Deterrence by Assets: How UAV Localization Under Saudi Vision 2030 Reshapes Gulf Security Architecture.

Abstract. This paper argues that Saudi UAV localization under Vision 2030 is likely to alter Gulf security architecture by shifting deterrence from alliance dependence toward asset-based resilience, industrial autonomy, and procurement adaptability. The study addresses a research gap in strategic studies and defense industrial policy: existing scholarship has examined Gulf alliance politics, UAV proliferation, and military innovation separately, but has less often connected them to localized production, reverse-engineering, and the economics of interception depletion. Using qualitative policy analysis, conceptual synthesis, and comparative strategic studies, the paper traces how the localization agenda may strengthen Saudi strategic control over supply chains, training, maintenance, and doctrinal adaptation. The analysis develops a detailed case study of the U.S. military's reported reverse-engineering of Iranian-derived UAVs, including Task Force Scorpion and the LUKAS system, to illustrate how battlefield learning can accelerate counter-UAV innovation and reshape procurement incentives. The principal finding is that deterrence by assets is not a substitute for alliances, but it can reduce vulnerability to coercion and increase bargaining leverage within a more multipolar Gulf order. Policy implications include deeper local industrial capability, stronger test-and-evaluation institutions, and calibrated cooperation with Western and Asian partners.

Keywords. *Saudi Vision 2030; UAV localization; Gulf security; deterrence by assets; defense industrial policy; reverse engineering; strategic studies*

1. Introduction

For much of the modern Gulf era, security was organized through an outsourced paradigm in which local monarchies delegated the burden of external defense to extra-regional patrons, most notably the United States and, in parallel, European partners. This arrangement produced a durable but uneven equilibrium: it helped contain conventional threats, yet it also embedded dependence in the domains of airpower, intelligence, logistics, spares, and high-end munitions. Saudi Arabia, as the largest Gulf military market, benefited from access to advanced platforms while remaining exposed to embargoes, technology denial, and political conditionality.

Shifting alliances and regional fragmentation have made that vulnerability more visible. The gradual diversification of Saudi foreign relations, the recalibration of U.S. commitments, and the growth of Chinese economic and technological engagement have together encouraged a broader debate over autonomy. In this context, Vision 2030 is not merely an economic program; it is also a strategic state-building project.

Autonomous and semi-autonomous warfare further compresses the gap between major powers and regional actors. Commercial components, software-defined control systems, and modular airframes make

UAV ecosystems unusually amenable to diffusion, adaptation, and reverse engineering. Saudi localization therefore carries significance beyond industrial policy. It may help reshape deterrence by creating assets that are politically harder to withhold, operationally easier to sustain, and strategically more credible in a contest marked by attrition, saturation, and information asymmetry.

2. Methodology

This paper uses a qualitative policy-analysis approach combined with conceptual synthesis to examine how Saudi Arabia's UAV localisation agenda under Vision 2030 may affect Gulf security architecture. The study draws on official Saudi policy documents, defence-industrial reports, strategic studies literature, and recent open-source reporting on UAV warfare, counter-UAV adaptation, and the economics of air-defence depletion.

The analysis is structured around three linked dimensions. First, it examines **industrial localisation** as a mechanism for reducing external dependency in defence procurement, sustainment, maintenance, and platform adaptation. Second, it applies **deterrence theory** to assess how locally controlled and replenishable UAV assets may strengthen Saudi resilience against coercion, saturation attacks, and supply-chain disruption. Third, it considers the **economics of attrition**, particularly the cost imbalance between low-cost loitering munitions and expensive air-defence interceptors.

The paper does not seek to provide a quantitative measurement of Saudi UAV production capacity or classified military capability. Instead, it develops a policy-oriented analytical framework based on publicly available sources and comparative strategic reasoning. This approach is appropriate because UAV localisation remains an emerging and partially opaque policy area, where official industrial targets, open-source battlefield lessons, and strategic theory must be interpreted together.

The case study of Iranian-derived UAV systems and the reported development of low-cost countervailing platforms is used to illustrate how battlefield learning, reverse engineering, and cost-driven procurement are reshaping modern military innovation. By linking this case to Saudi Vision 2030, the paper evaluates UAV localisation not only as an industrial-diversification objective, but as a potential foundation for asset-based deterrence in a more contested and multipolar Gulf security order.

3. UAV Localization as a Security-Industrial Strategy

The localization of unmanned aerial vehicle production under Saudi Vision 2030 is best understood not as a narrow procurement preference, but as a security-industrial strategy that links defense, innovation, labor-market transformation, and foreign-policy autonomy. The policy logic is fundamentally deterrent: by embedding unmanned systems design, assembly, testing, sustainment, and upgrade cycles inside national industrial ecosystems, the state reduces the vulnerability created by external chokepoints while increasing the credibility of retaliatory and denial capabilities. In the Gulf, where geography compresses infrastructure, where critical assets are highly concentrated, and where escalation can proceed through indirect proxy channels, the capacity to build, field, and replenish UAV systems domestically has exceptional strategic value. Localization lowers time-to-repair, shortens feedback loops between battlefield observation and engineering modification, and reduces the exposure of national security to sanctions, export controls, and supply interruptions. More importantly, it changes the political economy of coercion by shifting the marginal cost of adaptation away from external vendors and onto domestic institutions that can be aligned with sovereign priorities.

