POLICY OUTLOOK

TRT WORLD research centre

Hard Times, Hard Choices

Turkey's Next Fighter Jet Procurement

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Through an in-depth analysis of both technical and political considerations, this policy outlook assesses Turkey's options in its quest to purchase its next fighter aircraft. The decision comes down to two choices: either continue to be part of the F-35 Joint Strike Fighter program or opt to purchase the Russian-made Su-35. Both options are challenging as they are intertwined with various geostrategic, political, technical and financial considerations.

Introduction

Following the delivery of the first S-400 components to Turkey in July 2019, the United States announced that Turkey would be 'suspended' from the F-35 Joint Strike Fighter program. This followed the decision to halt new pilot training and the suspension of the delivery of parts and services related Turkey's purchase of the jets. While ostensibly based on technical concerns related to the potential of the Russian-made S-400 system to infiltrate NATO systems and gather critical information about the F-35's capabilities, given the trajectory of Turkish-US relations in recent years, one cannot help but ponder whether broader geopolitical issues are at play. Thus, while Turkey seeks to acquire a fifth-generation fighter as part of the American-led program, it has become clear that Turkey and the US conceive of regional security in different terms, compounded by specific security issues, such as the US support for the YPG. The option to purchase the agile and highly manoeuvrable Russian Su-35 is also on the table. However, this choice too is connected to multiple dimensions, which include various geostrategic, political, technical and financial considerations. This policy outlook assesses Turkey's choices in its quest to purchase its next fighter aircraft through an in-depth analysis of both technical and political considerations.

The final parts of the second battery of Russian S-400 missile defense system arrive at Murted Airbase in Ankara, Turkey on September 15, 2019. (TURKISH NATIONAL DEFENSE MINISTRY / HANDOUT - Anadolu Agency)

The F35 Program

Devised to represent the pinnacle of military aviation, the F-35 program is produced by a multilateral cohort of nations. However, it was asserted that this program was ultimately "designed to advance the interests and influence of the lead state, even as it binds the smaller ones into an asymmetric interdependence." The program itself involves an array of single-seat, single-engine, all-weather, stealth, fifth-generation, multirole combat aircraft, which are designed for both ground-attack and air-interception missions. These combat jets are built by Lockheed Martin and other subcontractors, such as Northrop Grumman, Pratt & Whitney, and BAE Systems. The F-35 program is considered to be the largest and most expensive weapons system ever developed. The F-35, for example, costs almost six times more than the F-16 it is replacing, and throughout its lifespan, the program is estimated to cost around $1.2 trillion, which is about twice as much as sending a man to the moon. Therefore, the program has become the subject of much debate over the past few years. While most of the discussions centred on the superiority of the supersonic stealth jet and its multiple advanced fifth-generation warfare capabilities, little has been generally said about the numerous glitches that have accompanied the design, production, performance, and maintenance of these F-35s.

Developmental, Structural, and Operational Flaws

In 2013, Vanity Fair was one of the first mainstream media outlets to open the debate on the shortcomings of the F-35. The opening lines by award-winning journalist Adam Ciralsky were brutally honest: "[the F-35] is plagued by design flaws and cost overruns. It flies only in good weather. The computers that run it lack the software they need for combat. No one can say for certain when the plane will work as advertised."

This impression is also shared by media commentator Gary Goldman, who argues that the F-35s have failed test after test, requiring frequent retrofitting. According to him, among the reasons for this situation is that the contractor, Lockheed Martin, tried to cut corners by rushing to get the aircraft in the air before prototypes had completed their test flights. This has created new complications, and the planes had to be taken out of service and repaired on numerous occasions. For example, one of the core systems in the design of the F-35 - the Autonomic Logistics Information System (ALIS) - has proven so troublesome that the U.S. Air Force's instructor pilots and students stopped using it entirely in 2018. ALIS, which was supposed to be a one stop solution for training, maintenance and logistical functions, as well as to monitor the aircraft's condition and history, has left the aviators unimpressed. Many ALIS system updates were late and timewasting, and the data displayed is often inadequate or utterly incorrect, requiring various interim solutions to keep the system working. All these factors contributed to poor user experience.

