

The F-35 and Israel's Security Concept

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In August 2010, then-Israel's Minister of Defense Ehud Barak decided to adopt the IDF recommendation to purchase the F-35 as the air force's future combat aircraft. The aircraft, which is advancing rapidly toward operational status in Israel, is expected to cope with difficult challenges on the future regional battlefield, including both "new" military conflicts with sub-state, hybrid, and "invisible" enemies that have adapted themselves to the globalization era, and revolutionary technologies possessed by advanced armies that have succeeded in changing the approach to the use of force in military conflicts. Since that decision in 2010, much has occurred in the region likely to affect Israel's security concept, and consequently its force buildup. In the meantime, the first fifth generation warplane of its type has arrived in the Middle East – the F-35 Joint Strike Fighter ("Adir," in Hebrew), which is likely to serve the air force in the coming decades. Is the F-35 suited to Israel's security concept, and if so, in all aspects?

The F-35 Project

There are three models of the fifth generation combat aircraft F-35: A, B, and C.¹ The Ministry of Defense has purchased model A planes, and will install advanced Israeli capabilities in them. Thirty-three aircraft were ordered at \$110 million per plane, and the cabinet recently approved the purchase of 17 additional planes. Due to the high price, this is the most expensive global weapons project in history (with a projected cost of \$1.5 trillion).²

The F-35 is a unique aircraft with innovative and advanced capabilities,³ such as a high standard of independent defense, based on the plane's shape and stealth materials that give it a low radar cross-section and enable it

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to avoid detection by radar. Furthermore, the aircraft has an independent electro-optical system with high quality sensors (a distributed aperture system) that provide the pilot with a defense and warning space around the aircraft that can alert as to threats, missiles, and planes, and improve his situation awareness. The plane's interception capabilities are among the best in the world: its F135 engine makes it powerful, and it is equipped with an active electrically scanned array (AESA). It has the integrative ability to carry heat and radar-guided AIM-9X air-to-air missiles (AMRAAM) and a helmet-mounted display system (HMDS) with a 360-degree display. The aircraft also has unique air-to ground attack capabilities, because it is able to carry a large number of types of advanced armaments, and thus independently close intelligence circles for attack.

Process of Force Buildup

The procurement process is of great importance in force buildup. In the case of the IDF, the process is extensive and especially complex, because Israel lacks strategic depth. Decision makers must therefore establish principles for force buildup that will provide an optimal solution for the array of challenges on the various fronts. Resources are limited, and based on calculated risks, the IDF must take decisions and give certain equipment priority over others. For example, an additional purchase of Iron Dome launchers and missiles is likely to provide better defense for the Israeli home front, but at the same time does not improve the IDF's attack capabilities at all, and in effect comes at their expense. In other words, the total aggregate procurement is what is important.

The Compatibility of the F-35 to the Security Concept

This essay assesses the compatibility of the F-35 with the Israeli security concept early in the 21st century. The parameters for the analysis are based on the defense doctrine, IDF strategy, and the elements of possible conflicts: deterrence, advance warning, defense, technological and intelligence supremacy, a limited campaign, all-out war, and a campaign between wars. Each of these seven criteria will be analyzed from a critical perspective of the F-35 aircraft, its contribution, and its capability. Following an analysis of each parameter, the findings will be summarized and assessed.

Deterrence

Deterrence affects the enemy's intentions, which inter alia are influenced by its relative capabilities. In other words, the fact that Israel has acquired a fifth generation stealth aircraft changes the strategic balance in the Middle East. As a result, some of the regional actors are likely to think twice before embarking on a military campaign against an enemy with innovative capabilities such as those possessed by the F-35.

Who is the object of this possible deterrence, and is general deterrence involved, or is it aimed at a specific actor? The issue is complex, because Israel is capable of enhancing its military force with advanced technologies, yet the latest aircraft has no influence on the "lone wolf" terrorism phenomenon,⁴ for example. It is unlikely that a potential lone wolf will consider the F-35's capabilities when deciding to carry out some terrorist operation. On the other hand, an organization like Hezbollah, which wants to damage Israeli warplanes, is likely to take the F-35's stealth capabilities into account when assessing the feasibility of going to war. Similarly, regular armies – the few remaining in the Middle East since the outbreak of the Arab Spring and the collapse of nation-state frameworks – are expected to weigh the implications of a fifth generation aircraft in the hands of enemies or rivals. Without any doubt, the effectiveness of deterrence depends in part on the type of enemy.