Saudi Vision 2030 explicitly ties industrial diversification to state resilience. In defense, resilience is not merely an economic category; it is an operational one. A country that imports a platform imports its maintenance timetable, its component obsolescence risks, and often its strategic hesitations. By contrast, a country that localizes the UAV value chain can iterate quickly in response to adversary adaptation. The central insight is that drones are a dual-use technology with unusually low entry barriers relative to manned aircraft. Their airframes, avionics, propulsion, communications, payload integration, and software stacks can be decomposed into modular industrial tasks that are amenable to localization at different levels of complexity. A state may begin with final assembly and graduate toward composite fabrication, control-system integration, mission-planning software, or engine maintenance, all while preserving a strategic pathway toward deeper autonomy. In this sense, localization is cumulative: each local capability increases the probability of acquiring adjacent capabilities through learning-by-doing, supplier development, reverse engineering, and systems integration.

The Saudi case is distinctive because localization is pursued alongside a broader transformation of governance. The state is attempting to institutionalize defense industrial policy through a networked ecosystem involving sovereign funds, state-owned firms, regulatory authorities, universities, and procurement agencies. The point is not autarky in a literal sense; it is strategic partial independence. Modern defense systems cannot be fully domestic in a globalized technological order, but the state can choose which dependencies to retain and which to eliminate. A mature localization program identifies the most strategically sensitive layers—software-defined flight control, secure datalinks, sensor fusion, mission payloads, and production tooling—and seeks national or allied control over them. It also hedges against supply shocks by cultivating multiple sourcing pathways and by keeping production knowledge within national jurisdiction. This is especially important for UAVs because the platform's low cost and high consumption rate in conflict create a demand structure unlike that of legacy fighters or tank fleets. Drones can be expended in large numbers, making sustainment capacity a decisive variable of warfighting endurance.

From a deterrence perspective, localization enhances both punishment and denial. Denial improves because air-defense systems, surveillance architectures, and strike platforms become more readily available and more rapidly replaceable. Punishment improves because localized production increases the credibility that Saudi forces can absorb a first strike, repair damage, and continue operating. This is relevant in a region where adversaries may calculate that limited attacks on energy infrastructure, airports, desalination plants, and command nodes can induce political pressure without crossing thresholds that trigger large-scale retaliation. If the defending state can immediately replace UAV losses, redeploy sensor networks, and reconstitute strike packages, then the attacker's expectation of achieving cheap coercive success diminishes. Localization therefore functions as a deterrence multiplier by reducing the perceived fragility of national defenses.

The industrial policy dimension should not obscure the technical one. UAV localization depends on the maturation of supporting sectors: electronics assembly, navigation systems, communications security, propulsion maintenance, materials science, and quality assurance. Each of these sectors generates spillovers into civilian manufacturing. Precision machining and composite fabrication assist aerospace and automotive industries; embedded software development supports telecommunications and industrial automation; supply-chain digitization strengthens logistics and predictive maintenance. Vision 2030's defense agenda thus serves a wider modernization project. But the strategic emphasis remains on reducing dependence on foreign military suppliers whose export licenses can be delayed, politicized, or conditioned. In times of crisis, an imported fleet is vulnerable not only to kinetic destruction but to administrative friction. Localization is, in part, a hedge against bureaucratic coercion from abroad.

There is also a doctrinal advantage. Domestic production allows the Saudi military to adapt platforms to its own operating environment: long-range desert patrol, maritime surveillance along the Red Sea and Gulf, border monitoring, and protection of dispersed energy infrastructure. Foreign-supplied UAVs are often optimized for generic export markets; localized systems can be tailored to the specific threat ecology of the Arabian Peninsula. This includes higher tolerance for heat and dust, extended loiter times over large uninhabited sectors, encrypted communications suited to contested electromagnetic environments, and payload configurations aligned to local intelligence requirements. The localization program thereby links operational geography to industrial design. The result is not only a sovereign industrial base but a sovereign concept of operations.

Equally significant is the role of localization in alliance management. Rather than severing external partnerships, Saudi policy seeks to improve bargaining power with suppliers and partners by establishing a credible domestic alternative. This changes the structure of interdependence. A buyer with no domestic industrial base is a price taker; a buyer with local capabilities is a co-developer or co-producer. That distinction matters in a region where great-power competition intersects with intra-Gulf rivalry and where technology transfer can be a source of leverage. In practical terms, localization enables Saudi Arabia to negotiate offset arrangements, local content thresholds, intellectual property access, and training packages from a position of greater strength. It also permits selective cooperation with non-Western suppliers, including Chinese firms, without fully exposing the national security architecture to any single foreign source.

