

TURKISH DEFENSE INDUSTRY, EMBARGOES, NATIONALIZATION STUDIES AND ASELSAN

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Abstract

Türkiye encountered the first embargo targeting the defense industry during the 1974 Cyprus Peace Operation. The applied arms embargo has revealed the importance of independence and national production in the supply of defense technologies and the satisfaction of military communication needs in Türkiye more than ever before. As a result of the lessons learned and negative experiences received after the operation, ASELSAN was established to meet the needs of military communications and electronics without depending on any country under the leadership of the Ground Forces Strengthening Foundation to support the domestic and national defense industry. ASELSAN has reached a global size with its original designs developed, more than nine thousand employees as of 2021, companies in which it has shares at home and abroad, thousands of square meters of campuses and exports to 78 countries within 46 years. The sanctions of the countries against Türkiye have continued in the recent past. It is aimed that the sanctions imposed will have an impact on the Turkish defense industry on the basis of systems, subsystems, components, especially in critical technologies. As a result of the sanctions, many countries and companies around the world have acted contrary to contracts in their relations with Turkish defense industry institutions and companies. ASELSAN represents Türkiye in the world with independent defense technologies on many platforms and systems today with its nationalization activities in order to reduce external dependence and supply risks in the defense industry, and it can offer many products that cannot be obtained from outside due to embargoes to its users. ASELSAN carries out nationalization activities in order to increase the proportion of domestic materials in its systems in order to reduce external dependence and supply risks in the defense industry. ASELSAN has reached the level that developed countries in the defense industry, where technology is kept under strict control between countries, have reached with intensive work within a century, within a few decades.

Keywords

Turkish Defense Industry, Embargo, ASELSAN, Nationalization, Defense Technologies

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Introduction

Many negative experiences throughout history have repeatedly made it known that an independent defense industry means existence and survival for Türkiye. The states that have developed economies, rich natural resources, and great opportunities with their imperialist policies have turned the defense industry into a leverage for other states and a force that threatens the existence of others when it comes to its place. Therefore, the geopolitical position in which Türkiye is located makes it necessary for us to create our national defense industry in our geography and make it sustainable with a strong ecosystem. It is considered as a necessity by decision makers that Türkiye has a word in these areas by producing domestic and national solutions in critical technologies, systems, subsystems, components, and materials in the defense industry.

Türkiye encountered the first embargo targeting the defense industry and independent military actions during the 1974 Cyprus Peace Operation. Although the Turkish defense industry in the 70s was far behind and even existed compared to the 2000s, serious efforts were made even then, determination was emphasized, and the military operation was carried out for the geopolitical interests of Türkiye, the survival of the historical Turkish presence on the island, was successfully completed. Despite all international pressure, an embargo was imposed on Türkiye by the United States of America (USA) between 1975 and 1978 after the operation was carried out with realistic and justified reasons. Later after a few years, upon the developments in our near geography, where the USA tried to have greater influence against countries such as the USSR, which is considered a threat to it, saw the need for military bases in Türkiye, and lifted the embargoes in 1978 with the official decision of Türkiye to close these bases.

The arms embargo imposed after the 1974 Cyprus Peace Operation has revealed the importance of independence and national production in the supply of defense technologies and the satisfaction of military communication needs in our country more than ever before. Based on this fact, minimizing the external dependence of our country has become the main goal of the state of the Republic of Türkiye in the field of defense industry. The inadequacy of the systems obtained through ready-made procurement in the 1974 Cyprus Peace Operation resulted from the lack of technology ownership and the inability to perform the necessary maintenance as a result of embargoes on imported systems.

As a result of the lessons learned and negative experiences following the operation, Land, Sea, and Air Force Strengthening Foundations were established with the donations of the Turkish people to support the domestic and national defense industry. Following this, ASELSAN was established on November 14, 1975, under the leadership of the Foundation for Strengthening the Ground Forces in order to meet the needs of military communications and electronics without depending on any country.