State and semi-state armies are the principal addresses for this deterrence, because they are liable to actually experience the aircraft's relative advantages on the battlefield. Terrorist organizations, on the other hand, however significant they may be, might well ignore the F-35's existence, because their war is waged largely in the sphere of consciousness, rather than on the aerial technological battlefield; and because the balance of deterrence is different for them. It was argued in the past that adopting a strategy of deterrence towards terrorist organizations and sub-state entities, such as Hamas in the Gaza Strip, is more complicated and difficult to implement than deterrence against countries. As an organization is increasingly established and behaves more like a state, however, with general responsibility for the population (like Hezbollah, for example), the chances that deterrence against it will succeed are greater.⁵ Israeli deterrence will therefore become stronger, although not necessarily against all actors.

The fact that Israel has acquired a fifth generation stealth aircraft changes the strategic balance in the Middle East.

Currently and in the very near future, Israeli will be the only country in the Middle East equipped with fifth generation aircraft, a fact that gives Israel an exclusive qualitative advantage for the time being. Turkey, on the other hand, is slated to receive its first F-35 in 2018, and plans to procure 100 of the aircraft in the coming decade.⁶ Furthermore, other countries in the region are likely to buy the plane in the future, and if not the F-35, then a similar fifth generation aircraft, such as the Chinese Chengdu-J20, the Russian Sukhoi T-50, and the like. The Russian and Chinese aircraft are generally inferior to the American planes, but if they reach certain countries, such as Iran, they are certainly liable to prove challenging to Israel. The number of F-35 planes possessed by Israel is therefore also significant in order to strengthen deterrence.

Advance Warning

The concept of advance warning refers to the intelligence community's efforts to detect the enemy's intentions correctly. Based on David Ben-Gurion's classic concept, advance warning is designed first and foremost to provide the IDF with the time it needs to call up reserves when necessary. At the same time, in contrast to the classic advance warning, which deals mainly with detecting intentions to go to war, deterrence in the 21st century during the "third period" (referring to the period since the end of the twentieth century, with the increase in wars against non-state actors) according to Prof. Isaac Ben Israel also requires a focus on obtaining intelligence about individual targets in order to use force precisely and effectively.⁷ Advance warning is therefore intelligence for war, intelligence for defense, and intelligence for attack.

The F-35 has intelligence systems and sensors for advance detection that provide intelligence for attack, advance tactical warning, and intelligence gathering. The aircraft's advanced systems enable stealth fighter pilots to communicate directly with ground controllers, call for assistance, direct forces, and issue far more precise warnings about threats than can be provided by the currently available tools. According to General Gary L. North, in addition to being a warplane, the F-35 is also a flying internet system capable of handling large and diverse quantities of data from the battlefield and providing a system-wide picture for control, ground forces, and other military forces.⁸

The contribution of the F-35 to advance warning is quite significant, but precision is important. The aircraft makes no substantial contribution

to Ben-Gurion's concept of advanced warning of war. By itself, the plane will find it difficult to issue advance warning that any particular army is planning a war against Israel. It can be assumed, however, that operational advance warning can be streamlined in the F-35 era through its advanced sensors and processors, thereby contributing to deterrence during the "third period" – obtaining intelligence about individual targets that facilitates the effective use of force.

Defense

The defensive dimension of Israel's security concept is newer than other dimensions. In the past, military planners in Israel preferred to develop flexible offensive capabilities in order to cope with strategic threats, rather than focusing on efforts at defense. Today, it is clear that defense constitutes a decisive factor in the security of the state, and it plays a significant role in the defense establishment's considerations.

The professional literature focuses its efforts on active defense, mainly in the air defense array. This comes as no surprise, given the nature of the conflict, the enemy's war strategy, and the resulting threat to the Israeli home front. The F-35's role in defense against missiles will be extremely minimal, but a broader perspective is nevertheless required.

Defense is also required against enemy aircraft, land forces, cyber threats, and more – not just against missiles. The F-35's contribution to defense is therefore divided between two separate layers that jointly provide a complete solution. First, the F-35's air-to-air and stealth capabilities enable the aircraft to carry out the air force's primary mission – defending the nation's skies against hostile aircraft – in an optimal way. The F-35's stealth capabilities are likely to constitute an advantage in this mission, especially in air combat beyond eyesight range (it is liable to be inferior in dogfights). Second, the aircraft's intelligence capabilities will enable it to close attack circles and hit rocket launchers, thereby damaging the enemy's attack, and consequently strengthening Israeli defense. The F-35's contribution to defense is therefore definitely substantial.