The deeper strategic implication is that UAV localization converts defense from a consuming function into a productive one. The state no longer only buys security; it manufactures it. That shift matters because deterrence is ultimately about credibility over time. A state that can produce, repair, and improve assets under duress demonstrates strategic stamina. In the Gulf, where adversaries may seek to exploit short windows of surprise, stamina is itself a form of deterrence. Localization under Vision 2030 therefore reshapes the strategic environment not simply by adding more drones to the inventory, but by transforming the industrial foundations on which regional military power rests.

3.1 From Import Dependence to Adaptive Sovereignty

The movement from import dependence to adaptive sovereignty is central to understanding Saudi localization. Adaptive sovereignty does not require full self-sufficiency; it requires the ability to reconfigure supply chains, substitute components, and maintain mission readiness under stress. UAVs are an ideal domain for this approach because their architectures are layered. Airframes can be manufactured locally even if certain chips are imported; propulsion systems can be assembled domestically even if some specialized bearings or sensors are foreign; software can be written at home even if radio modules are sourced internationally. The strategic object is not to sever all foreign inputs, but to ensure that no single external actor can paralyze the system. This is especially important in an era of sanctions, export-control tightening, and technology decoupling.

Adaptive sovereignty also creates a learning state. As engineers localize subsystems, they acquire tacit knowledge that is difficult to import as a finished package. This knowledge accumulates in testing protocols, failure analysis, and iterative refinement. For military organizations, that learning is crucial because it shortens the cycle between intelligence collection, platform adaptation, and field deployment. A localized UAV ecosystem can respond to adversary electronic warfare, adjust payload design, and improve endurance more rapidly than a purely imported fleet. Thus, the industrial policy is inseparable from the operational policy.

3.2 Saudi Vision 2030 and the Defense Innovation Ecosystem

Vision 2030 treats defense as a driver of broader economic transformation. The localization of UAV technologies stimulates research universities, vocational training, and private-sector participation while building a resilient military supply base. The architecture is deliberately ecosystemic: regulators set content requirements, state-owned enterprises anchor demand, and private contractors and SMEs fill manufacturing niches. The policy is not merely about assembling aircraft; it is about creating a domestic innovation pipeline. The most consequential effect is the establishment of a defense-industrial learning curve in which each produced unit lowers the cost of subsequent units while increasing local expertise. Over time, this can generate scale economies, export potential, and bargaining power in international collaborations.

3.3 The 2026 Iran-American conflict, Drone Swarms, and the Lessons of Air-Defense Depletion

The 2026 Iran-American conflict must be treated in this paper as a defining strategic episode because it revealed, with unusual clarity, how drone swarms and massed loitering munitions can exhaust even sophisticated air-defense architectures. The conflict demonstrated that modern air defense is not defeated solely by stealth or speed, but by saturation, ambiguity, and cost imposition. As Iranian forces and aligned partners employed large numbers of low-cost drones, cruise-like improvised systems, and mixed salvoes designed to complicate target discrimination, Western and regional defenders encountered a classic depletion problem: each interceptor fired against a cheap inbound asset represented an exchange ratio that, when aggregated across many engagements, favored the attacker. The point was not that every drone penetrated defenses; rather, it was that enough drones, at enough moments, forced defenders to spend premium munitions, activate expensive radar cycles, and accept the risk of leakage. The strategic lesson for Gulf planners is profound: air-defense depth is no longer measured only by sensor quality or missile range, but by economic endurance under repeated saturation.

The war underscored that drone swarms are valuable not because they are individually decisive, but because they create a pacing problem for defenders. When a salvo arrives in mixed formations—decoys, jammers, loitering munitions, reconnaissance drones, and one-way attack platforms—the defender must classify, prioritize, and engage under compressed decision time. Even advanced command-and-control systems struggle when the number of tracks exceeds the number of available interceptors, the reload rate of launchers, or the human capacity to validate targets. In such a context, the attacker is not trying to win every exchange; it is trying to force the defender into a pattern of overreaction. The 2026 conflict revealed that a defender can appear tactically successful while still being strategically depleted. That is because the relevant metric is not simply the percentage of drones destroyed, but the sustainability of the defensive expenditure curve over days and weeks of high-intensity attack.

For Saudi Arabia, this lesson is directly applicable. Gulf critical infrastructure is highly exposed, and the region’s air-defense systems have historically been optimized for ballistic missiles, aircraft, and limited cruise threats. Drone swarms change the threat hierarchy by shifting emphasis toward low-altitude, low-signature, and high-volume attacks. A localized UAV sector under Vision 2030 enables Saudi planners to respond by distributing counter-swarm capabilities across multiple layers: short-range guns, directed-energy prototypes, electronic attack, sensor fusion, passive detection, and their own mass-produced UAV assets for scouting and interception. In other words, the appropriate response to massed cheap drones is not only more expensive missiles, but a richer, cheaper, and more distributed defense architecture. Localization matters because the defender must be able to absorb, replace, and adapt faster than the attacker can refine its mass tactics.

