ansar Allah Red Sea campaign (2023–2026). Empirical assessments by the Centre for Strategic and International Studies (CSIS) 2024 documented that Houthi forces imposed cost-exchange ratios of between 40:1 and 100:1 against advanced United States Navy Aegis defensive systems. This empirically proves the financial unsustainability of conventional interception models. However, empirical evidence from the 2026 Iran–US–Israel conflict and subsequent analyses of Iranian military doctrine reveal that saturation warfare is merely the operational expression of a deeper strategic architecture: the Decentralised Mosaic Defence (Monnappa, 2026; Shah, 2026). The empirical distinction is critical; while saturation is a finite tactical option bounded by munition stockpiles, the DMD provides the distributed, self-sustaining organisational substrate that allows saturation to persist even under severe attrition and leadership decapitation (Hudson Institute, 2026). The literature gap lies in the failure to systematically separate these two levels, leaving resource-constrained militaries attempting to counter a strategic organisational design with tactical weapon-system procurement.

2.2.2 Institutional Constraints and Capability Traps in African Defence

The empirical reality of Sub-Saharan African defence establishments demonstrates that they are structurally locked out of the conventional counter-saturation paradigm. Quantitative data from the Stockholm International Peace Research Institute (SIPRI) 2024 and the International Institute for Strategic Studies (IISS) 2024 establish a stark fiscal baseline: the median defence expenditure in Sub-Saharan Africa is 1.2% of GDP, and the per-unit cost of a single Patriot PAC-3 battery exceeds the entire annual defence budget of 38 African states. Beyond fiscal constraints, empirical studies on African security governance highlight severe institutional deficits that compound this vulnerability. Omach (2010) and Lotze and Kasumba (2020) empirically document persistent Planning-Execution Gaps in African defence procurement, characterised by acquisition timelines of five to ten years that are constitutively unable to match the tempo of contemporary doctrinal innovation. Furthermore, empirical research on the DSZ identifies a Critical Implementation Gradient and compromised Resource Sovereignty, wherein external dependency and systemic governance deficits prevent the translation of strategic policy into operational capacity (Daka, 2025a, 2025b). Collectively, this empirical evidence confirms that the African Defence Capability Trap (ADCT) is not merely a theoretical construct but a measurable structural condition that renders conventional, technology-heavy doctrinal adaptation mathematically and institutionally impossible.

2.2.3 Asymmetric Doctrinal Adaptation in Resource-Constrained Environments

In response to the inaccessibility of conventional paradigms, empirical literature on asymmetric adaptation offers alternative pathways, though a unified framework for African contexts remains absent. The conceptual foundations of distributed, attritable warfare have been empirically explored by DARPA (2017) and O'Donoghue et al. (2021), who demonstrated that distributed kill-chains and organisational resilience can substitute for technological superiority. Within the African context, empirical studies on peacekeeping operations reveal that African militaries already possess the doctrinal seeds for this adaptation. Williams (2018) and the Kofi Annan International Peacekeeping Training Centre (KAIPTC) 2020 document the widespread adoption of mission command doctrines in African peacekeeping, which rely on decentralised, pre-authorised operational action in communication-denied environments. Additionally, the rapid proliferation of dual-use Commercial Off-the-Shelf (COTS) technology, particularly in the agricultural drone sector across states like Zambia, presents an empirically viable foundation for cost-asymmetric deterrence. However, existing literature treats these elements in isolation. There is an absence of a systematic, contextually grounded empirical framework that integrates the organisational insights of the mosaic with the structural realities of the ADCT. This study addresses that gap by developing the AADAF, translating empirical operational lessons into a measurable, institutionally viable model for Sub-Saharan military establishments.

III. METHODOLOGY

3.1 Research Design and Epistemological Positioning

This study employs a qualitative research design explicitly framed as a Systematic Conceptual Framework Development study (Jabareen, 2009), combining systematic secondary source analysis with comparative case studies. This design is epistemologically appropriate given that the primary research problem, the doctrinal implications of novel operational phenomena for institutions whose classified data is not publicly accessible, necessitates analysis from open-source operational intelligence, published military doctrine, and strategic analysis literature (Creswell & Poth, 2018). The paper does not claim to generate new primary survey or interview data. It instead performs the function that Jabareen (2009) identifies as analytically prior to empirical testing: the construction of a validated conceptual framework from empirical operational evidence, suitable as a theoretical model for subsequent primary research.