Another major problem is the loss of stealth experienced by the F-35 jets at extremely high altitudes. The U.S. Navy and Marine Corps reported that their F-35s could only fly at supersonic speeds for short periods of time. Otherwise, they would sustain structural damage and loss of stealth capability. This snag makes it impossible for the Navy's F-35C to conduct supersonic intercepts, which is contrary to the one of the main purposes of procuring such an overly expensive fighter jet. Similarly, the F-35 reacts very badly in icy conditions (near minus 30 degrees Fahrenheit or minus 34 Celsius), giving erroneous indications that one of its batteries is out of service, thereby prompting missions to be aborted. This situation occurred in early 2018 in Alaska when several F-35s received such warnings and were forced to land as quickly as possible and switch out the battery. This action wiped out flying hours, raised

costs for maintenance, and instilled doubts about the capacity of the fighter to be used in emergency situations in cold-weather climates. There have also been issues with corrosion in several fastener holes under the fuselage panels. The Pentagon stopped accepting the delivery of F-35s in 2017 after discovering that 200 of the supersonic jets were affected. The issue was fixed by Lockheed, however, deliveries were halted again in 2018 after a dispute occurred between the Pentagon and the contractor who is ultimately liable for such a complex logistical fix.

In a similar vein, in 2015 Marine Corps Lt. Gen. Chris Bogdan expressed his concerns about the integrity of the F-35B's aluminium 496 bulkhead, which bears critical structural loads where the trailing edge of the wing attaches to the rear fuselage. Stress fractures have been discovered on adjacent bulkheads, requiring consecutive "reinforcements," to the extent that a complete redesign of the bulkhead may be needed. Other technical shortfalls, deemed 'category one deficiencies,' have also been associated with the F-35. For example, in at least two cases in 2019, F-35 pilots suffered barotrauma, which involves excruciating ear and sinus pain resulting from sudden spikes in cockpit pressure and causing loss of in-flight situational awareness. This glitch has been known since 2014 but has not been corrected in spite of the contractor's promises.

Then there is the helmet, which is pivotal to the F-35 operability, as the aircraft was initially designed to have a state-of-the-art helmet with sensor fusion and a 360-degree battle-space awareness. The helmet, which is estimated to cost around US $400.000 a piece, presents some serious challenges. The US Air Force officially admitted that there is a risk of neck damage during ejection to middleweight and lightweight pilots. In addition, a "green glow" occasionally hinders visibility on the helmet-mounted display, increasing the difficulty of landing the F-35C on an aircraft carrier.

The U.S. Government Accountability Office (GAO) issued a report (June 2018), in which it stated "as of January 2018, the F-35 program had 966 open deficiencies—111 category 1 and 855 category 2. At least 25 category 1 deficiencies and 165 category 2 deficiencies will not be resolved before full-rate production."

Cost Overruns

While it was initially planned that the first squadrons of the high-tech fighters would be "combat-capable" by 2010, these deadlines were not met. In fact, the entire program has been over budget and behind schedule almost since it was conceived in the 1990s. According to Ciralsky, "the aircraft is at least seven years behind schedule and plagued by a risky development strategy, shoddy management, laissez-faire oversight, countless design flaws, and skyrocketing costs."

Ciralsky also outlined that the initial plan of the Department of Defense (DoD) in 2001 involved the procurement of 2,852 F-35s for a projected US $233 billion. However, in 2013 the Pentagon declared it would be spending 70 per cent more for 409 fewer fighters — without considering maintenance and other costs, which inflates the total cost of the project. In 2019, according to the Pentagon's annual cost assessment of major projects, the estimated total cost of research and procurement has increased by US $22 billion in current dollars adjusted for inflation. In addition, the cost estimate for operating, supporting, and maintaining the F-35 squadrons over 60 years grew by approximately $73 billion to reach a total of $1.196 trillion.

Fixing existing flaws could drive the cost of the F-35 program up. The GAO stated "if the critical deficiencies are not resolved before moving to production, the F-35 program faces additional concurrency costs to fix fielded aircraft — which are currently estimated at US $1.4 billion."