The 2026 conflict also showed the importance of production tempo. In a prolonged conflict, the side that can regenerate UAVs faster gains an operational advantage. Swarm warfare is a logistics contest disguised as a tactical contest. Mass production of low-cost aerial vehicles, especially if supported by commercial supply chains, creates a reservoir of expendable platforms that can be committed to reconnaissance, electronic probing, decoy roles, and attritional attack. Defenders that rely on scarce interceptors face an unfavorable exchange ratio unless they can field equally low-cost countermeasures. This suggests a doctrinal imperative for Saudi Arabia: build an industrial base capable not only of producing offensive UAVs but of sustaining a high-volume air-defense environment. Localization thus becomes a hedge against the depletion strategy revealed in the war.

Another lesson is that swarm warfare redefines escalation management. When adversaries can launch small, deniable, and geographically dispersed UAV attacks, the threshold between harassment and war blurs. The 2026 conflict indicated that the cumulative effect of many small attacks can be strategically comparable to a few large strikes. This creates ambiguity in response planning. States must decide whether to retaliate to each individual event or to wait for a pattern. Such ambiguity favors the side that can generate persistent pressure at low cost. Saudi policy, therefore, must prioritize persistent surveillance, early warning, attribution mechanisms, and rapid repair. Localization aids all four by enabling customized sensors, regional maintenance nodes, and locally governed data links. The state that can see the swarm earlier and fix damage sooner will be less vulnerable to coercion.

The conflict further highlighted the geopolitical dangers of import dependence in high-intensity conflict. Defenders dependent on imported interceptors, replacement radars, or foreign technical support discovered that supply constraints could emerge precisely when need was greatest. Delays in resupply, negotiation over emergency transfers, and the uncertainty of allied political will all contributed to the sense that technological superiority does not guarantee operational resilience. For Saudi Arabia, which seeks to avoid strategic surprise in a volatile environment, the lesson is to localize the parts of the defense architecture most likely to be consumed in volume. UAV manufacturing, sensor integration, and maintenance capacity are therefore not adjuncts to deterrence; they are the core of a depletion-resistant strategy.

At a deeper theoretical level, the 2026 conflict validated the economic logic of asymmetry. A state or non-state actor that can force a technologically superior adversary to spend disproportionate sums on defense can influence battlefield outcomes without matching the adversary platform-for-platform. This is not a new principle, but drones make it dramatically more scalable. The same logic that once applied to anti-ship missiles and improvised explosive devices now applies to aerial systems. The implication is that strategic stability in the Gulf cannot rest on the assumption that expensive Western defenses automatically neutralize cheap regional threats. Instead, stability depends on the ability to deny attackers the cost advantage of swarm tactics. Saudi localization is therefore a form of counter-asymmetric adaptation: it produces the means to deny the attacker the economy of force that made drone swarms attractive in the first place.

4. Theoretical Framework: Deterrence by Assets and the Economics of Attrition

Deterrence by assets refers to the proposition that the credibility of coercion prevention is enhanced when a state possesses visible, replenishable, and locally controlled military assets whose production and sustainment are not hostage to foreign vetoes. In the case of UAVs, assets matter because they are both instruments and symbols. They are instruments because they conduct surveillance, strike, and electronic warfare; they are symbols because their local manufacture signals sovereign capacity. Classical deterrence theory emphasizes punishment and denial. Localization strengthens both by ensuring that capability exists not only on paper but in an industrial ecosystem capable of replacing losses. For a region like the Gulf, where defense competition is shaped by rapid technological diffusion and changing supply chains, deterrence by assets offers a more realistic model than static balance-of-power formulas.

The core theoretical move is to connect strategic effects to asset regeneration. A deterrent posture is credible only if the adversary believes the defender can absorb a blow and still continue to operate. Assets that can be manufactured locally, repaired locally, and upgraded locally are more than inventory; they are resilience infrastructure. In this sense, the economics of deterrence become inseparable from industrial organization. The state that controls the means of production of its military tools controls the rhythm of escalation. This is especially important for UAVs because they embody modularity, software updateability, and scalable production. As a result, the threshold for meaningful deterrence is lower than for legacy manned systems, but the importance of replenishment is higher.

4.1 The Cost Curve of Asymmetric Air Defense

Asymmetric air defense is shaped by a simple but severe cost curve. Cheap inbound drones can compel the use of expensive interceptors, manpower-intensive alert systems, and high-end radar emissions. When the attacker can choose the time, direction, and number of objects in the air, the defender’s fixed infrastructure is forced into repeated activation. The attacker’s costs may be measured in thousands or tens of thousands of dollars per platform; the defender’s response may involve missiles or sensors worth hundreds of thousands or millions. Over a prolonged campaign, this imbalance becomes strategically decisive. A localized Saudi UAV sector can partially flatten the curve by enabling lower-cost interceptors, loitering counter-UAVs, and layered detection systems.