Domestic Production Leader in the Defense Industry: ASELSAN

The struggle for technological independence of Türkiye began with ASELSAN, which was established in 1975 with a single licensed product and a technical staff of four engineers, with donations made by citizens to the Foundation for Strengthening the Ground Forces. ASELSAN has reached a global size with its original designs developed, more than nine thousand employees as of 2021, companies in which it has shares at home and abroad, thousands of square meters of campuses and exports to 78 countries within 46 years. The “Defense News Top 100”, which is published annually by Defense News magazine based

on the defense sales of the previous year, is recognized as the most prestigious defense industry list in the world. ASELSAN, an organization of the Turkish Armed Forces Strengthening Foundation (TSKGV), first entered the list of the world's top 100 Defense Industry Companies (Defense News Top 100) from the 97th place in 2008. ASELSAN, which has grown its national and global achievements exponentially, has risen to 48th place in 2020 and kept the 48th place in the global list in 2021 (Defence News, 2021).

The establishment of ASELSAN immediately after the Cyprus Peace Operation was an important milestone for the Turkish defense industry. ASELSAN's founding General Manager *Hacim Kamoy* explained the company's founding strategy as follows:

“ASELSAN has been assigned to save the Turkish Armed Forces from external dependence and to develop and manufacture our own weapons, our own radio, and our own electronic warfare devices in the face of the problems arising during this operation. Those who served in the establishment of ASELSAN have worked and are working with the excitement of giving the 'War of Independence' in the field of defense electronics... When we received the task of establishing ASELSAN, our initial decisions were:

1. ASELSAN will be established with Turkish brainpower.
2. ASELSAN will be at least equal to the most modern western hometown factories and even better than many of them.
3. All executive and expert staff of ASELSAN will be made up of young people who have just graduated from the university, and all our staff will be trained and grown by ourselves. Expert personnel will not be transferred from other industrial and public organizations, and other institutions working mainly with limited expert staff will not be weakened when establishing ASELSAN.
4. Construction work will be started immediately and the plant will be operational within two years.
5. The first production will be started by obtaining a license, and not assembly, but actual manufacturing will be done with the maximum domestic contribution.
6. Research and development studies will be started immediately together with the factory establishment studies, and a strong research and development facility will be established to develop the equipment we will manufacture ourselves.
7. In order for it to be completely national and for us to have electronic warfare devices whose characteristics have been determined, designed and developed by our own personnel, work will be started immediately.
8. Our Armed Forces will be equipped, designed and manufactured in accordance with NATO Military standards, but always cheaper than imported goods prices.
9. Every year, our facilities will be developed and expanded, a strong defense electronics industry will be established, and our nation will receive the share it deserves in joint manufacturing projects within NATO.
10. Türkiye will be removed from being the only importing country in the field of defense electronics and turned into an exporting country” (Kamoy, 1988).

The decision to establish ASELSAN, which is a milestone for the Turkish Defense Industry, has been the most concrete measure taken to prevent similar problems from happening again. The projects and nationalization activities carried out in the light of the company's founding goals will provide Türkiye with great gains in the defense industry over the coming years.