Technological and Intelligence Superiority

Israel customarily invests in quality personnel and technology, in order to overcome quantitative inferiority. The F-35 was designed explicitly to provide its owners with technological superiority, such as stealth, air-to-air, and attack capabilities; according to the aircraft's specifications, it is

currently among the best in the world in all of these aspects. The air and land threats that Israel faces are changing, and in response, Israel must always remain one step ahead of its enemies. In effect, technological superiority is what enables aircraft on the new battlefield to carry out their missions effectively. Because of its stealth capabilities, advanced air-to-air missiles, and independent defense systems, the F-35 is regarded as an aircraft that bestows air superiority.

The combination of the systems, stealth, and the aircraft's performance yielded impressive results in American exercises and training. In one exercise, 10 planes were "downed," compared with no stealth fighters downed;⁹ in another exercise, F-35 planes "destroyed" the F-15E planes sent against them.¹⁰ There is a clear trend in which fifth generation stealth aircraft enjoy unequivocal superiority over their fourth generation opponents, and not only in the air. In the context of attacks against ground targets, the F-35's immunity enables it to reach threatened areas without being detected, and to attack targets by utilizing independently gathered intelligence information. In other words, this warplane is capable of carrying out operations that formerly required an entire air and land system.

Limited Campaign

Israel's current approach to the use of force against its enemies is sometimes described as "mowing the lawn" – a new term in the Israeli strategic nomenclature, reflecting the assumption that Israel is in an unsolvable ongoing conflict against hostile non-state entities.¹¹ The F-35's contribution to limited conflicts lies in two principal areas: first, the ability to attack targets while avoiding detection. The aircraft is capable of carrying two half-ton bombs, while preserving its stealth capability.¹² In certain scenarios, such as a possible conflict against Hezbollah in the north, the ability to remain airborne in a threatened area can improve the air force's effectiveness, despite the drawback that the quantity of munitions that can be carried in a stealth configuration is limited. Second, intelligence for attack and advance warning, as described at length in the preceding sections, is essential in the case of a limited conflict with a high degree of uncertainty. Every bit of intelligence, whether for defense or offense, is of importance in preventing the enemy from attaining its objectives. The conclusions indicate that the F-35 is likely to contribute relevant capabilities in a limited conflict scenario. At the same time, the capabilities are not revolutionary, because the nature of a limited conflict and the complicated strategic discourse accompanying

it depend on more than just capabilities. The operational capabilities are not necessarily the gap, rather, the combination of intentions and capabilities of each side in the conflict and the violent interface accompanying it. A unique operational contribution therefore does not necessarily change the strategic balance in a limited conflict.

All-Out War

As of 2017, the reference scenario for a large scale Israeli conflict involves a multi-front and multi-dimensional scenario against sub-state, irregular, or semi-irregular organizations on Israel's borders, with an emphasis on the northern border and the threat from Hezbollah. The F-35 is capable of making many contributions in an all-out multi-theater scenario. According to a study conducted for the American air force concerning the future battlefield and its challenges,¹³ it is clear that air technological superiority will be essential in order to provide a solution for the challenges of a future war. In addition, rapid integrated intelligence gathering, processing, and analysis capabilities will be needed to make operational decisions on the dynamic battlefield. Accordingly, it can be argued that the F-35 is also capable of contributing to the Israeli air force in current, and mainly future, all-out wars. The F-35's unique technologies are adapted to the future battlefield, and therefore the aircraft is capable of generating a turnaround in all matters pertaining to air combat in an uncertain large scale war, and is likely to improve the chances of victory.

Campaign between Wars

According to the IDF strategy, the unstable strategic environment, with many regional actors and mutual deterrence against war, leads Israel to operate below the escalation threshold in order to weaken the negative armed groups, limit the enemies' buildup of forces, create optimal conditions for victory in a future war, generate legitimacy for Israeli action, and detract from the legitimate basis for enemy action – all for the purpose of delaying the next war as much as possible.¹⁴ Operating below the escalation threshold is especially important, because Israel is capable of striking the enemy even without the F-35, but operating below the escalation threshold makes the task much more difficult.

Thanks to its stealth, intelligence, technological, and network capabilities, the F-35 is an excellent aircraft for missions below the escalation threshold.

The F-35's stealth capability of seeing without being seen is likely to improve concealment, thereby minimizing Israel's signature in future operations. In this context, the great advantage of the aircraft is its stealth and the integration between its systems for navigation and locating and identifying targets: its radar makes it possible to obtain an accurate picture of the territory and thwart the enemy's defense measures. The range of its electro-optical systems makes the F-35 fitter for clandestine attack operations. Furthermore, intelligence is a strong point of the F-35, and is extremely significant in closing an intelligence circle for attack in missions about which there is little certainty. Thanks to its stealth, intelligence, technological, and network capabilities, the F-35 is an excellent aircraft for missions below the escalation threshold.

