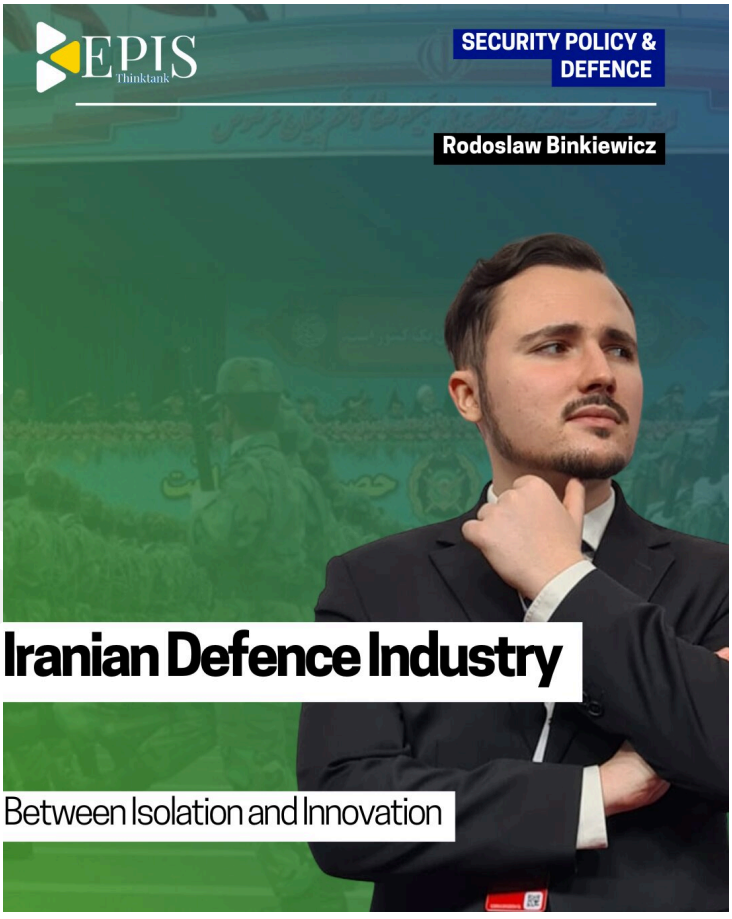
Iranian Defence Industry

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Iranian Defence Industry: Between Isolation and Innovation

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Introduction

The national defence industry can be regarded as a key indicator of state capacity and strategic autonomy. For most countries, military procurement remains deeply embedded in global supply chains, dependent on foreign technologies, licensing and political alliances. This also means varying

degrees of external control over a nation's escalation capabilities. Iran, however, stands as a striking exception. It is perhaps the only middle power in the world so thoroughly committed to the pursuit of what can be called defence autarky, meaning a policy of near-total self-reliance and indigenisation in the research, production, and maintenance of military equipment. Regime officials and state news outlets claim that over 90% of military equipment and defence systems used by the Islamic Republic are designed and manufactured inside Iran (Tasmim News Agency, 2025). Even after taking this information with a grain of salt, given its propagandistic value, it is evident that no other country, aside from possibly North Korea, has sought to insulate its defence sector so completely from external dependence. This determination has been driven by both ideology and strategic necessity. The Islamic Republic of Iran was created in the wake of the 1979 Revolution, with one of its main slogans calling for the new order to constitute a third way – neither Western (capitalist), nor Eastern (communist), but Islamic instead. Meanwhile, the Iraq-Iran War (1980-1988), combined with decades of subsequent international sanctions, pushed Tehran towards a policy of defence autarky marked by a paradoxical interplay of isolation and innovation. This resulted in a deeply unbalanced defence industry environment, characterised by both highly obsolete and innovative aspects.

