

# Suppression of Enemy Air Defense

## SEAD in Iran's Defense Doctrine

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### Abstract

Before the 1979 Iranian Revolution, Iran was a cornerstone ally of the West, with the United States as its chief arms supplier. The revolution, the ensuing arms embargoes, and eight years of war with Iraq left Tehran's air force hollowed and incapable of sustaining suppression of enemy air defenses (SEAD) missions. This study examines how Iran sought to offset those losses by shifting to kinetic alternatives. Excluding nonkinetic methods such as electronic warfare, the analysis focuses on Iran's pursuit of antiradiation ballistic missiles and an expanding fleet of drones as asymmetric substitutes for manned airpower. Yet the June 2025 conflict—marked by Israel's Operation Rising Lion and the US-led Operation Midnight Hammer—tested these capabilities in combat. The results were sobering: while Iran could mass fire and impose costs, its missile- and drone-centric SEAD strategy failed to achieve durable suppression against a modern, layered defense.

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Iran's defense strategy has undergone profound changes since the 1979 revolution. Before that rupture, Iran was a pillar of Western security in the Persian Gulf, armed and sustained by the United States. The revolution, the ensuing sanctions, and eight years of war with Iraq stripped Tehran of modern aircraft, precision weapons, and the ability to execute suppression of enemy air defenses (SEAD) missions once central to its doctrine. SEAD—neutralizing or disrupting hostile air defenses to secure freedom of action—is indispensable to modern airpower. For Iran, however, the collapse of its air force meant a crippling loss of that capability.

This article asks: How did Iran attempt to sustain SEAD without modern fighters and advanced munitions? The answer lies in asymmetric innovation. Unable to field a new generation of strike aircraft, Tehran turned to standoff alternatives: antiradiation ballistic missiles, cruise missiles, and an expanding family of drones designed to saturate, overwhelm, and suppress enemy defenses. In doing so, Iran sought to substitute volume and ingenuity for the precision and reach it could no longer buy.

Yet this adaptation met its first real-world test in June 2025. Israel's Operation Rising Lion and the US-led Operation Midnight Hammer exposed both the potential and the limits of Iran's missile- and drone-centric SEAD strategy. Iran demonstrated it could mass fire and impose costs, but it failed to achieve lasting

suppression against a coordinated, multi-domain campaign. The implication is clear: Iran has developed tools that complicate adversary operations, but they remain an incomplete substitute for conventional airpower against a modern, layered defense.

This study addresses a gap in the literature by tracing Iran's shift from aircraft-based to missile- and drone-based SEAD, then weighing those doctrinal ambitions against battlefield performance. The first section introduces SEAD as a concept and its role in modern warfare. The study then reviews Iran's air force and SEAD capabilities before, during, and after the revolution and war with Iraq. Next, it examines the impact of sanctions and the aging fleet. Thereafter, the article analyzes Iran's reliance on ballistic missiles, cruise missiles, and drones as substitutes for manned SEAD. Finally, it assesses the June 2025 conflict, drawing lessons for Iran's evolving defense posture and for regional security.

### **Suppression of Enemy Air Defenses Concept**

The US Department of War defines SEAD as the effort to “neutralize, destroy, or temporarily degrade surface-based enemy air defenses by destructive and/or disruptive means.”<sup>1</sup> These operations combine kinetic strikes—such as missiles targeting radars and launchers—with nonkinetic measures, including electronic warfare to blind sensors and disrupt command networks. SEAD is not a luxury; it is the prerequisite for air superiority and the survival of friendly aircraft in contested airspace.

In its earliest form, SEAD fell to fighter pilots armed with unguided bombs. Pilots flew low and fast, releasing “dumb” munitions against radar and missile sites.<sup>2</sup> The tactics were crude, the risks immense, and the losses often severe. The Russian Air Force's experience in Ukraine underscored the folly of such methods in the modern era: forced to rely on unguided munitions and low-altitude tactics, Russian pilots absorbed heavy losses to Ukrainian air defenses. The lesson is clear—without precision and standoff reach, SEAD becomes a bloodletting.<sup>3</sup>

As air defenses grew more sophisticated—with integrated radar networks, long-range surface-to-air missiles, and mobile batteries—old methods collapsed under the weight of modern precision. The response was the development of guided

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<sup>1</sup> Christopher Bolkcom, *Military Suppression of Enemy Air Defenses (SEAD): Assessing Future Needs*, CRS Report RL30639 (Washington, DC: Congressional Research Service, 23 February 2005), 1, <https://apps.dtic.mil/>.

