

Chapter Nine: Artificial Intelligence in Israel

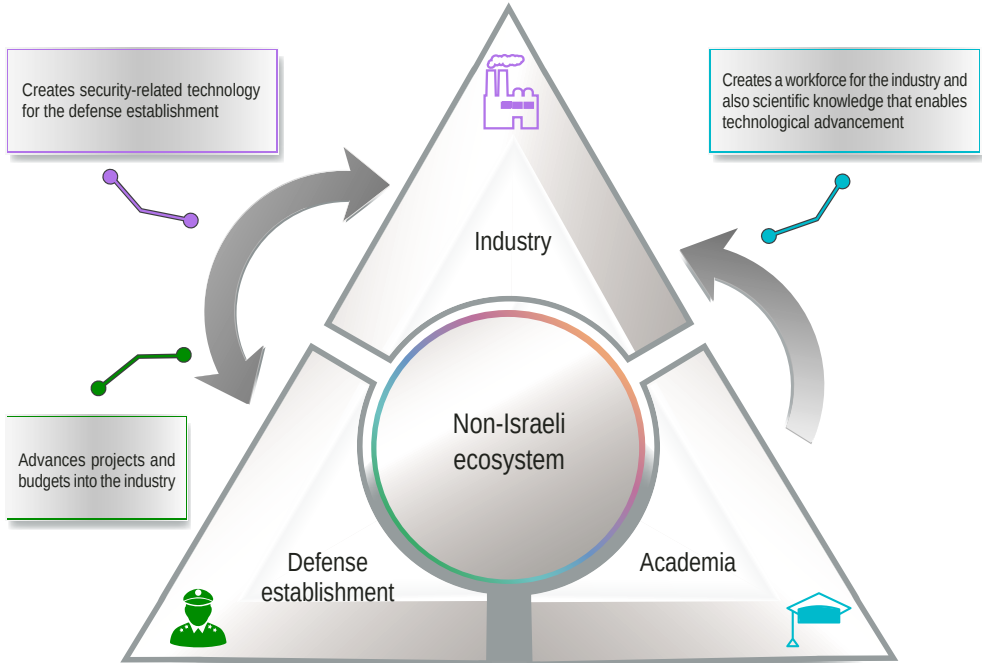
Israel is an international technological leader in both civilian and security fields. In recent years, Israel has gained a significant foothold in AI, thanks to the growth of startups in Israel and to the international companies that have established development centers in Israel. A large part of the security solutions have embedded AI into their systems, which strengthens their capabilities. Israel has several characteristics that affect these aspects, and this chapter will describe the fields in which Israel leads, including the unique ecosystem and the interactions between the various elements.

Israel's Technological Strength

Known for its powerful technological strength, Israel has been referred to as the “startup nation,” because of its large number of startup companies in comparison to the size of its population. Technologies and capabilities in the field of communications that the security establishment developed in collaboration with the academic sector enabled Israel to take advantage of the developing internet in the 1990s. Many Israeli companies at that time, among them Checkpoint, Amdocs, and Nice, firmly established Israel's stature as a leading power in the fields of communication, security, data storage, and semiconductors. Furthermore, Israel's entrepreneurial culture has led to the growth of innovative companies, which greatly have contributed to the country's successful technological ecosystem.¹⁹⁷

Israel understood from its inception that it must compensate for its lack of natural resources and limited human resources compared to its adversaries by investing in human resources and technology, an understanding that was embedded in the national security strategy of the first prime minister, David Ben-Gurion. Over the years, Israel's success in these areas has grown.