Historical Background

The foundations of Iran's defence industry predate the Islamic Revolution. Under the Pahlavi monarchy (1925-1979), the majority of military equipment used by the Imperial Iranian Army consisted of Western munitions. In the 1970s, it was widely considered to be the world's fifth strongest military force. The Shah's mass purchase of the latest American technology then available on the market was estimated in 1979 to be worth between 8 and 10 billion dollars (Branigin, 1979). This means between 34.8 and 44.62 billion US dollars in 2025. The Pahlavi-era defence industry thus focused almost exclusively on maintaining and repairing foreign designs. Despite this, there was already some interest at that time in developing advanced missile systems, foreshadowing later, more intense Iranian endeavours in this domain. This interest was made manifest, for example, by the so-called Project Flower, a joint Israeli-Iranian program, which lasted from 1977 to 1979.

Much changed after the Revolution and the overthrow of the Pahlavi Dynasty. Iran became a heavily sanctioned regime, cut off from outside trade and imports. It also waged a brutal 7-year-long war against Saddam Hussein's Iraq, known in Iran as Sacred Defence. It ended only in 1988 and became a founding myth of the Islamic Republic. It can be argued that this isolation worked as the main evolutionary pressure on further development of the Iranian industrial base. Limited access to foreign equipment, replacements, and spare parts during wartime necessitated a complete and urgent

reorganisation of the previously import-dependent Iranian armed forces. Instead of crippling Iran's military, Western sanctions became an incentive for defence autarky. The Islamic Republic had to make substantial long-term investments in state-owned defence industries, enabling the domestic production of everything from small arms and ammunition to rockets, missiles, mines, boats and components needed to keep older systems operational. Those investments continued even after the war, over time creating a highly complex, centralised, and hierarchical defence-industry structure. The modern Iranian defence industry was built on the foundations laid in the Pahlavi era. However, in many respects, the two exist at opposite ends of the spectrum and face opposite problems. One enjoys an extensive budget, is over-reliant on imports, and neglects domestic production, whereas the other faces significant resource constraints and lacks access to many modern cutting-edge technologies.

Artesh and IRGC: Major Stakeholders

Most Iranian industries are either fully nationalised or closely connected to either the IRGC (Islamic Revolutionary Guard Corps) or the Iranian military. This is especially true of the defence industry. Unlike most countries, Iran possesses two separate and parallel primary branches of armed forces, each with its own duplicating capabilities and procurement. One of them is the Islamic Republic of Iran Army, commonly known as Artesh, which is the army in the classical sense. The purpose of Artesh is to serve the State as its military and protect national territorial sovereignty. The other branch comprises the Islamic Revolutionary Guard Corps. IRGC is loyal not to the Iranian State, but personally to the Supreme Leader (Rahbar). It is tasked with defending the system and ideology of the Islamic Revolution. The IRGC is the dominant force in the Iranian defence industry and exerts greater influence than the Artesh (McInnis, 2017). IRGC influences or outright controls key programs, such as the indigenous UAV and drone production, missile programs or satellite launchers, and possesses immense political, economic and institutional influence over the whole defence industry. Artesh remains an operational stakeholder with much weaker political influence, primarily dominating the areas of conventional weapons and the maintenance of legacy systems.

Defence Industry Structure

The standard structure of the Iranian military-industrial complex resembles a pyramid, on top of which resides the Rahbar. Below him is the Armed Forces General Staff (AFGS), which oversees both branches of the Iranian armed forces and exercises direct operational command over them. Below lies the Ministry of Defence and Armed Forces Logistics (MODAFL). It handles funding and planning. It is also a crucial player in the defence industry, controlling numerous maintenance, manufacturing, and R&D entities. The

main example of the last category is Malek Ashtar University of Technology (MUT), which provides the Iranian defence sector with a steady stream of scientists and engineers (McInnis, 2017). MODAFL also oversees several IRGC-related companies, which, due to the IRGC's secretive nature, form an opaque industrial cluster separate from, but partially overlapping with, the rest of the national defence industry.