<sup>2</sup> Michael Paul, “Location, Suppression, and Destruction of Enemy Air Defenses: Linking Missions to Realize Advanced Capabilities” (Master's thesis, United States Marine Corps Command and Staff College, 2008), 1–3, <https://apps.dtic.mil/>.

<sup>3</sup> Rafael Ichaso, “Russian Air Force's Performance in Ukraine Air Operations: The Fall of a Myth,” *Joint Air Power Competence Centre Journal*, no. 35 (2023), <https://www.japcc.org/>.

munitions, especially antiradiation missiles, which allowed aircrews to suppress or destroy air defenses from beyond their lethal envelopes.<sup>4</sup> These innovations transformed SEAD into a mission where accuracy and distance replaced risk and attrition.

For states denied access to modern strike aircraft and advanced munitions, the challenge is stark. Iran embodies this dilemma. Sanctions and an aging fleet have left Tehran with few conventional options. Maintaining a credible SEAD capability has forced it into asymmetric innovation—investing in ballistic missiles and drones as substitutes for manned strike aircraft. But as the June 2025 war revealed, these substitutes can harass and impose costs, yet they fall short of delivering the sustained suppression needed against a modern, layered defense.

### **Doctrinal and Strategic Role of SEAD in Iran’s Military Planning**

Iran’s SEAD development cannot be reduced to technology alone; it must be understood within the logic of Tehran’s broader military doctrine. That doctrine, forged in the crucible of the Iran–Iraq War, reflects a hard lesson: Iran cannot match the conventional superiority of the United States or its regional allies. Instead, it relies on asymmetry, layered defense, and denial strategies designed to impose costs, buy time, and erode an adversary’s freedom of action.

Rather than seeking total air superiority, Iran’s doctrine focuses on degrading an opponent’s ability to operate unhindered. Over time, Tehran’s posture has shifted from reactive defense to the “Forward Defense” model—a strategy of shaping threats beyond its borders through proxies, cyber operations, and standoff strikes.<sup>5</sup> Within this framework, SEAD plays a defined role. Unlike Western doctrines, where SEAD clears the skies for manned strike packages, Iran uses SEAD to blind enemy sensors, crack open defensive networks, and prepare the battlespace for missile salvos and drone swarms. The 2019 strikes on Saudi oil facilities,<sup>6</sup> and more recently Iran’s massed drone and missile attacks on Israel, reflect this logic of disabling defenses to create windows of vulnerability.<sup>7</sup>

Central to that posture is the deliberate use of proxy forces as an extension of Iranian power. Tehran deploys and sustains a network of partners—most prominently

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<sup>4</sup> Stanisław Czeszejko, “Anti-Radiation Missiles vs. Radars,” *Journal of Telecommunications and Information Technology* 59, no. 3 (2013): 285–88, <https://www.journals.pan.pl/>.

<sup>5</sup> Matthew McInnis, “The Strategic Foundations of Iran’s Military Doctrine,” in “Iran’s Military Doctrine, Capabilities, and Strategy,” *IISS*, 3, <https://www.iiss.org/>.

<sup>6</sup> Omar Ahmed, “Was Iran Really Behind the Attack on Saudi Aramco Facilities?,” *Middle East Monitor*, 20 September 2019, <https://www.middleeastmonitor.com/>.

<sup>7</sup> “Iran Launches Salvo of Ballistic Missiles at Israel,” *Arab News*, 1 October 2024, <https://www.arabnews.com/>; Paul Millar, “How Israel Could Respond to Iran’s Drone and Missile Assault,” *France 24*, 18 April 2024, <https://www.france24.com/>.



and missile defense when employed against a coordinated Israeli–US campaign.<sup>11</sup> The result reinforces a key analytic point: proxies extend range and create dilemmas for adversaries, but they are a force multiplier within an asymmetric strategy, not a stand-in for the capabilities lost with an aging air force.