The comparative case study component selects the DSZ as the primary analytical reference case on the grounds that it is representative of mid-tier Sub-Saharan African military establishments in terms of fiscal constraint, structural characteristics, and doctrinal orientation. Findings are cross-validated against published capability assessments of comparable militaries (Nigeria, Kenya, and Tanzania) to assess the generalisability of the analytical framework (Yin, 2018).

3.2 Empirical Anchors and Case Selection

A critical revision in this version of the paper addresses the epistemological weakness of relying solely on the 2026 Iran–US–Israel conflict, which, as an ongoing event at time of writing, is cited through open-source intelligence assessments rather than peer-reviewed post-conflict analysis. The paper therefore grounds its theoretical architecture in three empirical cases of ascending verification confidence.

The primary empirical anchor is the Houthi Ansar Allah Red Sea and Gulf of Aden campaign (October 2023–present). This campaign provides the most sustained, independently documented, and academically verifiable contemporary demonstration of the saturation-mosaic logic. Multiple peer-reviewed and established grey-literature sources (CSIS, 2024; Watling and Reynolds, 2023), the US Naval Institute, and the International Institute for Strategic Studies [IISS]) have documented the operational mechanics, cost-exchange dynamics, and strategic effects of Houthi operations with sufficient methodological rigour for academic citation. The secondary empirical anchor is the 2019 Abqaiq-Khuras attack, which provides a verified single-event illustration of cost-asymmetric saturation effects against fixed strategic infrastructure. The tertiary empirical anchor is the 2026 Iran–US–Israel conflict, which extends the saturation-mosaic analysis to state-level multi-domain operations; this case is cited with explicit epistemological caution given its recency.

3.3 Search Strategy and Source Selection

Systematic searches were conducted across Google Scholar, JSTOR, and EBSCO covering the period 2000–2026 using the following search terms: "saturation warfare," "mosaic defence doctrine," "Houthi drone campaign," "African military capability," "defence capability trap," "asymmetric warfare Africa," "drone warfare doctrine," "cost-exchange asymmetry," and "Iranian military strategy." Grey literature searches were conducted across the websites of CSIS, RAND Corporation, Hudson Institute, Soufan Center, US Naval Institute, and Watling & Reynolds at RUSI. Doctrinal and policy documents were sourced from publicly available African Union, SADC, and Economic Community of West African States defence framework publications and Zambia's national defence documents where accessible. SIPRI (2024) and IISS (2024) were the exclusive sources for all defence expenditure quantitative claims.

3.4 Inclusion and Exclusion Criteria

Sources were included if they directly addressed saturation warfare, mosaic defence doctrine, or the Houthi or Iranian military campaigns with verifiable operational evidence; engaged with African military capability, force development, or security governance; or provided verified quantitative data on defence expenditure or system costs from SIPRI or IISS datasets. Sources were excluded if they were published before 2000, except for foundational theoretical texts (Schelling, 1966; Biddle, 2004); lacked traceable institutional or authorial attribution; or appeared in outlets identified as predatory under Beall's criteria. The decision to retain Shah (2026) is justified solely on the grounds that its analytical framing of Iran's deterrence-compellence evolution is used as a counterpoint to the paper's theoretical argument, not as primary empirical evidence; the evidentiary weight rests on the Houthi campaign and RAND/CSIS/RUSI-verified sources.

3.5 Analytical Procedure

Data analysis proceeded in three stages. In Stage 1, the operational record of the Houthi Red Sea campaign, the Abqaiq-Khuras attack, and the 2026 Iran conflict was systematically reviewed and coded to identify recurring doctrinal



principles, distinguishing between features specific to their strategic contexts and those with broader doctrinal applicability. In Stage 2, each identified doctrinal principle was applied analytically to the DFZ's published structural characteristics and the Zambian defence budget data from SIPRI (2024), with cross-validation against comparable African militaries. In Stage 3, the CIG, Planning-Execution Gap, and Resource Sovereignty constructs (Daka, 2025a) were applied as analytical lenses to diagnose the institutional gap between current African doctrine and the saturation-mosaic requirement, generating structured and measurable adaptation recommendations.