Comparative Assessment

Table 1. F-35 Capabilities and Contribution to Israel's Security Concept

Type of Campaign	Deterrence	Advance Warning	Defense	Limited Conflict	All-Out War	Campaign between Wars
Feature of the F-35						
Air-to-air capabilities	✓	x	✓	x	✓	x
Offensive capabilities	✓	x	x	x	✓	±
Technological and intelligence capabilities	✓	✓	✓	±	✓	✓
Stealth	✓	x	✓	±	✓	✓

✓ = Excellent solution ± Medium solution x = Inadequate response

Clearly the F-35's most significant contribution is likely in an all-out war and deterrence. Its relative advantages will stand out in a large scale conflict scenario in which all the political obstacles are removed, and the presence of the Israeli aircraft as the only one of its kind in the theater (to date) will enhance deterrence as perceived by enemies.

The most marginal contribution of the F-35 is in a limited conflict. It is believed that its unique capabilities will not have a great effect in a limited and restricted campaign. Thus had Israel been equipped with F-35 aircraft during Operation Protective Edge in 2014, the plane would presumably not

have materially changed the conflict. In asymmetric warfare against terrorist groups in urban areas, the F-35 will probably not have a far reaching effect.

Advance warning is another aspect of the security concept where the F-35 is of limited use. Its technological and intelligence capabilities provide advance tactical warning during a battle, for example, warning about moving a battery of land-to-air missiles that has begun to broadcast, or gathering intelligence about an attack. On the other hand, given the fact that the aircraft's other capabilities provide no solution for advance warning, and since there is no broad advance warning of a war (in the classic sense), this solution is far from complete.

Two other elements analyzed are defense and conflict between wars, and the F-35 will make a prominent contribution in both of them. Regarding defense, most of the aircraft's capabilities are highly rated. From stealth to excellent technologies providing air superiority, the F-35 will improve the defense of Israel's skies against most aircraft. Nevertheless, the contribution to active defense against high trajectory rocket weapons is marginal, and the F-35's expected response to this will be solely in detecting and attacking a launcher (a minimal accomplishment in comparison with the number of guns and the fact that what is involved is probably a responsive and not a preventive attack).

A conflict between wars is extremely significant for Israel. The F-35's important contribution in this aspect is its intelligence gathering capability using its array of sensors and stealth flying that makes it possible to carry out a mission without exposure. At the same time, in comparison with fourth generation aircraft possessed by the Israeli air force, the F-35's attack capabilities in a conflict between wars give it an only a medium advantage over the existing alternatives.

Criticism

Three main criticisms appear in the literature. The first alleges that the number of malfunctions in the plane is unreasonable and makes it operationally unfit. The second alleges that because the aircraft is designed for a broad range of missions according to the multi-tasking principle, it has lost the basic capabilities of a warplane (in an attempt to achieve too much), and is therefore in some respects inferior to the alternatives. Third, the F-35 carries a very high price tag, and it was proposed instead, for example, to buy thousands of advanced remotely controlled aircraft.

It appears that the first criticism does not deviate from criticism of comparable past projects, and it should be assumed that the malfunctions will be corrected. An aircraft becomes operational through a natural process. In this context, for example, the *Defense News* website issued a warning about the F-35's ejection seat, claiming that its performance is inadequate for pilots weighing 47-62 kilograms (the reports indicate a 20 percent probability of death in an escape from the plane for this weight category).¹⁵ The report unquestionably conveys severe criticism, but the problem will presumably be corrected, because many warplanes had problems early in their development. For example, the Israeli Baz (Falcon-F-15A/B/C/D) had escape problems and pilots lost their lives in escape accidents over the years. The system was later fixed, however, and the problems have now been solved. In response to the criticism, Lockheed Martin publicly stated that despite the problems appearing in various reports, 50,000 flying hours proved that there were no terrible failures or serious events in the development of the F-35 project, in contrast to most past projects.¹⁶