### **Iran’s Air Force and SEAD Capability Before and During the Iran–Iraq War**

Scholarship on Iran’s air force before the 1979 revolution and its subsequent performance in the Iran–Iraq War is extensive, drawing on interviews, memoirs, and declassified files. Yet one critical dimension remains underexplored: Iran’s ability—or inability—to conduct SEAD.

Evidence suggests that, unlike Western air forces, Iran entered the 1980s without dedicated antiradiation missiles. Instead, its pilots relied on substitutes such as AGM-65 Maverick air-to-ground missiles and unguided munitions. These were not designed to home on radar emissions, forcing Iranian crews to improvise tactics against Iraqi surface-to-air missile sites and radar networks.<sup>12</sup> The result was an ad hoc approach: courageous pilots flying at low altitude, attacking with weapons ill-suited for SEAD, and absorbing high risk in an unforgiving environment.

This improvisation illuminates the structural limits of Iran’s air force after the revolution. Sanctions cut off the supply of modern precision weapons, while the war’s attrition hollowed out the pilot corps and maintenance base. In this context, SEAD missions were less a doctrinal specialty than an act of necessity—pilots cobbling together solutions to keep air operations viable. The gap left by the absence of true antiradiation capabilities foreshadowed the trajectory of Iran’s doctrine after the war: unable to sustain conventional SEAD through manned aircraft, Tehran would eventually look to missiles and drones as substitutes.

The lesson is clear. Iran’s experience in the 1980–1988 war was not only a crucible for asymmetric doctrine but also the proving ground for a mindset: if conventional tools were denied, Tehran would find or build alternatives, however unorthodox, to keep contesting the skies.

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<sup>11</sup> Anthony H. Cordesman, *The Gulf and the Challenge of Missile Defense: Net Assessment Indicators* (Washington: Center for Strategic and International Studies, 16 April 2019), 2–25, <https://www.csis.org/>.

<sup>12</sup> Ronald E. Bergquist, *The Role of Airpower in the Iran–Iraq War* (Maxwell AFB, AL: Air University Press, 1988), 26, <https://www.airuniversity.af.edu/>.

## **Iran's SEAD Capability from the Postwar Period to the Present**

The 1979 Islamic Revolution severed Iran's access to Western arms, cutting off the flow of aircraft, munitions, and spare parts that had sustained its air force. Once equipped with advanced US-made F-14 Tomcats and F-4 Phantoms, Tehran soon found itself scrambling to keep aging platforms airborne. The Iran–Iraq War only deepened the attrition, leaving Iran with a gutted fleet and few prospects for modernization.

To compensate, Tehran turned to Eastern Bloc and Chinese suppliers. Aircraft such as the Chengdu F-7, a derivative of the 1950s MiG-21, entered service, but they underscored Iran's technological regression. The collapse of Saddam Hussein's regime in 1991 gave Tehran an unexpected windfall when Iraqi aircraft—including MiG-29s, Su-24MKs, and Su-22s—fled into Iranian airspace. Later, Iran acquired small numbers of Russian fighters, but these additions did little to alter the fundamental imbalance with US and allied airpower.<sup>13</sup>

Denied reliable access to modern strike aircraft and precision-guided weapons, Iran doubled down on asymmetric alternatives. Some efforts were clandestine. In the 1990s, Ukrainian security services exposed Iranian operatives attempting to smuggle technical manuals and components for the Kh-31 antiradiation missile—evidence of Tehran's determination to secure standoff SEAD capability despite sanctions.<sup>14</sup> Earlier, the illicit transfer of Kh-55 cruise missiles had demonstrated the same intent.<sup>15</sup> Reports also point to limited acquisitions of Kh-58 antiradiation missiles for Iran's Su-24s, Su-22s, and MiG-29s, though their numbers and readiness remain uncertain.

Before the 1979 Islamic Revolution, Iran was a pillar of Western strategy in the Cold War. Its value rested on vast energy reserves, control of the Persian Gulf chokepoint, and proximity to the Soviet Union. Tehran's alignment with Washington made it one of America's closest regional allies.