3.6 Validity, Reliability, and Limitations

Analytical validity is grounded in the convergence of multiple independent sources on the Houthi operational record: CSIS, IISS, RAND, RUSI, and the US Naval Institute all produced assessments using overlapping but independent methodological approaches, providing triangulated confirmation of key cost-exchange claims. Reliability is supported by the consistent application of the three theoretical constructs across all analytical stages. The principal limitations are: reliance on open-source data, as classified operational assessments would provide a stronger empirical foundation; the recency of the 2026 conflict, with assessments subject to revision; the heterogeneity of Sub-Saharan African military establishments, requiring that the AADAF be adapted to national context rather than applied prescriptively; and the absence of primary interview data from serving African military officers, which would strengthen the empirical application to the DFZ and is identified as a priority for subsequent research.

IV. FINDINGS & DISCUSSION

4.1 Findings

4.1.1 Saturation-Mosaic Nexus: Conceptual Architecture and Empirical Evidence

The prevailing scholarly and policy literature on asymmetric strike warfare has tended to treat saturation warfare as a self-contained doctrine: a strategy premised on the deployment of high-volume, cost-asymmetric projectile systems to overwhelm adversary defensive capacity. Shah (2026), drawing on Schelling's (1966) deterrence-compellence framework, traces Iran's evolution from static deterrence to offensive asymmetric compellence through a saturation architecture exploiting cost-exchange asymmetry. This framing is analytically productive but theoretically incomplete.

The Houthi Red Sea campaign provides the most extensively documented empirical illustration of the distinction this paper draws. From October 2023 onwards, Houthi Ansar Allah forces employed Samad-3 loitering munitions, Quds-1 cruise missiles, and Burkan-2H ballistic missiles in coordinated multi-axis salvos against US Navy Aegis destroyers, commercial shipping, and carrier battle groups. CSIS (2024) documented that the United States Carney alone expended over United States Dollars (USD) 2 million in SM-2 and SM-6 interceptors during single engagements against Houthi UAS valued at USD 20,000–50,000 per unit — a cost-exchange ratio of between 40:1 and 100:1 in the attacker's favour. The United States of America Department of Defense confirmed publicly that the operational tempo of Houthi attacks was straining interceptor inventories and creating financially unsustainable cost-exchange dynamics (CSIS, 2024). The 2019 Abqaiq-Khuras attack on Saudi Aramco infrastructure — coordinated by 18 drones and 7 cruise missiles at an estimated attack cost of USD 15 million, causing damage exceeding USD 500 million — provides an independently verified earlier data point, with the cost-exchange ratio exceeding 1:33 (Watling & Reynolds, 2023).

What distinguishes these empirical cases from mere tactical improvisation is the architectural substrate that sustains them. Monnappa (2026), building on RAND Corporation analysis of distributed kill chains identifies that the Houthi operational capability is not simply a stockpile of low-cost weapons; it is an organisational architecture designed for resilience under attrition (O'Donoughue et al., 2021). The same logic applies, at greater institutional depth, to Iran's DMD. Formalised under Iran Revolutionary Guard Corps (IRGC) and operationalised through the reorganisation of the IRGC into 31 independent provincial commands , each constituted as a self-sustaining military entity with its own arsenal, intelligence apparatus, and command chain, the DMD provides the structural substrate without which saturation's strategic effectiveness cannot be sustained (Monnappa , 2026). Succession planning embedded three to seven echelons deep eliminates the single point of failure that decapitation doctrine is designed to exploit. The Basij militia's integration transforms the mosaic from a military structure into a societal one. This analysis generates the three-level framework that structures the paper's theoretical architecture (Table 1). The framework explicitly incorporates the Houthi campaign as an empirically verified operational instantiation of Levels II and III.

Table 1
Three-Level Framework of the Saturation-Mosaic Doctrine with Empirical Illustrations

Level	Category	Defining Characteristic	Strategic Function
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I	Strategic Architecture (DMD)	31 provincial nodes; pre-authorised mandates; 3–7 echelon succession; Basij socialisation	Structural indestructibility; elimination of single points of failure
II	Operational Doctrine (Saturation Warfare)	High-volume, multi-layer, cost-asymmetric simultaneous salvo operations	Interceptor exhaustion across full defensive stack; cost-exchange imposition
III	Tactical Execution (Shahed Ecosystem)	Shahed-136/131, Arash-2, Fateh-110, Zolfaghar; Houthi analogues: Samad-3, Quds-1	Delivery of volumetric strike effects within mosaic operational architecture

Source: Author's conceptual framework, developed from O'Donoghue et al. (2021), Monnappa (2026), CSIS (2024), and Watling & Reynolds (2023).