4.2 Theoretical Economics of Using Cheap Loitering Munitions to Exhaust Expensive Western Air Defenses

The economic logic of cheap loitering munitions is among the most important developments in contemporary military affairs because it converts industrial asymmetry into operational leverage. The attacker does not need to defeat every layer of an air-defense network; it only needs to make each layer more expensive to use than the platform being defended against. Western air defenses are technologically sophisticated, but sophistication often comes with cost structure. High-performance interceptors, integrated radar networks, and command systems were designed in an era when threats were fewer, slower, and more expensive. Cheap loitering munitions exploit that legacy by forcing defenders to spend scarce premium resources on low-value targets. The resulting exchange ratio can be devastating. Even a modest attack campaign can produce strategic attrition if the defender repeatedly fires multi-hundred-thousand-dollar interceptors at drones that cost a tiny fraction of that amount.

The theoretical significance lies in marginal analysis. If the defender's marginal cost of each engagement exceeds the attacker's marginal cost of each launch, then the attacker can sustain pressure longer than the defender can sustain responses, assuming comparable industrial depth. In practice, the attacker's advantage is compounded by the ability to manufacture drones with commercial electronics, simple engines, and standardized parts. These platforms are not technologically impressive in the conventional sense; their power comes from their affordability, volume, and adaptability. They can be launched in clusters, sent on reconnaissance missions, used as decoys, or armed for terminal attack. Each role creates additional uncertainty for defenders, further increasing the cost of engagement. The central economic insight is that deterrence depends not only on the absolute lethality of a platform but on the cost imposed on the enemy per unit of uncertainty generated.

Western air-defense systems are optimized for high-value targets: aircraft, ballistic missiles, and cruise missiles. Loitering munitions blur these categories. They are slow enough to appear vulnerable, small enough to evade easy detection, and cheap enough that losses are tolerable. Because of this, the defender faces a sequencing problem. Should it use a costly missile immediately, wait for better classification, or risk a leak? Every option has cost. Attackers exploit this by designing salvos that mix target profiles, making the defender's decision tree more complex. Theoretical economics explains why this matters: complexity itself has a price. When the defender must spend more time, more fuel, more radar exposure, and more ordnance per target, the attacker's cheap unit acquires an outsized strategic effect. The ratio between asset cost and defensive cost becomes the battlefield metric that matters most.

For Saudi Arabia, the lesson is twofold. First, national defense must avoid over-reliance on expensive, scarce interceptors for a threat environment increasingly dominated by expendable aerial systems. Second, domestic industrial capacity should be directed toward low-cost countermeasures that can be produced in volume. This includes indigenous loitering munitions, electronic warfare tools, passive detection systems, and inexpensive interceptors designed around cost parity rather than exquisite performance. The ideal is to impose symmetrical or near-symmetrical economic pressure on the attacker. If an attacker must risk multiple drones to saturate a target, and if those drones can be intercepted by lower-cost systems whose production is domestically controlled, the economic appeal of offensive drone swarms declines. In that sense, localization does not merely add capacity; it changes the calculus of attack itself.

The broader economic theory also implicates supply chains. Cheap loitering munitions are often assembled from globally available parts, including commercial off-the-shelf components. Their resilience lies in substitutability. If one supplier is interrupted, another can replace it. This makes sanctions and export controls less effective than in legacy weapons categories. However, the same logic works in reverse for defenders. A state that localizes key components of its UAV ecosystem can reduce its vulnerability to supply shocks and use its own low-cost systems to impose attrition on opponents. The battlefield thus becomes a competition in industrial optionality. The side with more flexible manufacturing has the stronger deterrent because it can absorb shocks, replenish quickly, and alter production volumes in response to threat intensity.

There is also an opportunity cost dimension. Funds allocated to expensive interceptors cannot be used for other defense priorities such as cyber resilience, infrastructure hardening, or training. Cheap loitering munitions exploit this constraint by forcing defenders into a defensive spending treadmill. To escape the treadmill, Saudi policy must invest in a multi-layered architecture that includes cheap sensors, native production, and adaptive doctrine. The key is to ensure that each defensive layer is economically sustainable over long durations. This is why localization is more than a nationalist slogan; it is an economic response to a strategic price war.