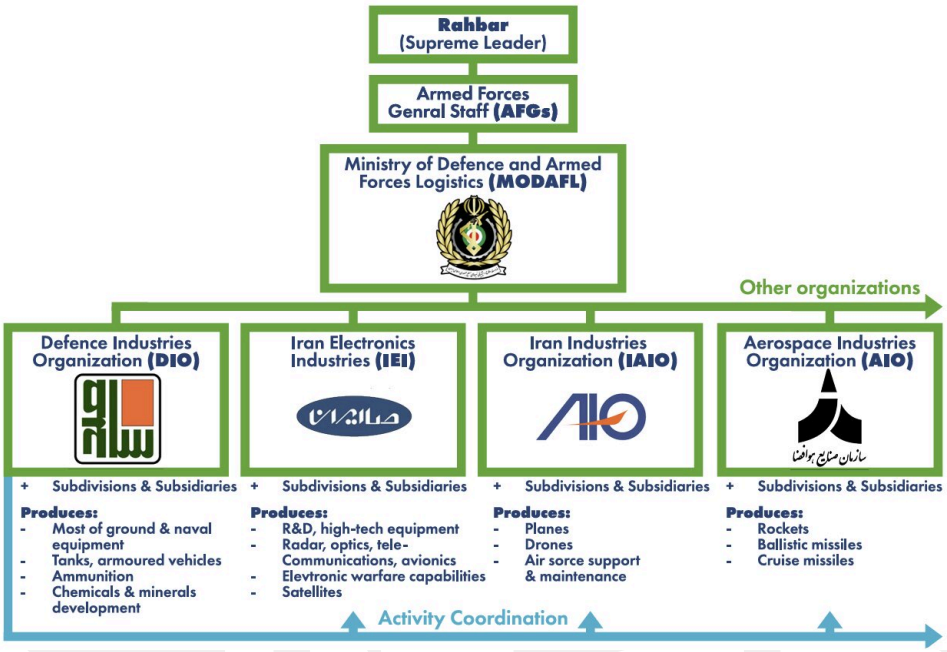


Figure 1: Simplified structure of the Iranian defence industry (Source: Own Work).

There are hundreds of organisations, companies, and research institutions under MODAFL, but four specific subsidiaries can be identified as the major pillars of the Iranian defence industry. The first one is the Defence Industries Organisation. DIO originally served as the chief overseer of the nascent Iranian arms industry under the Shah. Currently, its role remains similar. It is the primary supervisor coordinating the activity of the rest of the system. Over time, DIO involved itself in all military production and R&D, becoming one of the engines of Iranian defence autarky (McInnis, 2017). It is a large conglomerate comprising over 300 smaller companies that produce most of the military equipment and ammunition, and also develop chemicals and minerals for use by the Iranian armed forces. Iran Electronics Industries (IEI) is another important subsidiary of MODAFL. It too originates from a Pahlavi-era company. Since then, IEI has evolved into a powerful conglomerate specialising in the production of high-tech equipment, including radar, satellites, telecommunications, avionics, and electronic warfare systems. It is also one of the main R&D investors. IEI established joint research centres in cooperation with at least 14 Iranian universities. The Iran Aviation Industries Organisation (IAIO) is responsible for planning and managing Iran's military aviation industry. Its subsidiaries produce aircraft, develop the Iranian drone industry, and are responsible

for the particularly impressive feat of keeping legacy Cold War designs operational, such as the American F-4 Phantom fighter jet. The final pillar of the Iranian defence industry is the Aerospace Industries Organisation (AIO). It is the youngest of the four, established around 1998 and without any prior Pahlavi predecessor. It specialises in the production of rockets, ballistic missiles, and cruise missiles. It is also one of the most obscure major organisations under MODAFL, which can be explained by the strategic importance of long-range missile capabilities for Tehran. AIO is also one of the entities most targeted by Western sanctions due to its role in enabling possible nuclear proliferation.

Coping Under Sanctions

The Islamic Republic's defence industry thus differs significantly from models more familiar to Western observers. It is not a traditional market with competing private contractors, but a vertical, state-managed yet overlapping industrial complex composed of multiple specialised conglomerates. They form a near-complete internal supply chain, from materials to final assembly, thereby reducing dependence on external imports. To avoid a single point of failure, key sectors are geographically spread out. Arms factories are often located underground or even abroad (Iran International, 2025). Detailed information on the possible locations of those factories is scarce due to their confidential military status. Some sources claim that factories are located in the territories of Iran's proxies and neighbouring Iraq (Kalev, 2025). However, there are also reports of their presence in countries such as Tajikistan, Russia, and Belarus (Jhaveri et al., 2023), as well as in Venezuela (Caruzo, 2025).