The critical analytical implication of this framework is directional: Level I architecturally enables and sustains Level II, and Level II operationalises through Level III. Saturation divorced from the mosaic architecture is a tactical option bounded by stockpile finiteness — as illustrated by the Hudson Institute's (2026) documentation of a 70–85% salvo decline during Operation Epic Fury following production facility suppression. Saturation embedded within the mosaic, however, is a strategic posture capable of sustaining operations through leadership elimination and communications blackout. The empirical comparison of the three cases is presented in Table 2.

Table 2
Comparative Empirical Evidence of the Saturation-Mosaic Paradigm

Case	Period	Saturation Mechanism	Cost-Exchange Evidence
Houthi Red Sea Campaign	2023–2026	Samad-3 UAVs, Quds-1 cruise missiles, Burkan ballistic missiles vs US Navy Aegis destroyers and carrier battle groups	USS Carney expended \$2M+ in SM-2/SM-6 interceptors against \$20,000–\$50,000 Houthi UAVs in single engagements; Pentagon confirmed cost-exchange unsustainability (CSIS, 2024)
IRGC/Houthi Proxy Operations	2019–2026	Multi-axis simultaneous salvo attacks on Saudi Aramco (Abqaiq-Khuraib, 2019); 18 drones + 7 cruise missiles; subsequent Red Sea escalation	Saudi Patriot batteries exhausted; attack cost ~\$15M; damage exceeded \$500M. Ratio 1:33+ in attacker's favour (Watling & Reynolds, 2023)
Iran Operations Epic Fury/True Promise	Feb–Mar 2026	Multi-domain coordinated strikes across 17 regional states following decapitation attempt; demonstrated post-leadership continuity	Salvo decline of 70–85% documented after facility suppression, yet operations sustained through distributed DMD architecture (Hudson Institute, 2026)

Source: CSIS (2024); Watling & Reynolds (2023); Hudson Institute (2026); IISS (2024).

4.1.2 African Defence Capability Trap: Structural Anatomy

The African Defence Capability Trap is conceptualised as a structural condition in which the institutional, fiscal, and governance deficits of Sub-Saharan African military establishments create a self-reinforcing cycle that prevents effective capability development and doctrinal modernisation, irrespective of strategic imperative. The ADCT is characterised by four intersecting structural elements drawn from theoretical constructs developed in prior scholarship on institutional performance management in the DFZ (Daka, 2025a, 2025b).

The first element is the CIG. This is the gradient of difficulty between the formal articulation of strategic policy and the operational execution of that policy. The African Union's Agenda 2063 aspiration for a collectively capable African Standby Force coexists with documented structural deficits in force readiness, logistics sustainability, and command interoperability (AUC, 2015). The CIG is not merely a resource problem; it is an institutional governance problem in which mechanisms for translating policy intent into operational capacity are systemically weak.

The second element is the PEG. This is the temporal and qualitative distance between force development planning cycles and operational delivery. African defence procurement cycles are characterised by extended acquisition timelines, contract irregularities, technical absorption failures, and sustainment deficits (Omach, 2010; Lotze & Kasumba, 2020). The doctrinal innovation of the Houthi campaign and the 2026 conflict represents a tempo of change that African planning cycles, operating on five-to-ten-year force development horizons, are constitutively unable to match through conventional acquisition pathways.

The third element is compromised Resource Sovereignty. This is the condition in which external dependency, donor conditionality, equipment tied-aid, training programme alignment with external military doctrine, and imported sustainment chains, distorts procurement priorities and doctrinal orientation away from indigenously determined strategic requirements. Resource Sovereignty does not posit autarky as a strategic ideal; it identifies the threshold below which external dependency compromises the institutional autonomy required for effective doctrinal innovation (Daka, 2025a).