The defense industry is a high value-added sector where the most advanced technologies are used, where it is necessary to have the most competent and experienced human resources and to be able to sustainably protect this resource. The high cost of production, the very long time from the start of projects to the use of products in the field, requires intensive investment and R&D activities of companies operating in the field of defense. ASELSAN attaches great importance to R&D and technology investments aimed at developing products and systems from the first day of its establishment. Every year, it transfers a significant part of its turnover to original R&D activities aimed at the development of new technologies. ASELSAN has made technology management more effective and increased its competitiveness with the structure it has established. ASELSAN, which continues its steady growth, continued its R&D activities with more than 5,000 R&D personnel in 2021 and made a total R&D expenditure of US\$632 million. It has achieved the first place in the R&D 250 survey of the Most R&D-Spending Companies in Türkiye in 2021. ASELSAN's turnover in 2021 increased by 25% compared to 2020 and reached TL 20.1 billion. Continuing its sustainable growth with its investments, ASELSAN's net profit was TL 7,1 billion in the same year. ASELSAN has acquired more than US\$2 billion in new orders even in 2021, when the uncertainties experienced during the Covid-19 pandemic are showing themselves a lot. ASELSAN's balance orders reached US\$8,5 billion as of the end of 2021. ASELSAN has become one of the locomotive companies of the Turkish defense industry at the point it has reached as of 2021 and has taken on a structure that develops, grows and directs the national defense industry ecosystem. More than 20 R&D projects are actively being carried out within the company, which accelerates its activities in cooperation with the stakeholders in the R&D ecosystem of Türkiye, on many basic technologies from artificial intelligence to bio-defense. The number of active projects is expected to increase to over 40 by 2022. ASELSAN aims to make the ownership of independent technologies sustainable by focusing on the future technology needs of these R&D studies that are ongoing within ASELSAN. For independent technology ownership, the assimilation and development of the technology in question is essential. ASELSAN creates the technological presence of the country with the companies it works within its ecosystem and the different technologies it has with its stakeholders. Defense technologies have a positive impact on Türkiye's technological infrastructure and R&D capability as well as on macroeconomic indicators. The key to competition in the defense industry, which requires large investments with an excessive cost, has been original design, innovation and R & D. It is observed that the speed of technology acquisition is decelerated along with the speed of return on investment in the defense sector, where R&D investment is needed more than in other sectors. This can be considered normal if it is assumed that the development of a defense industry product or platform takes at least 7-8 years, and the transition to the production stage takes 10-15 years (Aselsan, 2022).

Current Embargoes and Their Effects

The US sanctions to be applied to the Defense Industry Administration (SSB) and corporate officials due to the "established relations with Russia" within the framework of the Countering America's Adversaries Through Sanctions Act (CAATSA) entered into force in April 2021. It is aimed that the sanctions announced by the United States will have an impact on the Turkish defense industry on the basis of systems, subsystems, components, especially in critical technologies. As a result of the US sanctions, many countries and companies around the world have acted contrary to contracts due to sanctions in their relations with Turkish defense industry institutions and companies. Non-fulfillment of

obligations and unfair invalidation of agreements concluded many years ago, excessive slowdown or complete cessation of deliveries were the main ones. There are also companies or countries which apply embargo on Türkiye indirectly without directly referring to the CAATSA sanctions. It is necessary to continue working in the field of defense technologies continuously in order to avoid problems due to embargoes on defense industry products that Türkiye depends on externally, to progress military operations that must take place due to geopolitical risks, and to minimize problems that may occur on the ground.

The embargoes imposed on Türkiye have made nationalization mandatory in many high-tech systems such as electronic warfare, radar, unmanned systems, avionics systems, munitions, missiles. ASELSAN has become a technology company that can design and produce devices, systems for all kinds of land, air, sea, spacecraft from the design and production of materials with nanometer-sized details as a result of the technology development studies it has carried out, and it has become a pioneer of nationalization efforts.

R&D activities are of vital importance for ASELSAN within the scope of nationalization efforts. ASELSAN has reached its current turnover, domestic and national product portfolio with the original products it has produced as a result of its R&D activities. ASELSAN has reached the level that developed countries in the defense industry, where technology is kept under strict control between countries, which is sometimes prohibited and sometimes allowed with restrictions, have reached with intensive work within a century within a few decades.

ASELSAN Nationalization Strategies and Turkish Defense Industry

ASELSAN attaches great importance to nationalization activities in order to reduce external dependence and supply risks in the defense industry and carries out nationalization activities in order to increase the proportion of domestic materials in its existing products and systems. Within the scope of the related activities; products that are primarily supplied from abroad, which are expected to have difficulties in supply due to reasons such as secret / open embargo, export license, high price, or cost pressure are analyzed and products that can be nationalized are determined. After that, the products covered by these activities are shared with suppliers, and suppliers are sought who will work together with ASELSAN on the path of nationalization and move forward together on this path. The main objectives of ASELSAN's nationalization activities are to strengthen relations with existing suppliers, increase the effectiveness of nationalization efforts, introduce potential value-added suppliers to the defense technologies ecosystem, support the industrialization model and contribute to the sustainability of the supply base with a win-win idea.