Figure 2: Map of possible locations of Iranian military factories abroad (Source: Own Work).

This drive for self-sufficiency was enabled by the systematic reverse engineering of captured, purchased, or otherwise acquired foreign equipment, which is one of Iran's main methods of technology acquisition. Foreign

blueprints or parts are then localised and indigenously produced as new Iranian designs. For example, most Iranian ASCMs are based on reverse-engineered Chinese C802 missiles; the Zulfiqar tank is based on the Brazilian Engesa Osorio; and the Ya Zahra 3 short-range air defence system is a reverse-engineered and upgraded version of the French Crotale. In contrast, Shahed-171 and related drone designs are based on the American Lockheed Martin RQ-170 captured in Iran in 2011 (Gawęda, 2021).

Another way the Iranian defence industry operates is through the integration of civilian and military sectors, as well as the introduction of dual-use technologies. In many ways, Iran was an early innovator in the area of defence integration into civilian sectors. Multiple universities collaborate closely with the IRGC and the Artesh, providing materials, composites, programming, and scientific staff. The automotive industry is similarly connected to the defence sector. SAIPA and Iran Khodro, two Iranian companies that dominate the market and produce the vast majority of cars in the country, have close ties with MODAFL and its subsidiaries, which provide the armed forces with necessary industrial machinery, engines, and metallurgical capabilities (Ghasseminejad, 2020). Iranian oppositional groups have even claimed that the IRGC in fact controls the automotive industry, connecting it to the opaque cluster of IRGC-related companies (Hakamian, 2024). Khatam-al Anbiya Construction Headquarters is another example of the civil-military fusion. It is an IRGC-controlled engineering company that serves as Iran's primary contractor for large-scale civil and military engineering projects. Khatam-al Anbiya constructs roads and dams, water, oil, and gas pipelines, and is involved in mining, agriculture, and telecommunications projects, but is also the prime contractor for Iran's ballistic missile and nuclear programs (Iran Watch, 2023). The IRGC can also use Khatam al-Anbiya to finance defence projects outside the official budget and to import technology via shell companies, thereby bypassing the financial restrictions imposed by sanctions.

Moreover, despite sanctions and the resulting isolation on the international stage, Iran has never been completely cut off from the outside world. It maintains ties with countries like North Korea, China, Russia, Venezuela, Iraq, Yemen, Lebanon, Libya, and Syria (especially during the Gaddafi and Assad regimes). This has allowed Iranian authorities to bypass Western restrictions, engage in limited imports and even test their designs in real combat environments through regional proxies. This cooperation among detractors of American hegemony is one reason for the success of the Iranian missile sector, which has become the most praised component of the entire defence industry. After the devastating experience of Iraqi ballistic and chemical bombardment during the Iraq-Iran War, DIO reached out to Syria, Libya, North Korea and China to acquire missile components and chemical capabilities. Cooperation with North Korea proved especially profitable (McInnis, 2017). Significant components of Iranian long-range ballistic missiles rely on North Korean designs, despite decades of subse-

quent indigenisation and domestic development. In recent years, Iran has also begun exporting military equipment abroad. This is the case especially in the area of Iranian military drones. Shahed 136 drones exported to Russia play an important role in the Russian invasion of Ukraine. Other Iranian exports have reached Ethiopia, Bolivia, Venezuela, and Western Sahara (Citrinowicz, 2024) and are also used by the Sudanese Armed Forces (SAF) during the ongoing Sudanese Civil War (Tyson, 2025). This provided a significant revenue stream for the Iranian regime. UN sanctions on Iranian military exports were reaffirmed in September 2025, but their impact is yet to be assessed.