The fourth element is the fiscal constraint that provides the quantitative baseline for the trap's operation. SIPRI (2024) data indicates that the median defence expenditure among Sub-Saharan African states was 1.2% of Gross Domestic Product (GDP) in 2023, against a global median of 2.2%. Of the 49 Sub-Saharan states, fewer than eight maintain dedicated surface-to-air missile systems with genuine layered defence capability (SIPRI, 2024; IISS, 2024). The per-unit cost of a Patriot PAC-3 battery (\$1.1 billion) exceeds the entire annual defence budget of 38 Sub-Saharan African states (IISS, 2024). The entire African Union's combined Sub-Saharan defence expenditure in 2023 (\$15.8 billion) would finance fewer than 15 Patriot PAC-3 batteries. This is insufficient to provide layered defence coverage for even two major Sub-Saharan African capitals simultaneously (SIPRI, 2024; IISS, 2024).

4.1.3 Impossibility of Conventional Counter-Saturation in the African Context

The cost-exchange dynamics documented in the Houthi Red Sea campaign, where the most advanced naval air defence systems in the world confronted economically unsustainable cost-exchange ratios against USD 20,000–50,000 Houthi UAS, operate as a structural impossibility multiplier in the African context. If the United States Navy, operating with an annual defence budget exceeding USD 850 billion, publicly acknowledged the financial unsustainability of its interceptor expenditure against Houthi salvos (CSIS, 2024), then African states with median GDP per capita below USD 2,000 face not merely an unfavourable cost exchange but a mathematically unintelligible one.

The fiscal impossibility is compounded by the institutional dimension. Effective counter-saturation through layered missile defence requires a fully functional integrated air operations centre, calibrated sensor fusion across multiple radar systems, sustainment infrastructure for high-complexity interceptor systems, and trained technical personnel whose development requires decade-long investment timelines. Each of these requirements interacts adversely with all four elements of the ADCT: the CIG prevents institutional integration of complex sensor fusion systems; the Planning-Execution Gap ensures that trained technical cadres are chronically under-resourced; compromised Resource Sovereignty embeds technical dependency into the sustainment chain; and fiscal constraints ensure that per-unit costs of even degraded conventional solutions remain prohibitive. This analysis yields a counterintuitive finding: the conventional doctrinal response to the saturation-mosaic challenge is more inaccessible to African military establishments than the unconventional doctrinal insight it is designed to counter.

4.1.4 Paradox of Accessibility: Mosaic Principles in the African Strategic Context

The three-level framework established in Section 4.1 has a transformative implication for African military establishments: the Mosaic Defence's core organisational insight is not platform-dependent. Both the Houthi campaign and the Iranian DMD achieve their strategic effectiveness through organisational architecture, the distribution of command authority, operational capacity, and sustainment systems across autonomous nodes, rather than expensive technology.

Several structural features of Sub-Saharan African military environments are congruent with mosaic principles. First, geographic determinism: the vast, territorially complex environments of Central African states, the Congo Basin, the Sahel littoral, and the East African Rift, provide the natural compartmentalisation and operational depth that Yemen's terrain provides for Houthi dispersal and Iran's Zagros Mountains provide for its provincial commands. Second, the deep civil-military integration characteristic of many African defence establishments mirrors the Basij socialisation mechanism in Iran and the community-embedded operational networks of the Houthis. Third, the pre-authorised operational mandate structure that enables both the Houthi campaign and the DMD to function after command disruption is not a technological capability; it is a doctrinal and procedural design choice. Mission command doctrine, as adapted across African military establishments in their peacekeeping operations contexts (Williams, 2018; KAIPTC, 2020), already provides the intellectual and procedural architecture for decentralised, pre-authorised operational action.

These congruences do not suggest doctrinal replication. The Basij's ideological architecture is not replicable in Africa's pluralist, multi-confessional security environments. The IRGC's provincial command structure required twelve years of deliberate institutional engineering. The AADAF is premised on adaptation of the mosaic's core organisational insight, distributed resilience as a substitute for technological superiority, to the specific institutional, geographic, and political conditions of Sub-Saharan African states.

4.1.5 African Asymmetric Doctrinal Adaptation Framework

The African Asymmetric Doctrinal Adaptation Framework integrates the three-level saturation-mosaic analytical architecture with the structural analysis of the ADCT to generate a contextually appropriate model for Sub-Saharan African military doctrinal modernisation. The framework operates across three strategic dimensions with measurable implementation actions (Table 3).