ASELSAN has constructed its nationalization studies with strategies that it can get the most contribution with completely open methods. Suppliers who will apply to ASELSAN to become an approved company can easily access information about the steps to be completed within the scope of the application and the process to be followed after. In addition, the application process and the list of products to be nationalized for companies that will contribute to the nationalization / domestication efforts, which is the main mission towards reducing dependence abroad, are constantly updated by publishing them clearly. ASELSAN's suppliers who will contribute to the nationalization efforts are informed about the current developments and the forward-looking vision of the sector with reports, research and informational articles by being directly informed of the events, trainings and different supports that will be offered. The industrialization model carried out by ASELSAN is in

accordance with the industrialization pyramid of the Defense Industry Presidency, a large number of sub-industrial companies specializing in a specific production or design area are located at the base, most of which are SMEs, while medium-sized companies with production and/or design capabilities identified as subcontractors, as well as project management, supply and supplier management, configuration management capabilities are located in the middle layer of the pyramid. ASELSAN continues to work directly or indirectly with universities and R&D organizations such as TUBITAK at every stage of industrialization process.

The Strategic Cooperation Agreement is signed with suppliers who have achieved sustainable success among approved Subindustry and Subcontractor companies, who can create business associations starting from the design stage, and who can contribute to ASELSAN's product development and cost improvement efforts. The selection and evaluation process of our suppliers to sign the agreement is carried out by a Commission established within ASELSAN. Considering the past period performances and the nature of the works performed, the candidate companies are recommended by the Commission and evaluated in accordance with the criteria set out below. The nomination process is carried out within ASELSAN and there is no ongoing process with the application of suppliers. After the Commission evaluation, a Strategic Cooperation Agreement is signed with the appropriate suppliers with the approval of the General Directorate. ASELSAN attaches great importance to the development of procurement competencies, the inclusion of new companies in the procurement ecosystem and the enhancement of the competencies of existing companies. In this direction, Strategic Cooperation Agreements are signed every year with suppliers that increase the added value and adopt ASELSAN's growth goals. In 2021, the Strategic Partnership processes were discussed from beginning to end and a new strategic partnership vision was determined. With the new vision set, the number of Strategic Partners, which was 50 at the end of 2020, was increased by 50% to 75 at the ASELSAN Strategic Partnership Meeting held on November 2, 2021 (Aselsan, 2022; Anadolu Agency, November 2021). A new roadmap was shared at the event, in which existing and new Strategic Partners were brought together; the main expectations collected in the headings of Quality, Nationalization, On-Time Delivery and Efficiency were conveyed with the advantages provided to Strategic Partners. In addition, awards were presented to ASELSAN's four Strategic Partners who contributed to the nationalization efforts in the categories of "Strategic Partner who has Nationalized the Most Products in the Last Three Years" and "Nationalization Award of the Year". In 2021, more than 50% of domestic orders were opened to ASELSAN Approved Subindustry companies, Strategic Partners and Subsidiaries. The number of approved subindustry companies increased by 16% compared to the previous year to 442. Over the past 10 years, orders to suppliers operating as SMEs have increased six-fold. Within this framework, orders placed to domestic companies in 2021 amounted to more than US \$ 1 billion, and close to 70% of the total order was placed to domestic companies.

In 2021, the nationalization of nearly 200 products has been completed by ASELSAN. Thus, the number of nationalized products has been increased to over 500 in the last three years up to 2021. In 2021, with the work carried out in the field of nationalization, it was ensured that a size of more than 75 million US dollars remained in the country. As of the beginning of 2022, the nationalization of 554 products is currently under process (Aselsan, 2022).

ASELSAN carries out serious activities to produce sustainable employment policies for the Turkish defense industry, to deepen university-industry cooperation, and to create a trained workforce, which is the most important need of the defense industry. In the ASELSAN Academy program created within the scope of this vision, graduate courses related to the defense industry are held at ASELSAN campuses. In this way, for the first time, an industrial enterprise has been located on the external campus of multiple universities. ASELSAN Academy continues its fifth year with 703 students, 96 of whom are doctoral students. The number of courses opened in the ASELSAN Academy program has reached 100. ASELSAN Academy has taken its activities to an international level and offered a credited course from a foreign university to its students for the first time in 2021. Students have produced 14 journal articles, 43 conference papers and 6 patent applications within the scope of their thesis studies; 2 of them have been awarded the best paper award at international conferences. ASELSAN Academy continues to be with the students in their academic journeys with the mentoring support it offers (Aselsan, 2022).