5. Case Study: Reverse-Engineering the Shahed-136 and the LUKAS Program

The capture and reverse-engineering of the Iranian Shahed-136 by the United States became a landmark case in modern military innovation because it exposed the degree to which effective one-way attack drones can be assembled from comparatively mundane technologies. The resulting U.S. response, including efforts to build the Low-Cost Unmanned Combat Attack System, or LUKAS, under Task Force Scorpion, illustrates a paradigm shift in how militaries understand innovation, diffusion, and procurement. The significance of the case does not lie in any single component, but in the integration of lessons about cost, manufacturability, and battlefield utility. The Shahed-136 demonstrated that an aircraft need not be elegant to be dangerous. Its value derived from its ability to be produced cheaply, launched in numbers, and targeted toward high-value infrastructure. That combination made it a weapon of strategic relevance and an object of urgent reverse engineering.

At the engineering level, the most important lesson was that high-end military effect can be built on low-end, commercially accessible foundations. The Shahed-136's architecture revealed the strategic power of commercial off-the-shelf microchips, widely available navigation components, and simple internal combustion engines. None of these elements is inherently advanced, yet together they create a platform that is easy to manufacture, repair, and proliferate. For the United States, reverse engineering did not mean merely copying a foreign drone; it meant learning how to strip cost out of military design. The LUKAS program emerged from the recognition that future conflicts will require large inventories of disposable systems rather than a small number of exquisite platforms. This is especially relevant in Pacific and Middle Eastern theaters, where distances, air defense density, and attritional expectations are changing rapidly.

The engineering lesson about commercial chips is particularly consequential. Military designers have long preferred hardened, bespoke electronics, but the Shahed-136 showed that many operational functions can be achieved with commodity processors if the overall system is engineered for simplicity. The tradeoff is clear: commercial chips may be less resistant to sophisticated electronic attack or harsh environments, but they offer dramatic savings in cost and production speed. That tradeoff is acceptable when the platform is expected to be expended. Similarly, the use of a simple internal combustion engine, rather than a more refined propulsion solution, allows production at scale and maintenance with ordinary industrial skills. The drone's endurance is adequate for one-way attack profiles even if it lacks the sophistication of high-end airframes. The lesson for militaries is that effectiveness is contextual. If the mission is saturating air defenses, delivering a warhead, or forcing an enemy to expend interceptors, then cost-effective simplicity may outperform technical elegance.

The LUKAS program, as a response, should be read as an institutional adaptation to this reality. Task Force Scorpion's effort to develop a comparable low-cost attack system reflected a broader reorientation toward scalable mass. The United States, despite its advanced aerospace industrial base, recognized that it needed to study enemy drones not just as threats but as models of efficient production. This is a major intellectual shift. For decades, Western militaries often treated low-cost adversary platforms as crude anomalies; the Shahed-136 case proved that crudity can be a design virtue when it aligns with operational goals. Reverse engineering therefore became a tool of doctrine as much as technology. By dissecting the drone, American engineers and operators could infer how to design systems that are manufacturable in large numbers, tolerant of loss, and suitable for distributed deployment.

From a policy standpoint, the case has several implications for Saudi Arabia. First, localizing UAV production does not mean aspiring only to premium systems. It means learning to build a spectrum of platforms, including simple expendable ones. Second, the reverse-engineering experience suggests that innovation can be accelerated by studying adversary designs rather than relying exclusively on indigenous invention. Third, the boundary between military and civilian technology is increasingly porous. The same supply chains that produce consumer electronics can support combat drones if institutions know how to integrate them. Saudi Arabia's localization strategy can therefore benefit from a dual-use innovation model that draws on commercial electronics, industrial automation, and defense requirements simultaneously.

The case also illustrates the strategic paradox of proliferation. The simpler a weapon is to manufacture, the more difficult it is to monopolize. This undermines traditional assumptions about defense-industrial dominance. The reverse-engineering of Shahed-136 made clear that the future of air power may depend less on possession of the most advanced avionics and more on the ability to iterate on low-cost design at scale.

For Saudi planners, the implication is that a domestic UAV industry should be organized around modularity and mass producibility, not only around prestige platforms. If adversaries are willing to use disposable systems to impose attrition, then the defender must be able to respond in kind with indigenous systems that can be replenished quickly and modified locally. The LUKAS case thus stands as a paradigm shift: modern militaries must learn to value the economics of disposability as much as the glamour of sophistication.

6. Institutional Roles of GAMI and SAMI in Localizing UAV Technology

Saudi Arabia's defense-industrial localization depends on institutional architecture, not merely on political will. The General Authority for Military Industries (GAMI) and the Saudi Arabian Military Industries (SAMI) function as complementary pillars in this system. GAMI serves primarily as the regulator, policy architect, and strategic enabler. It shapes localization targets, licensing requirements, industrial standards, and investment coordination. SAMI, by contrast, serves as the execution arm, operating as an industrial champion that can absorb technology transfer, coordinate supply chains, and develop indigenous production capabilities. Together they form the governance mechanism through which Vision 2030 translates from aspiration into capacity. For UAV localization, the interaction of these institutions is especially important because drones sit at the intersection of military procurement, industrial development, and technology policy.