The revolution shattered that partnership. The new Islamic Republic reoriented foreign policy toward exporting revolutionary ideology, confronting Western-aligned states, and supporting anti-US movements across the region. The 1980 US embassy hostage crisis triggered the first in a long line of sanctions, cutting Iran off from the arms trade that had once underpinned its military strength.

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<sup>13</sup> Douglas Barrie, "Iran and the Challenge of Combat-Aircraft Recapitalization", The International Institute for Strategic Studies (IISS), 2017, 2–5, <https://www.iiss.org/>.

<sup>14</sup> Dario Leone, "Busted: Ukraine Catches Iranian Military Attaché Trying to Smuggle KH-31 Parts out of Kiev," *National Interest* (blog), 20 June 2019, <https://nationalinterest.org/>.

<sup>15</sup> John Pike, "X-55 Long-Range Cruise Missile," GlobalSecurity.org, 2 April 2019, <https://www.globalsecurity.org/wmd/world/iran/x-55.htm>.

The Iran–Iraq War (1980–1988) marked a turning point. The “War of the Cities,” defined by missile strikes on urban centers, forced Tehran to improvise. To retaliate against Baghdad, Iran imported Scud-B missiles from Libya and North Korea. Those early purchases laid the foundation of a program that steadily advanced in range, accuracy, and survivability despite sanctions.

Four decades later, the missile force has become the centerpiece of Iran’s defense strategy. With the largest arsenal of short- and medium-range ballistic missiles in the Middle East, Tehran treats missiles not as an auxiliary tool but as the core of its deterrence doctrine—an asymmetric substitute for the modern air force it cannot acquire.<sup>16</sup>

### ***Hormoz-1***

In May 2014, Iran unveiled the Hormoz-1, a short-range ballistic missile (SRBM) billed as the world’s first antiradiation ballistic missile (ARBM). Unlike conventional ballistic systems, the Hormoz-1 employs terminal guidance to home in on radar emissions during its final flight phase. With a 300-kilometer range, it gives Iran a standoff tool to strike enemy radar sites across much of the Persian Gulf—whether land-based installations or naval sensors operating within US Central Command’s area of responsibility.<sup>17</sup>

The missile’s design reflects Iran’s core problem: an aging fleet of strike fighters that cannot safely approach modern integrated air defenses. By substituting a ballistic missile for a manned SEAD package, Tehran sought to neutralize radars without exposing pilots to lethal envelopes of surface-to-air fire. Solid-fueled and road-mobile, the Hormoz-1 offers rapid launch capability, compressing the response window for US and allied radar crews in a region where geography places many sites within range.<sup>18</sup>

On paper, the Hormoz-1 signaled a leap in Iran’s asymmetric doctrine. By shifting SEAD from cockpit to launcher, Tehran appeared to create a credible threat to US and allied detection networks. Yet the June 2025 conflict revealed the limits

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<sup>16</sup> Mehran Atashjameh, “Passive Defense Measures in Saving Iran’s Ballistic Missile Arsenal,” *MES Insights* 15, no. 4 (2024), 2, <https://www.usmcu.edu/>.

<sup>17</sup> Mariel Ferragamo et al., “U.S. Forces in the Middle East: Mapping the Military Presence,” *Council on Foreign Relations*, 29 January 2025, <https://www.cfr.org/>; “Hormuz Ballistic Missiles, Another Advance in Iran’s Naval Capability,” *Iran Press*, 22 September 2022, <https://iranpress.com/>; and Sebastien Roblin, “How Iran’s Massive Missile Force Could Overwhelm Any Target,” *National Interest* (blog), 22 March 2021, <https://nationalinterest.org/>.

<sup>18</sup> “US Central Command Priorities,” U.S. Central Command website, 2022, <https://www.centcom.mil/>; and Sahar Mokhtari et al., “Inferring Spatial Distribution of Oil Spill Risks from Proxies: Case Study in the North of the Persian Gulf,” *Ocean & Coastal Management* 121 (January 2016): 48–60, <https://doi.org/>.

of this innovation. Israeli and US forces, supported by mobile radars, emission-control practices, and layered missile defenses, absorbed and deflected Iranian salvos. The Hormoz-1 and similar systems demonstrated Iran's ingenuity under constraint, but they failed to deliver sustained suppression or blind adversary networks for meaningful periods of time.