The first Vocational and Technical Anatolian High School in this field was established in Ankara in 2019 within the scope of the protocol signed between the Ministry of National Education and ASELSAN in order to train qualified personnel for the defense industry. ASELSAN Vocational and Technical Anatolian High Schools, which started their education in Konya later, have the distinction of being unique schools in their own field with what they offer to their students both in education and after education. Schools continue to recruit students from the highest percentile tranches every year. ASELSAN Vocational and Technical Anatolian High School and ASELSAN Konya Vocational and Technical Anatolian High School offer a radically growing resource to the defense sector with their curriculum structures that provide training in the field of defense technologies. These schools, which are an important part of ASELSAN's vision of supporting the development of the Turkish defense industry, contribute to the training of qualified workforce needed in the defense industry.

ASELSAN with Regard to Systems that Respond to Embargoes

ASELSAN's national engineering studies have been successful in many products and systems developed in response to embargoes. In order to achieve the success of the domestic and National Technology Initiative, as well as the projects carried out by the academy, companies, decision-making institutions, R&D and innovation processes, users who demand products should also rely on domestic and national production. Türkiye has been able to have its own domestic, national and original platforms and systems on issues where this mutual cooperation and trust have been achieved for many years. The share of this domestic trust and the culture of being able to work with the end user has been very high in making Türkiye a game changer in the world and in its region. The best example of this is the Turkish UCAVs, Bayraktar TB2s, who serve in the operational field.

In addition to the achievements achieved with domestic and national UAVs and UCAVs, many platforms and subsystems have been developed against embargoes and are successfully operating in the field.

ASELSAN's GÖKDENİZ close air defense system has been developed instead of the Phalanx system, which is the close air defense system commonly used on warships. Although the country that supplied the fire control radar for the Naval Forces Command has not yet placed an embargo, studies have been started with caution, and as a result, ASELSAN has developed its own Fire Control Radar, the AKREP-D. With the close

support of the Naval Forces Command, these systems continue to be developed and are used on Turkish warships.



Figure 1. ASELSAN CATS (*Common Aperture Targeting System*)

In the recent past, surveillance cameras used for tactical and operational UAVs and UCAVs of Türkiye have had to be imported from abroad. A Canadian company which was recognized worldwide, was the leader in this market. It was expected the embargo to be imposed by the NATO member country Canada on defense products to Türkiye would have negative effects. Despite the embargo decision, there have been no problems with the supply of cameras for Türkiye's UAVs and UCAVs. This is due to the fact that ASELSAN has been working for many years to develop a domestic and national camera and has acquired the ability to integrate ASELSAN CATS (Common Aperture Targeting System) into domestic and national UAVs. ASELSAN production CATS EO Sensor System flight tests have been successfully completed on BAYRAKTAR TB2 Platforms. Baykar's support in this regard has been a great source of motivation and has provided a great impetus and contribution to the domestication of systems and saving from embargoes. Thus, the embargo imposed in this area in Türkiye was neutralized and the EO system produced with national facilities was introduced into the Turkish defense industry. In 2022, the CATS camera will also be added to the avionics and communication devices in the ANKA and Aksungur UAV configurations, so the technology developed in response to the embargoes in UAV projects will continue. CATS is a product in which many disciplines come together, these disciplines are operated together, the boundaries of technology are pushed. The development process of ASELSAN CATS is continued as feedback is received from users.