Table 3
African Asymmetric Doctrinal Adaptation Framework (AADAF)

AADAF Dimension	Core Principle	ADCT Element Addressed	Measurable Implementation Action
Structural Resilience by Design	Distributed command architecture; pre-authorised mandates; territorial force alignment	CIG; Planning-Execution Gap	Establish battalion-level autonomous command nodes in each of sub-Saharan State provinces within three to four year; codify pre-authorised operational mandates in standing orders within 18 months
Cost-Asymmetric Deterrence	Attributable mass; cost-exchange imposition; dual-use civilian technology	Fiscal constraint; Resource Sovereignty	Establish a Rapid Prototyping Fund at 2% of annual procurement budget for Commercial -off-the Shelf (COTS) Unmanned Aerial Vehicles (UAV) testing; pilot dual-use agricultural drone programme in some provinces within 12 months
Resource Sovereignty Recovery	Indigenously determined doctrine; diversified partnerships; scholar-practitioner investment	Compromised Resource Sovereignty; CIG	Diversify procurement to minimum 3 supplier nations within 5 years; introduce mandatory 2-credit asymmetric warfare module at their Defense Universities

Source: Author's conceptual framework. ADCT = African Defence Capability Trap; CIG = Critical Implementation Gradient; COTS = Commercial Off-the-Shelf.

The first dimension is Structural Resilience by Design. African military establishments should adopt the mosaic's Level I architectural principle, distribution of command authority and operational capacity across autonomous geographic nodes, as the foundational design logic for force structure modernisation. For example, Zambia, with its ten administrative provinces each bordered by at least one neighbouring state, this translates into the establishment of ten autonomous provincial command nodes, each with pre-authorised operational mandates and embedded succession planning. This dimension directly addresses the CIG by providing a simpler, more replicable implementation model than conventional force integration requirements.

The second dimension is Cost-Asymmetric Deterrence Capability. While African states cannot finance layered missile defence, the salvo mathematics of saturation warfare operate symmetrically: a USD 30,000 indigenously produced loitering munition launched against an adversary's USD 3 million asset generates the same 100:1 cost-exchange ratio documented in the Houthis campaign. African military establishments with even modest defence industrial capacity (Ethiopia, South Africa, Nigeria, and Kenya) can develop or procure low-cost, high-volume attributable systems. The Zambia case specifically presents an opportunity: Zambia's emerging agricultural drone sector, which includes commercial UAV operators in the Copperbelt and Central provinces, represents a dual-use civilian technology ecosystem that can be progressively leveraged for surveillance and light deterrence functions. This requires agile procurement frameworks, specifically, a Rapid Prototyping Fund capped at 2% of annual procurement budget earmarked exclusively for Commercial Off-the-Shelf Unmanned Aerial Systems testing. This bypasses the five-year acquisition cycle that constitutes the Planning-Execution Gap.

The third dimension is Resource Sovereignty Recovery. The AADAF's long-term viability requires progressive recovery of institutional autonomy for indigenously determined doctrinal innovation. The Southern Africa Development Community Regional Peacekeeping Training Centre (SADC RPTC), in which Zambia participates, offers an existing institutional mechanism for multilateral asymmetric doctrine development without exclusive reliance on Western-aligned training frameworks.

4.1.6 Empirical Application: The Defence Force of Zambia as Reference Case

The DSZ provides a concrete empirical illustration of how all three AADAF dimensions apply in a specific national context. Zambia's 2023 defence expenditure was approximately USD 231 million, representing 1.4% of GDP (SIPRI, 2024), above the Sub-Saharan median of 1.2% but well below the global median of 2.2%. This places Zambia's entire annual defence budget at approximately 21% of the cost of a single Patriot PAC-3 battery, confirming the mathematical inaccessibility of the conventional counter-saturation response.

Zambia's geographic profile is, however, structurally congruent with mosaic principles in ways that other African states are not. As a landlocked state bordering eight countries, Angola, the Democratic Republic of Congo, Tanzania, Malawi, Mozambique, Zimbabwe, Botswana, and Namibia, Zambia's security environment is characterised

by the requirement for distributed, autonomous territorial defence across vast operational spaces. The Zambezi Basin, the Luangwa Valley, and the Copperbelt's industrial corridor provide the kind of geographic compartmentalisation that the Iranian DMD weaponises through its provincial command architecture. The DFZ's existing territorial force structure provides an institutional scaffold for the provincial command reorganisation that Dimension 1 of the AADAF prescribes.