System of Imbalance

Despite those successes, the doctrinal focus on defence autarky is not without high costs or lasting consequences. Iran lacks the resources and economic capacity necessary to support a modern, fully self-reliant industry. This forces Tehran to specialise and prioritise certain areas, thereby creating a structurally imbalanced system. Different industries and segments of the military possess different levels of capability. Many conventional sectors, such as artillery, tanks, armoured personnel carriers, and general infantry forces, remain underfunded and underinvested in. Others are completely obsolete. The Iranian air force, once the pride of the Pahlavi military, has to rely on outdated machines which require regular cannibalisation of spare parts to keep planes operational. A similar situation occurs in the Navy. The Artesh's fleet is small and composed mostly of ageing corvettes, frigates and warships. Naval forces of the IRGC, however, present the opposite side of the coin. Major Iranian investments go into unconventional, asymmetric, cost-effective, or even makeshift solutions, and these are the areas in which the Islamic Republic's defence industry excels. The IRGC possesses a large navy composed of relatively cheap, mass-produced, and fast attack boats designed for guerrilla warfare. Iranian authorities have, for decades, invested heavily in missile procurement, production, and development, acquiring a largely indigenous long-range missile arsenal, including designs such as the hypersonic Fattah-1 and Fattah-2 (Pierce, 2025). The drone sector is another strong point for Iran. Tehran can be considered one of the foremost global innovators in drone warfare, with the low-cost and easily manufacturable Shahed drones being the most famous example of Iranian expertise in this domain. This system of imbalance in the Iranian defence industry is important because it at least partially explains many of Tehran's strategic decisions in recent decades.

Asymmetric Warfare as a Consequence of Defence Autarky

Defence autarky and resulting systemic imbalance of the defence industry essentially necessitate the adoption of the asymmetric warfare doctrine by Iran. The state has limited resources, is partially isolated, and is under

constant pressure from sanctions. It operates in a challenging geopolitical environment, while its rivals are typically stronger in conventional terms. This incentivises Tehran to seek ways of subverting the equation. The strategy pursued by Iran since the turn of the 21st century, known as the Axis of Resistance, is an excellent example of this approach. The Axis of Resistance is a broad coalition of militias and political organisations that serves as allies and proxies of Iran in regional conflicts against Tehran's enemies. It consists of multiple non-state organisations in Lebanon, Jordan, Bahrain and Afghanistan, Palestinian and Iraqi armed groups and even de facto state actors, such as the Houthis ruling northern Yemen or, until his downfall, the Bashar al-Assad regime in Syria (Steinberg, 2021). The logic behind the Axis of Resistance is that through the use of its regional proxies, Iran can surround, tie down and harass US and Israeli forces without entering into a confrontation. The proxies can be armed with Iranian arms, especially drones and rockets, while the arsenal of long-range missiles serves as a deterrent against attacks on Iran itself. This way, Tehran can utilise all the assets provided by its defence industry. However, the fact that the IRGC is the primary stakeholder in the Iranian defence industry, while the Axis of Resistance is also mainly an IRGC project, creates a certain vicious circle. Sanctions and the Iraq-Iran War led to the pursuit of defence autarky, which made Iran, and especially the IRGC, adopt 86 an asymmetric warfare doctrine. IRGC control over the defence industry now reinforces defence autarky and uneven specialisation of the defence industry, creating a self-strengthening feedback loop. This raises questions about potential flexibility and Iran's ability to adapt to sudden changes in conditions, such as those that occurred in the Middle East in 2025.

Conclusions

The Iranian defence industry is a unique case of sustained, decades-long pursuit of defence autarky. Tehran achieved substantial self-reliance in military production, maintenance, and R&D, successfully developing its defence industry under the evolutionary pressure of sanctions. This, however, produced a deeply uneven defence sector, simultaneously obsolete and immensely innovative. Many armed forces branches suffer from a chronic lack of funding and outdated equipment, while cost-effective, out-of-the-box solutions have led to the proliferation of asymmetric capabilities and new technologies. This systemic imbalance is a key factor shaping broader Iranian strategic doctrine, as evidenced by the case of the Axis of Resistance. For decades, it served as the primary instrument of Iranian influence in the Middle East, although it has recently faced significant setbacks. The war in Gaza, the fall of the Ba'athist regime in Syria and the so-called Twelve-Day War between Israel and Iran in June 2025 shook the Axis of Resistance, representing a crisis of Iranian grand strategy. The war with Israel and later events are also a great trial for the Iranian defence industry.

An analysis of its effectiveness in light of recent conflicts requires a separate article.

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