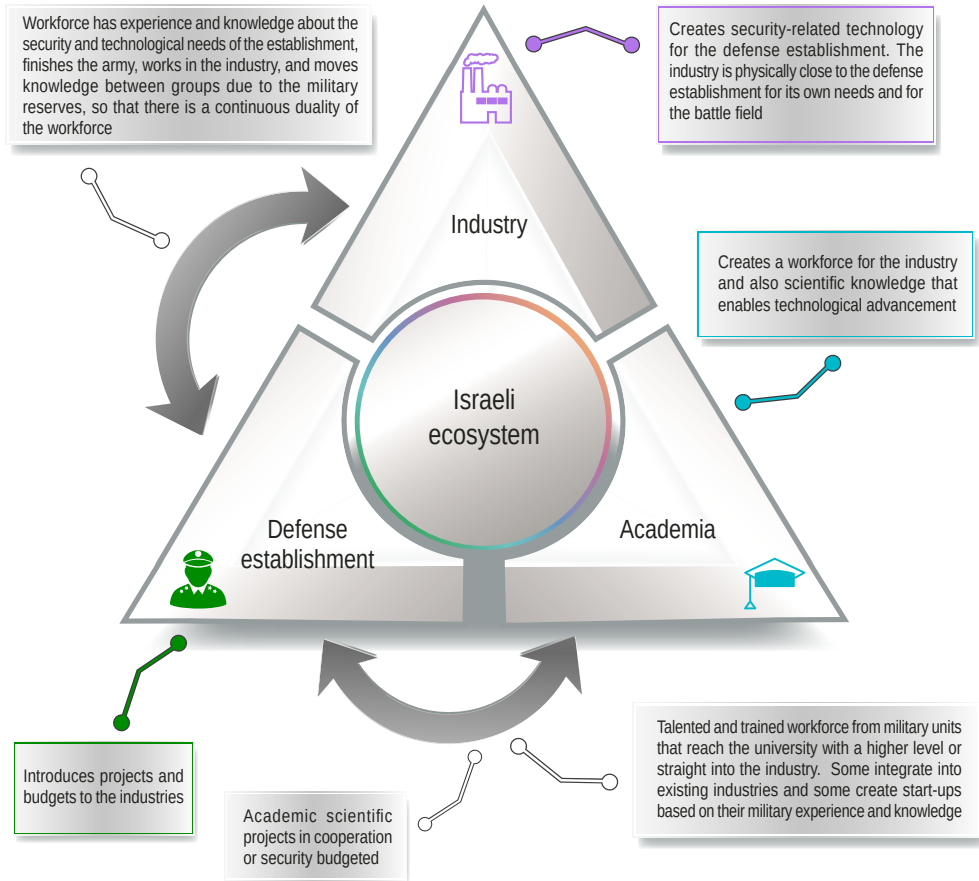
Figure 7. The non-Israeli ecosystem



Security exports, for example, increased and transformed Israel into one of the world’s largest weapons exporters, while the security industries have turned Israel into a technological and economic power whose capabilities many countries rely upon and are interested in acquiring or utilizing.

The competitive advantage of Israel’s security industry in the international market has resulted from its close relationship with the IDF, as the industry relies upon security units to advance the research, development, and implementation processes, which promote sales.¹⁹⁸ The “double-feeding element” (the transfer of human resources between the IDF and the security industries)—partly the result of the mandatory military service model and the unique Israeli military reserve service—also influences the transfer of knowledge and strengthens those responsible for Israel’s technological strength. As a result, the Israeli ecosystem differs from that of many other countries, as the two figures below show.

Figure 8. The Israeli ecosystem



The Israeli Ecosystem and AI

The Israeli ecosystem is comprised of security bodies, the academia, and industry and operates cooperatively, sharing ideas and human capital. For example, the Israeli academia enables research that contributes to the development of AI and forms the basis of different AI systems.¹⁹⁹ The leading industries and the giant technological companies have also established research centers, working alongside thousands of innovative startups. The industrial sector has also witnessed a significant increase in the field of AI. Between 2014 and 2018, the percentage of companies engaged in the field

increased by 120 percent, from 512 companies to 1,150, some developing the core technology of AI, and others developing supported technologies, such as autonomous vehicles and cybersecurity.²⁰⁰ Gartner, a research company, has ranked Israel as leading in having the “cool and hot” vendor companies in 2017, over China and the United Kingdom.²⁰¹ The existence of these companies is made possible partially by Israel’s unique ecosystem. Moreover, the year 2018 was a turning point for the funding of Israeli companies that engage in AI, raising about \$2.25 billion²⁰²—a testament to the rapid growth of this market.

The security bodies and the military also have undergone impressive development, especially for the purposes of military intelligence—so that they can cope with a wide range of sources of information—and for operational activities. In addition to processing data and reaching conclusions, various autonomous systems, such as gliders, robots, sensors, and vehicles are being developed and are even being used at the forefront of knowledge and ability in the world.²⁰³

In Israel, connections between academia, the civil–commercial industry, and the security bodies occur quickly at the organizational, social, and professional level, due to Israel’s advantage of being a small country. Beyond the physical closeness, which promotes innovation and creativity, academia and industry in Israel share a “partnership of fate,” which helps mobilize them to work together on behalf of Israel’s security.²⁰⁴

The short physical distance between the substantial concentration of technological companies and Israel’s government or security centers also helps strengthen cooperation. This is quite different from the situation in the United States, for example, where the geographical distance and the time difference between Washington DC and Silicon Valley—the technology development center—are considerable.