Supply Chain Problems

In 2017, the F-35 achieved a mere 55 per cent mission capable rate. In 2018, according to another report by the GAO, only about half of the F-35 jets worldwide were ready to fly. This was the figure observed during an eight-month period in 2018. Furthermore, a lack of spare parts grounded the combat jets nearly 30 per cent of the time. While the DoD tried to address this situation with the manufacturer and sought to introduce concrete changes to the logistical and maintenance procedures, the GAO's findings suggest the situation was not improving, but rather worsening. The GAO also indicated the DoD has "a limited capacity" to repair the F-35s' broken parts, creating a backlog of 4,300 parts. Furthermore, it took more than six months to fix parts that should have been repaired in a window of two to three months.

Several senior commanders have expressed similar concerns regarding the availability of spare parts. For instance, Air Combat Command Head Gen. Mike Holmes has expressed concerns about the systems' reliability. In his view, logistical and maintenance software systems, such as ALIS, were hindered by numerous software bugs, potentially leading to the designation of certain fighter jets as not mission capable, leading military commanders to ground the aircraft.

In addition, there is an increasing competition about spare parts between existing jets and the new production jets. According to Vice Adm. Mat Winter, the F-35 program executive, "the supply chain is struggling to get parts to Lockheed's production line on time — which increases labour costs because the aircraft cannot move as quickly through the production process." Winter added, "the reliability of parts is still not meeting expectations, and it is taking too long to move them through depot."

Data Security Issues

Several international buyers of the F-35 have expressed their apprehension about the lack of confidentiality surrounding the program. Again, ALIS is at the centre of this debate as it captures all flight data operations pertaining to any nation using the F-35. For the concerned countries, this issue potentially undermines their sovereignty, as the U.S. has unrestricted access to their information. In fact, the international partners' reservations were so serious that multiple nations expressed their intention to pull out from the program if this issue is not addressed. Australia raised this issue back in 2013, however, it was only three years later that the DoD recognised the validity of such concern. As a result, each international F-35 partner was invited to build its own solution to manage the flow of information. Italy and Norway, for example, established their own laboratory at Eglin Air Force Base to filter data accessibility. In the meantime, DoD awarded another contract to Lockheed Martin to develop and test an "ALIS Sovereign Data Management" system for the use of international clients to tackle data security.

The Su-35 Program

While the F-35 is classified as fifth-generation, the Su-35 can be regarded more as a 4.5 generation fighter with some fifth-generation avionics. It is originally a fourth-generation jet that has seen numerous upgrades, including the ability to "deploy current and reasonably foreseeable advanced armaments." Developed and introduced by the Moscow-based Sukhoi Design Bureau for the Russian military, the Su-35 is a multi-role fighter that, unlike the F-35, specialises in air superiority — not stealth. A derivative of the Sukhoi Su-27 Flanker air superiority fighter, the Su-35 made its first flight on February 2008 and had its combat debut in Syria in 2016. China and Indonesia have also ordered the aircraft; Russia completed the delivery of 24 Su-35s in 2019 to the former, and the latter had their shipment of 11 units delayed until the end of 2019.

Strengths

The Su-35 is designed primarily to engage airborne fighters, and as potentially the "best jet-age dogfighter ever made," has numerous strengths. It is renowned for its unrivalled manoeuvrability and ability to attack from high angles, both useful for evading missiles and dogfighting at close ranges. It can fly in one direction with its nose pointed in the other; considering it is equipped with thrust-vectoring engines, the Su-35 can find and target enemy aircraft effectively. In fact, its advanced nose-pointing capability allows the Su-35 to "outmanoeuvre the enemy, 'lock on' to them with [the] radar and heat-seeking missiles and take the decisive shot." Furthermore, with defined air-to-air missile capability and the generally superior evasive capabilities of the Flanker design, it can also intercept enemy aircraft. For example, according to some media

Russian Multi-role fighter aircraft Sukhoi Su-35 flies over Istanbul within the Teknofest Istanbul, Turkey's aerospace and technology event on September 15, 2019. (Islam Yakut - Anadolu Agency)

reports, Russian Su-35s intercepted Israeli aircraft over Syria in August 2019 and forced them to retreat, preventing a second round of airstrikes in the process and showcasing the Su-35's multi-role nature and versatility.