GAMI's first role is agenda setting. It defines what localization means in practice: local assembly, local parts sourcing, local engineering, local ownership, and local maintenance. These categories are not merely semantic. They determine whether a program produces sovereign capability or only superficial assembly. In UAV programs, this matters because critical value often resides in software, sensors, flight control algorithms, and test infrastructure. GAMI's challenge is to ensure that localization thresholds include these intangible but decisive dimensions. A country can assemble airframes while remaining strategically dependent if it lacks access to software updates, encryption standards, and mission integration know-how. Thus, GAMI's regulatory role includes pushing programs up the value chain from screwdriver assembly toward design participation and eventually original engineering.

SAMI's role is complementary but distinct. It must translate policy objectives into industrial performance. That means building or acquiring manufacturing competence, negotiating technology transfer, and creating relationships with suppliers, universities, and foreign partners. In UAV localization, SAMI can serve as the integrating entity that brings together propulsion technicians, avionics specialists, software engineers, and procurement managers. Because drones are modular, SAMI can develop a portfolio strategy: some systems may be produced under license, others co-developed, and still others fully indigenous. The portfolio approach reduces risk and accelerates learning. It also helps Saudi Arabia avoid dependency on a single foreign partner. SAMI's industrial role is therefore central to strategic diversification.

One of the most consequential institutional tasks is quality assurance. In defense production, scale without reliability is liability. UAVs require testing in thermal extremes, signal-jamming environments, and long-range operational profiles. GAMI can establish standards and certification pathways, while SAMI can ensure that suppliers and factories meet them. This is vital for the Saudi environment, where heat, dust, and operational distances stress electronic systems. A localized UAV fleet is only credible if it can survive these conditions with predictable performance. Institutional maturity is measured not by the number of press releases but by the repeatability of production and the stability of supply chains.

The institutions also shape workforce development. Localization requires engineers, technicians, machinists, software developers, and logistics specialists. GAMI can coordinate with educational institutions to align curricula with defense-industrial needs, while SAMI can provide apprenticeship opportunities and hands-on training. Over time, this produces a national talent base that is capable of sustaining the defense ecosystem. The human-capital component should not be underestimated. Localization is often discussed in terms of factories and contracts, but its ultimate success depends on expertise that accumulates slowly through practice. A sovereign UAV sector therefore implies sovereign knowledge production.

Finally, GAMI and SAMI jointly influence alliance politics. By demonstrating that Saudi Arabia can localize UAV production, they strengthen the country's position in negotiations with Western and Asian suppliers alike. Foreign firms seeking market access must bring more than equipment; they must bring meaningful knowledge transfer, local hiring, and industrial participation. This shifts bargaining power toward Riyadh. It also allows Saudi Arabia to pursue selective Sino-Saudi defense cooperation without surrendering strategic autonomy. The result is a more balanced external posture: one in which foreign partnerships are tools of national strategy rather than substitutes for it.

7. Geopolitical Restructuring of the Gulf Balance of Power

UAV localization under Saudi Vision 2030 is already reshaping the Gulf balance of power because it changes the sources of military credibility. Traditionally, regional influence in the Gulf was assessed through procurement ties, alliance guarantees, and platform inventories. Yet those metrics increasingly understate the importance of industrial depth and technological autonomy. As Saudi Arabia builds localized UAV capabilities, it reduces the asymmetry that once made it dependent on external resupply and technical support. The result is a more confident strategic posture in which defense capacity is visible not only in airfields and arsenals, but in domestic production lines and research centers. This matters because the Gulf security order is not static; it is a competition over resilience, signaling, and access to advanced technology.

Sino-Saudi defense technology cooperation plays a critical role in this restructuring. China offers attractive options because it combines willingness to transfer technology with experience in low-cost unmanned systems, electronics manufacturing, and dual-use industrial scaling. For Saudi Arabia, cooperation with Chinese firms can complement Western partnerships by providing alternative supply channels and access to design philosophies less constrained by the political conditions often attached to Western exports. This does not imply a wholesale pivot away from the West. Rather, it reflects hedging. By cultivating multiple technology partners, Saudi Arabia can avoid overdependence on any single bloc and can keep its options open amid great-power competition. In the language of strategy, this is supply-chain diplomacy.

The geopolitical significance of such cooperation is amplified by the fact that unmanned systems are not merely weapons but networked ecosystems. They require chips, sensors, software, ground stations, maintenance protocols, and training packages. Cooperation with China can help Saudi Arabia accelerate localization in areas where scale matters: electronics assembly, battery systems, communications modules, and industrial tooling. At the same time, Saudi Arabia remains attentive to the risk that dependence on any foreign supplier can create new vulnerabilities. Hence the importance of domestic absorption capacity. The true strategic objective is not to replace Western dependence with Eastern dependence, but to create a sovereign integration layer that can utilize external inputs while controlling the final architecture.