The lesson is stark. The Hormoz-1 highlights Tehran's determination to maintain SEAD capacity in the absence of modern aircraft, but its performance under combat conditions underscores the gap between doctrinal ambition and battlefield effect. As with much of Iran's missile program, the Hormoz-1 imposes friction and costs—yet it cannot substitute for the freedom of action that true air superiority provides.

### ***Drone-Based SEAD Method***

The rise of drones has transformed the conduct of SEAD. By assuming high-risk missions—reconnaissance, electronic warfare, decoy, and strike—unmanned systems reduce the need to expose pilots to lethal environments. Israel demonstrated the concept during the War of Attrition, when drones were used to bait and blind Arab air defenses, rewriting the logic of SEAD for modern warfare.<sup>19</sup>

Iran recognized the value of drones early. During the Iran–Iraq War, Tehran fielded the first-generation Mohajer, a rudimentary platform that served more as a low-cost strike munition than an intelligence, surveillance, and reconnaissance (ISR) asset.<sup>20</sup> High pilot attrition and sanctions on advanced aircraft drove Iran to seek unmanned alternatives. Drones could fly closer to defended zones, gather intelligence, or strike targets at a fraction of the cost of a manned sortie. If lost, they carried no political risk of captured pilots and little strategic cost.

From these beginnings, Iran developed a diverse fleet: ISR drones for surveillance, loitering munitions for strike, electronic-warfare unmanned aerial vehicles for jamming and deception, and expendable decoys designed to saturate radars and missile batteries. Tehran has even experimented with combat drones capable of carrying air-to-air missiles—an ambitious, if limited, attempt to extend unmanned systems into traditional fighter roles. Most significant, however, has been the steady refinement of loitering munitions designed for SEAD. These drones can linger near defended zones, detect emissions, and dive on radars or launchers once they expose themselves.

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<sup>19</sup> Grant T. Willis, "Israel's Firebees: UAVs & the Future of the Suppression of Enemy Air Defenses," *Consortium of Indo-Pacific Researchers*, 2022, 1–10, <https://indopacificresearchers.org/>.

<sup>20</sup> *The Iranian Drone Threat* (New York: United Against Nuclear Iran, 2023), 5, [https://www.unitedagain-  
stnucleariran.com/](https://www.unitedagain-<br/>stnucleariran.com/).

The appeal of such systems is obvious: they give Iran a cheap, expendable way to probe, harass, and degrade an adversary's defenses. Yet their limits were made plain in June 2025. During Operation Rising Lion and Midnight Hammer, Iranian drone swarms were met by Israeli and US layered defenses—interceptors, electronic warfare, and deception. While some drones penetrated and forced defenders to expend interceptors, the swarms failed to blind radar networks or suppress defenses long enough to alter the campaign's outcome.

The record is mixed but instructive. Drones allow Iran to impose costs, saturate defenses, and complicate enemy planning. They are emblematic of Tehran's asymmetric adaptation under constraint. But they do not substitute for the sustained suppression achieved by modern strike aircraft with advanced antiradiation weapons. In SEAD, as the June 2025 war proved, drones are a tool of harassment, not of decision.

### ***Kian Drone Family***

In recent years, Tehran unveiled the Kian series of suicide drones—Kian-1 and Kian-2—claiming they could be fitted with radar-wave receivers, effectively turning them into loitering munitions with antiradiation capability.<sup>21</sup> With a declared range of 1,000 kilometers, the Kian family promised a low-cost, long-range option for striking enemy radar and early warning systems deep in the battlespace. For Iran, denied access to advanced strike aircraft, the Kian represented an attractive substitute: expendable, affordable, and versatile.