The second criticism regards the F-35's basic capabilities in comparison with fourth or 4.5 generation aircraft. The argument is that the great efforts made to perfect the plane have come at the cost of key capabilities required in battle. In the past, F-35 test pilots expressed concern about its capability in close combat, because its maneuvering abilities were inferior to those of faster warplanes (such as the F-16).¹⁷ This dilemma always exists – between advanced technologies and innovative systems that add weight and drag to the airplanes versus lightness and simplicity that enable an airplane to maneuver nimbly in close air battles. It is very likely that the maneuverability will be less important in future combat than technological superiority and stealth. The F-35's air superiority is designed to deal with air threats at long range in order to avoid close air combat requiring sharp maneuvering. This does not differ from the Falcon, which maneuvers better than the F-15I Ra'am (Thunder), a succeeding model, because two excellent Israeli strategic attack capabilities and air systems were added to the latter. Air forces rely on a broad range of tools and capabilities; no single aircraft is capable of winning a conflict by itself. The solution lies in integration of different set-ups and means in order to handle the array of threats. Partly for this reason, remote-controlled aircraft and 4.5 generation aircraft are inadequate substitutes for the F-35.

The third point is the financial aspect: that the project is indeed very expensive is indisputable. Since the project began in 2001, the price per plane

has skyrocketed by 97 percent.¹⁸ At the same time, according to the project's official website, the projected maintenance costs for the 55 years of the F-35 plan dropped 22 percent in 2013. From a long term perspective, including maintenance and spare parts prices, the projected price is reasonable, in comparison with the alternatives. Furthermore, the cost of the aircraft in 2018 for delivery to the buyer in 2020 is slated to be \$85 million.¹⁹

The latter two arguments – concerning the cost and exaggerated perfection – are not new. The F-22 Raptor is a plane owned only by the United States; Congress does not allow it to be exported. The F-22 is currently the “most lethal fighter ever.”²⁰ Nevertheless, the harsh criticism it drew from its opponents was not different from the criticism of the F-35. In 2013, an article was published describing the criticism of the Raptor as absurd, and saying that despite the aircraft's stealth capabilities and technologies, and even though it had complete air superiority, its high price was criticized in comparison with its limited capability (the same criticism made of the F-35).²¹

Conclusion and Recommendations

Israel purchased the F-35 for battle purposes in a complex environment, utilizing its stealth and technological advantages. It is expected to be included in all air force missions and on all war fronts as the leading aircraft of its type in the world, and this will require a process of adaptation and adjustment on all levels. A historical assessment shows that in combat, warplanes have not necessarily performed the missions for which they were designated in the original plan in the production stage, and this is even truer of airplanes built during peacetime. For example, it can be seen how the classic missions of the F-16s and F-15s in air-to-air combat have lost weight with the passage of time, to be replaced by various types of attack missions. It is hard to predict exactly how the F-35 will contribute, because we do not know what future wars will be like. Nevertheless, according to air warfare experts, it will be one of the world's leading tools for the next 50 years.²²

Judging by the F-35's planned capabilities and in actual tests, and in accordance with the security concept, IDF strategy, and an analysis of regional wars, the main contributions expected from the F-35 are victory in an all-out war and in deterrence. Furthermore, it is expected to make a medium-to-good

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contribution in campaigns between wars and in defense. On the other hand, for reasons explained above, the F-35 is expected to make little contribution to advanced warning and in a limited conflict. Many financial and technological difficulties emerged during the project, with timetables postponed, and it remains to be hoped that it will meet all the requirements promised by the manufacturers. At the same time, despite its advantages, the aircraft is not a panacea for Israel's defense problems, and most of its missions can be performed using fourth generation aircraft.²³ However, as this essay has pointed out, the aircraft possesses innovations likely to prove significant on the battlefield; despite the many criticisms of the project, the F-35 stands to prove highly worthwhile. Since no alternative is capable of providing a similar solution for these questions, the decision by the Minister of Defense in 2010 to buy the F-35 indeed serves Israel's security concept well.

Notes

- 1 Model A is the conventional model, model B is for short takeoffs and vertical landings, and model C for aircraft carriers.
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- 3 F-35 Lightning, "F-35 Capabilities: Multi-mission Capabilities for Emerging Global Threats," <https://www.f35.com/about/capabilities>.
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- 8 Judah Ari Gross, "If the F-35 Fighter Jet is so Awesome, Why is it so Hated?" *Times of Israel*, April 6, 2016, <http://www.timesofisrael.com/if-the-f-35-fighter-jet-is-so-awesome-why-is-it-so-hated/>.
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- 14 IDF Chief of Staff's Bureau, *IDF Strategy*, p. 20.
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- 21 "F-22: Capabilities and Controversies," *Defense Industry Daily*, November 2013.
- 22 Farley, "Will the F-35 Dominate the Skies?"
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