Moreover, it is faster than the F-35 with a maximum speed of Mach 2.25 at high altitude and can maintain supersonic speed even without engaging its afterburners when it is lightly loaded. One American Air Force official stated that "the Su-35's ability to go high and fast is a big concern, including for the F-35," which was built primarily as a strike fighter. Furthermore, the Su-35's service ceiling of 60 thousand feet means it can also climb ten thousand feet higher than the F-35. Combined with an insurmountable edge at low speeds, high combat effectiveness and a superior thrust/weight ratio, the Su-35 has a solid edge over enemy aircraft. It is also decidedly more affordable than the F-35 — cost estimates for the Su-57 "have run between $40 million and $65 million; ...[with] exports contracts...at prices above $80 million per unit."

Additionally, the Su-35 has fifth-generation avionics, which is "the most important difference between the Su-35 and [4.5] generation fighters." The equipped Irbis-E passive electronically scanned array (PESA) radar station allows aerial targets to be detected at a range of around 125 miles (200 km) — even tracking up to 30 targets simultaneously. The radar can be used to detect low and super-low observable and stealth aircraft. The Su-57 also has potent infrared search and track capability, which at 50 (80 km) miles means it can be a legitimate threat to stealth fighters. Moreover, it is equipped with a powerful L175M Khibiny electronic countermeasure system which lets it "distort radar waves and misdirect hostile missiles" at 160 miles (257 km) away. This would make it more difficult to attack and hit the Su-35 in combat, making the enemy waste numerous more missiles to achieve a kill. This aspect, when combined with the fact it carries larger missile load outs than the F-35 in standard combat configurations, makes the Su-35 an extremely formidable opponent. The Su-35 will have "twice as many infrared seeking missiles to fire at their opponents" than the F-35 in close range, meaning it will be able to fire multiple missiles at once to maximise strike probability.

President of Turkey, Recep Tayyip Erdogan (C-R) and President of Russia, Vladimir Putin (C-L) view a Sukhoi Su-57 fighter aircraft as they tour the MAKS-2019 International Aviation and Space Salon in Moscow, Russia on August 27, 2019. (Metin Aktas - Anadolu Agency)

Furthermore, the Su-57 has excellent fuel capacity compared to the bulkier F-35. Its range, which is the maximum distance an aircraft can fly between take-off and landing, is 2200 miles (3540 km) on internal fuel while the latter's is 1400 miles (2250 km). The life expectancy of the Su-57 is also impressive, where it is reliably expected to fly around 6000 flight hours, a massive improvement on its predecessors. The F-35 is showing inconsistency in this area as some jets are only able to fly a quarter of their expected life of 8000 hours because of 'major structural issues'. Some other issues came to the fore when, as aforementioned, the F-35 was tested in Alaska, where the cold-weather conditions overwhelmed the battery sensor and caused the mission to be aborted - in stark contrast to the Su-57's "round-the-clock and all-weather capability."

Drawbacks

The Su-35 also has drawbacks. Primarily, its limited stealth technology means that it is less able to perform stealth missions like the F-35. While the Su-35 is an incredible dogfighter, the F-35 is better able to see enemy jets from far beyond visual range with its state-of-the-art sensors and engage them with advanced missiles. According to Justin Bronk, a research fellow specialising in combat airpower at the Royal United Services Institute (RUSI), the Su-35 would not see the F-35 until it is close, and the latter can "avoid them, engage them, or position themselves for an engagement entirely on their terms." Technology to detect these stealth fighters can be imprecise, so the Su-35 is at a disadvantage and will have to compete with the F-35's stealth and strong beyond-visual-range proficiency through its speed and agility. Besides, while the Su-35 is not a stealth fighter, adjustments "to the engine inlets and canopy, and the use of radar-absorbent material" could reduce its range of detection. It is also important to note that "other factors such as supporting assets, mission profile, pilot training and numbers play a large role in determining the outcomes of aerial engagements."