The Kian drones were designed to give Tehran flexibility in deployment. They could be launched from forward positions against nearby radar sites or from deep within Iranian territory against US and allied sensors along the Persian Gulf.<sup>22</sup> In theory, this capacity allowed Iran to threaten radars without risking manned aircraft or exposing launch crews to immediate retaliation. By degrading or blinding early warning networks, the Kian family fit neatly into Iran's asymmetric doctrine: create temporary windows of vulnerability, then follow with missile salvos or larger drone swarms.

In practice, the record is more sobering. During the June 2025 conflict, Kian drones were employed as part of Iran's massed SEAD effort. Israeli and US defenses, however, proved adept at countering them. Mobile radars, decoys, and electronic-warfare measures diluted seeker effectiveness; layered interceptors

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<sup>21</sup> "Kian Combat and Defense Drone," *Iran Press News Agency*, 30 April 2022, <https://iranpress.com/>.

<sup>22</sup> Stanisław Koziej, "Israel's Air Defense System Should Be a Model for Poland," *Eastern Frontier Initiative*, 16 April 2024, <https://easternfrontier.eu/>.

eliminated many before impact. While the Kians forced defenders to expend interceptors and attention, they did not deliver the sustained radar suppression Iran had hoped for.

The Kian family illustrates both the ingenuity and the limits of Tehran's approach. They provide a cheap, standoff harassment tool and complicate adversary planning, but they fall short of the decisive suppression required to alter the outcome of a modern, multi-domain campaign. As June 2025 made clear, the Kians are more a weapon of nuisance and saturation than a true substitute for conventional SEAD platforms.

### ***Arash Drone Family***

The Arash series represents a derivative of the Kian line, but with notable improvements. With a reported range of 2,000 kilometers—double that of the Kian—the Arash extends Iran's ability to strike radar and air defense sites far beyond its borders. Powered by a propeller rather than a jet engine, the system trades speed for endurance, offering greater flexibility in mission profiles. One of its defining features is containerization: the Arash can be carried in civilian-style launch boxes mounted on trucks, allowing camouflage as commercial traffic and complicating adversary ISR efforts.<sup>23</sup> This design gives Tehran a survivable, deceptive deployment option suited for surprise salvos.

The drone's doctrinal purpose is clear: provide Iran with a long-range, low-cost means of threatening adversary radar networks, particularly those in Israel. Reports indicate that Arash drones were employed during the June 2025 conflict. At least some were intercepted en route, underscoring both their operational intent and their vulnerability. The geography alone tells the story—the Arash's 2,000-kilometer range aligns almost precisely with the distance from Iranian launch sites to Israeli radar fields.<sup>24</sup>

Combat, however, revealed the same asymmetry seen with other Iranian systems. While the Arash expanded Iran's theoretical strike reach, layered Israeli defenses—supported by US assets—detected and neutralized them before they could achieve meaningful suppression. The system demonstrated Tehran's ingenuity in extending drone-based SEAD capability, but it failed to blind Israeli radars or create sustained openings for follow-on strikes.

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<sup>23</sup> "Iran's Arash; World's Longest-Range Suicide Drone with High Precision," *Iran Press News Agency*, 12 October 2022, <https://iranpress.com/>.

<sup>24</sup> "Distance From Israel to Iran," *DistanceFromTo.net*, n.d., <https://www.distancefromto.net/>.

The lesson is consistent. The Arash, like the Kian, reflects Iran's determination to build substitutes for manned SEAD platforms. Containerization and extended range add survivability and reach, but they do not overcome the technological edge of a modern integrated air and missile defense. In practice, the Arash proved a weapon of harassment and deterrence—not decision.

### ***Shahed Drone Family***

The Shahed-136, exported to Russia and rebranded as the Geran-2, has become one of the most visible Iranian drones on today's battlefields. In Ukraine, Russian forces have used it in large numbers to target high-value assets, saturate air defenses, and exhaust interceptor stocks.<sup>25</sup> The logic is straightforward: launch swarms of low-cost, expendable drones to overload defensive networks, expose radar positions, and set the conditions for follow-on precision strikes.<sup>26</sup>

Iran has refined the Shahed family with this role in mind. Although not a dedicated antiradiation weapon, the Shahed-136 functions as a loitering munition optimized for saturation attacks. Its value lies less in its accuracy than in its numbers. At scale, Shaheds can distract and soften defenses, turning the weight of production into an operational effect.