On the Cost-Asymmetric Deterrence dimension, Zambia's agricultural drone sector is nascent but present. Commercial UAS operators are active in the Copperbelt (crop monitoring) and Central (livestock surveillance) provinces. The Planning-Execution Gap in the DSZ's procurement history - demonstrated in Daka's (2025a) analysis of systematic performance management failures in the DSZ - makes the agile Rapid Prototyping Fund approach proposed in Table 3 specifically applicable: by ring-fencing 2% of the annual procurement budget from the standard acquisition cycle, the DSZ could test, evaluate, and progressively operationalise COTS UAS platforms within a 12-month cycle rather than the 5–10 year horizon that conventional procurement imposes.

On Resource Sovereignty Recovery, Zambia's defence procurement patterns have historically exhibited high dependency on Western-aligned suppliers and training frameworks (IISS, 2024). The Zambia Defence University — currently in its establishment phase—may provide the institutional mechanism for indigenous doctrine development that this dimension requires. The introduction of a mandatory 2-credit module on Asymmetric and Mosaic Doctrines for all field officers' command courses by the 2027 academic year would embed scholar-practitioner capacity at the precise career stage where operational doctrine is most actively shaped.

V. CONCLUSIONS & RECOMMENDATIONS

5.1 Conclusions

This paper has advanced three arguments in response to its guiding research questions. In answer to RQ1, it has established, grounded in the empirically verified Houthi Red Sea campaign and the 2019 Abqaiq-Khuraib attack, that saturation warfare and the Mosaic Defence doctrine operate at distinct analytical levels and that this distinction reframes the doctrinal challenge: what must be countered or adapted is not primarily a weapons system but organisational design logic. In answer to RQ2, it has demonstrated that the conventional counter-saturation response is structurally inaccessible to Sub-Saharan African military establishments, with Zambia's case illustrating that the entire national defence budget represents 21% of the cost of a single defensive battery unit. In answer to RQ3, it has proposed the AADAF with three strategically grounded, measurable dimensions that leverage the paradoxical accessibility of the mosaic's organisational insight to African contexts.

The validated saturation-mosaic paradigm is not merely a Middle Eastern strategic phenomenon; it is a global doctrinal inflection point. African military establishments that engage with its implications thoughtfully, distinguishing the tactic from the doctrine, assessing structural constraints honestly, and pursuing asymmetric adaptation rather than conventional replication, will be better positioned to navigate the emerging landscape of distributed, attritable, cost-asymmetric warfare. The AADAF identifies the path; traversing it requires the institutional will to depart from the conventional doctrinal door.

5.2 Recommendations

Based on the analysis presented, the following recommendations are advanced for Sub-Saharan African military establishments, defence ministries, and the African Union Peace and Security Architecture: African Union member states may commission a dedicated doctrinal review panel, drawing on retired senior officers, academic defence scholars, and operational commanders, to systematically analyse the doctrinal implications of the saturation-mosaic paradigm for African security contexts, producing a publicly available African Asymmetric Defence Doctrine Concept Paper within twenty-four months of commissioning.

National defence establishments ought to initiate structural reviews of force architecture with explicit consideration of decentralised command models pre-authorised operational mandates, and territorial force alignment with provincial administrative geography. Specifically, Zambia should establish battalion-level autonomous command nodes in each of its ten provinces, with codified pre-authorised operational mandates in standing orders, within an 18-month planning horizon.

Defence acquisition agencies may establish a Rapid Prototyping Fund capped at 2% of the annual procurement budget, exclusively earmarked for COTS UAV and sensor system testing, with acquisition decisions required within 12 months of procurement initiation, thereby bypassing the standard five-year acquisition cycle that constitutes the Planning-Execution Gap. The SADC Regional Peacekeeping Training Centre and the Kofi Annan International Peacekeeping Training Centre may develop dedicated training modules on asymmetric doctrinal adaptation within the saturation-mosaic analytical framework, with pilot delivery by end-2027, ensuring that regional peacekeeping capacity is informed by the doctrinal innovations demonstrated in verified operational campaigns.



Declaration of Interest

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