Figure 2. *The first RF (Radio Frequency) seeker test missile launch of the HISAR O+ system*

Due to Türkiye's geopolitical position and the increasing risks, air defense systems, in particular, are of critical importance in terms of locality and nationality. ASELSAN has worked with its stakeholders on all the systems included in the layered air defense architecture to maximize the ratio of locality and nationality. Türkiye is rapidly continuing its efforts to create a national layered air defense network. HISAR-A+, the National Low-Altitude Air Defense Missile System, has been made available to the Turkish Armed Forces. The HISAR O+ Air Defense Missile System, the National Medium-Altitude Air Defense Missile System, was delivered to the TAF with all its elements in the last days of 2021 (TRT, 2022). The system, which previously had the ability to launch an Infrared Seeker Missile, has also achieved the ability to launch a Radio Frequency Seeker Missile with the recent test firing. The air defense system was developed domestically and nationally in cooperation with ASELSAN-ROKETSAN as a DIP project. HISAR, which is capable of working in all weather conditions, is effective against combat aircraft, helicopters, air-to-ground missiles, cruise missiles and armed/unarmed unmanned aerial vehicles (UAV/UCAV). HISAR, designed in accordance with current needs and threats, is intended to be a serious force multiplier in the country's air defense. HISAR O+ system performs point and area air defense tasks with its distributed, flexible architectural capability. There is an organizational infrastructure in the battery and battalion structures of the HISAR O+ system. The system consists of a Firing Control Center, a Missile Launch System, a Medium-Altitude Air Defense Radar, an Electro-Optical System, a Missile with an Infrared Seeker and a Missile with an RF Seeker. It is aimed that the SİPER, a long-range air defense system that has been undergoing test firing, will be ready for use in 2023.

UV Missile Warning System is a system that started production at ASELSAN with the transfer of a license belonging to a German company and produces warning information to protect TAF helicopter platforms against IR guided missile threats. The critical elements in the Sensor Unit; the photo-detector and 6 different optical filters are supplied from Germany, all other secondary items are manufactured domestically. Due to the embargo initiated by the German government in 2017, these critical components were not supplied, and the production of MWS was stopped. In November 2020, the nationalization of optical filters was completed and delivery was carried out by the end of 2021. As of February 2022, the difference qualification tests of the national photo-detector team have been completed

and it is planned to carry out flight tests (FHIT) with helicopter integration. Within the scope of the NEFIS Project, it was aimed to completely eliminate the export restriction of the UV Missile Warning System with a one hundred percent domestic design.

Türkiye is obliged to replace a large number of products related to defense technologies due to various restrictions, secret and open embargoes imposed on it. The experience has shown that it is not certain that even the products given now will be supplied from abroad in the future. For this reason, Türkiye is a country that has to nationalize all the critical technologies it uses in the military field, with or without embargoes, licenses and export restrictions. The National Technological Initiative towards technological independence is a matter of Türkiye's survival.

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Prof. Dr. Haluk GÖRGÜN was born in Istanbul in 1973. He completed his undergraduate and graduate education in Electrical Engineering Department of Yıldız Technical University and his Ph.D. in Rensselaer Polytechnic Institute in New York USA in 2003. After his Ph.D. graduation, he has engaged in scientific studies at the University of Connecticut in 2004-2005. He became an associate professor in 2008 and became a professor in 2013 at Yıldız Technical University, where he served from 2005-2008 as an assistant professor. Prof. Dr. Haluk GÖRGÜN, who is the founder department chairman of Yıldız Technical University, Control and Automation Engineering Department, has served as the chairman of Control and Automation Engineering Department in between the years 2009-2013. Prof. Dr. Haluk GÖRGÜN was elected as the Associate Member of Türkiye Academy of Sciences in 2013. Between November 2014 and April 2018, he has been served as the Rector at Gebze Technical University. Prof. Dr. Haluk GÖRGÜN was appointed as a Member of the Board of Directors for the first time at the ASELSAN Ordinary General Assembly Meeting held on April 2, 2018 and as the Chairman of the Board of Directors at the Board of Directors Meeting held on the same day, and he was re-elected to the same positions at the ASELSAN Ordinary General Assembly and Board of Directors meetings held on April 26, 2019. Prof. Dr. Haluk GÖRGÜN is the Chairman of the Board of Directors and has also been the General Manager of ASELSAN since April 27, 2018.