Recent conflicts confirmed both the strengths and the limits of this approach. During Operation True Promise 1 and the June 2025 war, Iran launched mass salvos of Shahed drones against Israeli targets.<sup>27</sup> Most were intercepted by layered defenses, but the volume forced Israel and the United States to expend interceptors and revealed the potential of saturation to impose costs. Geography, however, mattered: the distance between Iranian launch sites and Israeli targets gave defenders time to detect, track, and engage incoming drones.<sup>28</sup> By contrast, US and allied radar sites in the Persian Gulf lie within far shorter flight times. In that theater, Shahed swarms—especially when paired with antiradar munitions—could compress warning windows and increase the risk of successful strikes.

The Shahed family thus illustrates Iran's asymmetric logic in its purest form: trade quality for quantity, and turn mass production into a weapon. In June 2025,

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<sup>25</sup> Shahram Akbarzadeh, *Iran's Missile And Drone Program: Disrupting U.S. Aerial Hegemony*, Issue Brief (Doha, Qatar: Middle East Council on Global Affairs, July 2024), 4, <https://mecouncil.org/>.

<sup>26</sup> Matthew Luxmoore, "Russia Defies Trump With Largest-Ever Drone-and-Missile Attack on Ukraine," *Wall Street Journal*, 13 February 2025, <https://www.wsj.com/>.

<sup>27</sup> David Daoud and Ahmad Sharawi, "Iranian Drone and Missile Attacks Against Israel: June 24, 2025," *Long War Journal*, 24 June 2025, <https://www.longwarjournal.org/>; and Shaan Shaikh, "The Iran-Israel Air Conflict, One Week In," Center for Strategic & International Studies, 19 April 2024, <https://www.csis.org/e>.

<sup>28</sup> Mehran Atashjameh, "Iran-Israel Conflict: Long-Distance Rivalry, Strategies, Toolkits, and Struggle for Penetrating Rival's Strategic Depth," *Institute of New Europe*, 22 April 2025, <https://ine.org.pl/>.

the concept strained against the reality of modern air and missile defense. Shaheds imposed costs but did not achieve decisive suppression. They remain a tool of harassment and attrition—dangerous in the Persian Gulf, survivable in local conflicts, but ultimately limited against a coordinated, technologically superior adversary.

### ***Iran's Cruise Missile Arsenal***

Cruise missiles are long-range, precision-guided weapons designed to fly low and hug terrain, exploiting radar gaps to slip past defenses. They can be launched from air, land, or sea platforms, strike fixed or mobile targets with accuracy, and deliver varied payloads. Their advantages—stealthy profiles, flexible basing, and precision—make them a cornerstone of modern SEAD campaigns.<sup>29</sup> The 2011 Libya intervention highlighted their value: US and allied Tomahawks systematically dismantled Libyan radar sites, missile batteries, and command centers, clearing the way for air operations.<sup>30</sup>

Iran turned to cruise missiles in the 1990s as sanctions hollowed out its strike fleet. A watershed came when Tehran reportedly acquired Kh-55 cruise missiles from Ukraine, giving it a template for indigenous designs. From that foundation, Iran has produced the Soumar, Hoveyzeh, and Ya-Ali land-attack cruise missiles, along with adapted antiship variants such as the Noor and Qader. These weapons, launched from mobile ground launchers or aircraft, offer Tehran the ability to bypass traditional airpower, deliver precision at range, and hold adversary radars and bases at risk.

Cruise missiles now form a core pillar of Iran's deterrence and SEAD toolkit. By threatening high-value radars, air bases, and command nodes, they allow Tehran to impose costs without risking pilots.<sup>31</sup> Yet their performance in June 2025 underscored their limits. Israel and the United States intercepted most inbound cruise missiles, using layered defenses and rapid reconstitution of radar coverage to blunt Iran's salvos. While a handful penetrated, the strikes failed to suppress defenses long enough to open sustained corridors for follow-on attacks.