Another drawback is the Su-35's lack of experience with respect to facing off against other enemy aircraft and exhibiting its combat prowess. While it gained valuable combat experience in Syria, Russia's opponents in that war theatre do not have "any airpower to speak of" for the Su-35 to display its air-to-air specialty, and some shortcomings were noted in the air-to-ground attack aircraft in the conflict. The equipped IRBIS-E PESA radar "failed to accurately and consistently locate and guide bombs onto their targets." Upgrading to the newer and more sophisticated active electronically scanned array (AESA) radar could be advantageous, as the PESA radar is also easier to jam and detect than the radars used by their Western counterparts. Pilots of the Su-35 also have a helmet-mounted targeting system. However, the radar on the helmet is vulnerable to jamming.

A F-35 fighter jet is seen as Turkey takes delivery of its first F-35 fighter jet with a ceremony at the Lockheed Martin in Forth Worth, Texas, United States on June 21, 2018. (Atılgan Özdil - Anadolu Agency)

Conclusion

The procurement of Turkey's next fighter jet is a hard decision to make. Should negotiations be reignited for Turkey to get reintegrated onto the American F-35 program, or should the country opt for the agile and highly manoeuvrable Russian Su-35?

Politically, the US decision to suspend Turkey from the F-35 program is strange at best, and ill-conceived at worse. The United States held that Turkey's commitment to purchase the Russian S-400 air-defence system would endanger the F-35 and NATO systems, a claim that Turkey has consistently denied. Turkey initially wanted to purchase the American PATRIOT air-defence system but was refused and forced to consider alternatives, which consequently lead to a more cost-effective deal for the S-400 with more favourable terms, including crucially technology transfer.

Henceforth, Turkey is again being required to consider alternatives to an American product — in this case the F-35 — with the Su-35 being an attractive, available option. The Su-35 has various strengths, including its dogfighting prowess, versatility and excellent avionics. It also has defined air-to-air and evasive capabilities that capitalise on its high thrust/weight ratio to find and target enemy aircraft in all-weather conditions.

Moreover, its purchase from Russia promises to be smooth sailing with the Su-35 model readily available for sale at a more affordable cost, which could be indicative of how the U.S. government inflates the prices and conditions of its air defence assets if alternatives are limited. This deal would help Turkey modernise its air force, but the jets would not be integrated into NATO's air defence network or have the ability to share data with the rest of Turkey's military aircraft fleet, which represents a major impediment.

All things considered, the F-35 remains a commendable option. The U.S. is actively mulling re-admitting Turkey to the F-35 program, according to Turkey's Foreign Minister Mevlüt Çavuşoğlu. While the F-35 has its flaws, if the latter are fixed in due time, this jet fighter represents the pinnacle of military aviation; it is a fifth-generation fighter jet with stealth, advanced sensors, and data fusion. Turkey already produces some parts of the F-35 and is a partner in the jet program, so it is reasonable for both Turkey and the US to maintain their mutual commitment.

Purchasing the F-35 will also enable Turkey to remain on better terms with their NATO ally, as they would be regarded to ostensibly be distancing away from Russia and its influence on a significant matter. The normalisation of bilateral relations is in the interest of both countries and their respective strategic outcomes, and their robust partnership should enable Turkey to be re-admitted and address its security concerns unobstructed. Ultimately, though, if the US reneges on re-admitting Turkey to the F-35 program, then the Su-35 is a valuable alternative, and Turkey will enjoy the benefits of an additional supplier.

In the current fluid environment, the Turkish leadership must be prepared for all eventualities. Ideally, the US government acknowledges Turkey's NATO and Western economic affiliations and acts reasonably, reintegrating Turkey to the F-35 program and making billions in the process. However, if the US chooses to continue to disregard Turkey's security concerns and its urgent need to counter the multiple geopolitical threats in the area, the Su-35 will be an excellent and cost-efficient fighter jet to fulfil Turkey's air force requirements.