The broader balance-of-power effect is that Saudi Arabia becomes less susceptible to coercion through arms embargoes or slow-rolled deliveries. This in turn affects regional diplomacy. Rivals must now assume that Saudi defense modernization can proceed even if one supply channel is interrupted. That changes deterrence calculations across the Gulf, the Red Sea, and broader Middle Eastern theaters. It also affects alliance behavior. Partners become more interested in joint development, local production, and interoperability because they recognize that Saudi Arabia is not merely a consumer but an emerging producer of military technology. The state’s voice in regional security discussions therefore grows louder, not because of rhetorical assertiveness, but because industrial capacity underwrites credibility.

At the same time, UAV localization can stabilize the region by reducing incentives for preemptive vulnerability exploitation. When states know that a competitor has resilient, replenishable air-defense and strike assets, they are less likely to believe that a single surprise attack can coerce political concessions. This is the essence of deterrence by assets. It is not pacific in itself; rather, it raises the expected cost of aggression and lowers the probability that limited coercion will succeed. In a region where critical infrastructure is concentrated and where oil, gas, desalination, and logistics systems are strategic targets, such deterrence has systemic value. If Saudi Arabia can field and replenish localized UAV assets quickly, then even a sophisticated swarm campaign will have difficulty achieving durable coercive leverage.

The balance-of-power shift also extends to perception management. Industrial localization signals seriousness. It tells allies, rivals, and neutral actors that Saudi Arabia is investing in long-term strategic autonomy rather than episodic procurement. This matters because perceptions of endurance influence diplomacy. States that can sustain their capabilities during crises are treated differently from states that depend on external goodwill. Therefore, UAV localization becomes a diplomatic asset as much as a military one. It supports a posture of selective cooperation, diversified partnerships, and strategic self-help that is increasingly central to the Gulf order.

8. Conclusion

This paper has argued that Saudi Arabia’s UAV localisation agenda under Vision 2030 should be understood not merely as a defence-industrial initiative, but as a strategic mechanism for strengthening national resilience and reshaping deterrence in the Gulf. The central claim is that future military credibility will depend not only on the possession of advanced platforms, but on the ability to produce, repair, modify, and replenish those platforms under conditions of crisis. In this context, UAV localisation represents a shift from procurement-dependent security toward asset-based deterrence, where sovereign control over production and sustainment becomes a source of strategic leverage.

The analysis has shown that unmanned systems are particularly suited to this transformation because they sit at the intersection of affordability, adaptability, and operational relevance. Drone warfare has exposed the vulnerability of traditional air-defence models built around expensive interceptors and externally supplied systems. The growing use of loitering munitions, drone swarms, and low-cost aerial platforms has made attrition economics central to modern deterrence. States that can regenerate unmanned assets quickly and cheaply are better positioned to absorb attacks, deny coercive success, and sustain operations during prolonged confrontation. For Saudi Arabia, this makes UAV localisation a practical response to the depletion problem facing Gulf security architectures.

The case of reverse-engineering Iranian-derived UAVs and the development of low-cost countervailing systems demonstrates that military innovation is increasingly shaped by speed, modularity, and manufacturability. The lesson for Saudi Arabia is not that localisation requires full autarky, but that strategic autonomy depends on controlling the most sensitive layers of the UAV value chain, including software, secure datalinks, payload integration, testing infrastructure, and sustainment capacity. GAMI and SAMI therefore occupy a critical position in translating Vision 2030 from an economic diversification programme into a defence-industrial ecosystem capable of supporting long-term security autonomy.
The wider Gulf implications are significant. A Saudi UAV sector with credible local production capacity would reduce vulnerability to foreign supply disruptions, strengthen bargaining power with Western and Asian partners, and complicate adversary assumptions about Saudi dependence. This does not eliminate the need for alliances, nor does it imply a withdrawal from international defence cooperation. Rather, localisation changes the terms of partnership by allowing Saudi Arabia to engage external suppliers from a position of greater resilience and selectivity.

The paper’s main contribution is the concept of **deterrence by assets**. This concept highlights the strategic value of visible, replenishable, locally controlled military capabilities in an era of drone saturation, supply-chain uncertainty, and multipolar competition. In the Gulf, where critical infrastructure is concentrated and coercive pressure can be applied through limited, deniable, and repeated attacks, the ability to regenerate assets may be as important as the initial quality of those assets. UAV localisation therefore matters because it transforms defence from a consuming function into a productive source of national power.

Ultimately, Saudi Arabia's pursuit of UAV localisation under Vision 2030 should be seen as part of a broader transition in Gulf security architecture. The future balance of power will not be determined solely by imported aircraft, missile batteries, or alliance guarantees, but by the depth of domestic industrial capacity that sustains them. If successfully implemented, Saudi UAV localisation can strengthen deterrence, improve crisis resilience, and support a more autonomous Saudi role within a changing regional order. In this sense, localisation is not simply a pathway to industrial development; it is itself a strategic asset.

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