The direct link between senior and high-ranking personnel in many places (including in certain military units) and an open and entrepreneurial character of Israeli culture (in comparison to countries where it is more hierarchical and bureaucratic) help move ideas and gain achievements. In the field of AI, Israel does not seem to have any special advantages, but in areas such as big data or hardware, the strength of Israel’s ecosystem gives it a relative advantage. At the same time, however, Israel’s size and its limited resources

also create challenges, so it is important to combine the different relative advantages to create force multipliers.

Israel's Other Technological Advantages and Integrating Forces with AI

Other fields have a relative technological advantage and provide Israel with strength and influence in the international arena. One is the development, production, and export of unmanned aerial vehicles (UAVs), in addition to Israel's extensive operational experience in the field. Already in the 1960s and 1970s, Israel used drones for photographic purposes, and in the 1980s it began to use them for deception and information gathering. In the 2000s, the main use of UAVs was for military intelligence-gathering in asymmetric conflicts, with the Second Lebanon War (2006) being a turning point. This was the first war in history in which more unmanned flight hours were carried out than flight hours of fighter jets, and in which the UAVs loitered continuously over the fighting area throughout the entire fighting.²⁰⁵ This turning point demonstrates the capabilities and experience that Israel has had in the field as early as 2006.

Since then, Israel has continued to invest in this field, and in recent years, it has made large deals with countries such as India and Germany. From 2005 to 2013, Israel was the world's leading exporter in the UAVs market, with the Israeli market share of exports reaching about \$4.62 billion.²⁰⁶

Israel is also one of the leading countries in developing, producing, and using other unmanned systems, some which enjoy a level of autonomy. These include unmanned patrol vehicles, ground robotic systems, and loitering munitions, such as the Harop and the Harpy, which the international arena considers AWS.²⁰⁷ According to foreign news reports, China, Germany, India, South Korea, Turkey, Uzbekistan, and Azerbaijan all have purchased these systems.²⁰⁸

Israel also gains strength from the nations that seek to collaborate with it, given Israel's significant technological knowledge and experience over the years. For example, Israel and Japan have announced joint research in military drones and unmanned surveillance systems. Israeli–American cooperation to protect against unmanned aerial systems should also be noted.²⁰⁹ In addition to the strengthening of contacts, Israel also has used its advantage in the field such as when Israel agreed to sell drones to Russia

in exchange for Russia's avoiding the sale of S-300 anti-aircraft weapons to Iran.²¹⁰

Israel also is a global leader in cybersecurity and cyber warfare. As part of the “dual feeding” process, leading military technology units such as the Unit 8200 of the IDF intelligence recruit talented high school graduates for military service, where they receive significant training and experience, and upon their release from the army, they integrate into startup companies or establish their own companies, many in cybersecurity. As a result of the military service that grants professional experience, the graduates of this unit are able to cope with complex issues faster and more efficiently than university graduates or young entrepreneurs who were not part of these military units and who lack practical experience. In addition, Israel's National Cyber Authority oversees the national computer emergency response team (CERT) and coordinates with the private sector.²¹¹ This serves as a global model for coordinated handling and managing of issues and resources. In recent years, the Israeli security industries have also devoted a great deal of resources and effort to the cyber sector to maintain Israel's competitive advantage and to avoid being dependent on other countries.²¹² A survey of companies in the fields of AI, data science, and intelligent robotics found that cybersecurity is considered the main technology in which Israel has the capacity to lead.²¹³

Israel has another relative advantage in the autonomous automotive industry. Israel's strength is in development and implementation of complementary technologies for autonomous systems, including sensors and navigation systems, and Israel has recently permitted more testing of autonomous vehicles within its borders using a real environment. A number of ventures in this field operate in Israel and these include technological testing of autonomous vehicles, carried out by the giant companies, alongside small startups, as well as several trials of transportation services with autonomous vehicles.²¹⁴ Companies such as GM and Mercedes develop autonomous technologies for cars in Israel, while Volkswagen has partnered with the Israeli company Mobileye in developing an autonomous taxi service. According to a report of the company KPMG, which provides financial services and organizational consultation, Israel ranks first out of 25 in the fields of technology and entrepreneurship, primarily due to the military experience of its entrepreneurs.²¹⁵

Developments in the field of AI and Israel's ability to improve its achievements in these areas and preserve its competitive advantage directly influence the technological areas mentioned here. Moreover, having a combination of abilities in the various fields could serve as a significant power multiplier for Israel. Given Israel's size and the limitations of its human resources, it is imperative that Israel emphasize a combination of fields to increase its competitive advantage. Therefore, mobilizing Israel's ecosystem, which has high-quality capabilities in the field of AI by using existing technological advantages, should ensure that Israel has long-term defensive and technological power.