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<sup>29</sup> "Cruise Missile Basics," *Missile Defense Advocacy Alliance*, 2025, <https://missiledefenseadvocacy.org/>.

<sup>30</sup> Carlo Copp, "Operation Odyssey Dawn: The Collapse of Libya's Relic Air Defence System," *Defence Today*, June 2011, <https://www.ausairpower.net/>; and Joseph Speed and Panagiotis Stathopoulos, "SEAD Operations of the Future," *Joint Air Power Competence Centre Journal*, no. 26 (2018), <https://www.japcc.org/>.

<sup>31</sup> Shahryar Pasandideh, "Under the Radar, Iran's Cruise Missile Capabilities Advance," *War on the Rocks*, 20 September 2019, <https://warontherocks.com/>.

## **Regional Security Implications**

Iran's investment in missile- and drone-based SEAD carries consequences beyond the purely technical realm. These capabilities shape the strategic environment across the Persian Gulf and Levant, complicating US and allied force posture. Even if Iranian systems cannot decisively suppress a modern integrated air defense, they impose planning costs, shorten warning times, and increase the burden on defensive interceptors. A salvo of Hormoz missiles or Shahed drones may fail to blind a radar permanently, but it can still force US naval assets or forward-deployed air bases to expend scarce interceptors and reposition defenses.

For regional actors, the message is twofold. First, US and allied airpower is no longer uncontested; it must operate in an environment where even an incomplete Iranian SEAD threat can disrupt tempo and impose attrition. Second, partners such as Israel, Saudi Arabia, and the United Arab Emirates are compelled to invest in ever-denser air and missile defenses, diverting resources toward protection rather than power projection. This dynamic strengthens Iran's deterrence by denial: Tehran does not need to win a battle in the air to achieve strategic effect—it need only raise the costs of entry.

At the same time, the June 2025 conflict underscored the fragility of Iran's approach. Against coordinated, multi-domain adversaries, its systems proved unable to achieve lasting suppression. For Washington and its allies, the lesson is to maintain integration across air, missile defense, cyber, and electronic warfare—ensuring Iranian salvos remain costly but strategically ineffective. For Tehran, the challenge remains sustaining mass production of drones and missiles under sanctions, while facing adversaries whose defenses grow stronger after each test.

## **Conclusion**

Iran's pursuit of SEAD over the past four decades reflects adaptation under constraint. Denied access to modern fighter aircraft and advanced munitions, Tehran built an arsenal of substitutes: ARBMs like the Hormoz-1; loitering munitions such as the Kian and Arash; and dual-use platforms like the Shahed-136, optimized for saturation and attrition. Alongside these came a growing cruise missile portfolio—Soumar, Hoveyzeh, Ya-Ali, and others—that offered long-range precision from mobile, survivable launchers. These systems represent a deliberate, systematic effort to replace conventional strike packages with standoff, unmanned, and expendable alternatives.

This approach has strategic and economic logic. Drones and missiles are cheaper to produce than modern combat aircraft, expendable in combat, and politically low-risk. They complicate adversary defenses, impose costs, and allow Tehran to

project power despite sanctions and technological isolation. In this sense, Iran has demonstrated ingenuity: it created the world's first claimed antiradiation ballistic missile and fielded large families of loitering drones, positioning itself as a pioneer in asymmetric SEAD.

Yet the June 2025 conflict put these innovations to the test—and exposed their limits. Israeli and US forces, employing mobile radars, layered defenses, electronic warfare, and deception, absorbed and deflected Iranian salvos. While Tehran demonstrated the ability to mass fire and force adversaries to expend interceptors, its drones and missiles failed to deliver sustained suppression of air defenses. They imposed friction but did not achieve the decisive openings needed to alter the course of the campaign.

The lesson is clear. Iran's SEAD strategy has evolved into a coherent doctrine built on missiles and drones, but its tools remain a substitute—not a replacement—for modern airpower. They serve to contest the battlespace, not to dominate it. Iran can harass, saturate, and impose costs, but against technologically superior, multi-domain opponents, it cannot secure lasting air superiority. That gap—between ambition and effect—defines both the ingenuity and the fragility of Iran's SEAD doctrine in the twenty-first century. 🦅

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