ISRAEL’S MILITARY, A STORY OF SUCCESSFUL INNOVATION UNDER FIRE

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IN DEPTH–ISRAEL’S DEFENCE TECH INDUSTRY

Israel Strategist, May 31 2012

The success of Israel’s defence sector is no surprise, considering the country’s history of having to confront violent conflict on its borders and consistent existential threats. Israel’s innovative
defence technologies were born of these conflicts. What is remarkable is the extent to which Israeli innovation in the defence arena has integrated into other sectors of the economy. Israeli defence companies rank as some of the largest in the world, contributing significantly to Israeli industry and economy. All over the world, and from high-tech to green-tech, we are seeing the fruits of Israeli innovation in the defence-technology arena.

Israel’s success at technological innovation stems in part from a cultural emphasis on education and science, and from high government spending in the defence sector. Israel’s population has the highest percentage of engineers in the world and, according to 2010 OECD data on government expenditure, Israel contributes a higher percentage of GDP to education than the United States, the United Kingdom, Germany, and Sweden, at 7.2%. Though natural resources are scarce, human capital has become Israel’s most abundant and valuable resource.

Israel’s defence companies are some of the largest in the world, with five companies ranked in the international top one hundred. According to the Samuel Neaman Institute, the defence industry in Israel accounts for 25% of industrial output and 20% of employment in the industrial sector, contributing significantly to the country’s domestic economy. Between 1963 and 2010 Israel was granted over 20,000 patents by the USPTO, only 3,000 fewer than Australia, a country with three times its population.

Israeli innovation in the defence industry ranges from weapons technology to transportation vehicles, medical supplies, and unmanned drones. Defence exports reached a record high in 2010 at $7.2 billion, making Israel one of the top four arms exporters in the world. Israel leads the market in development and production of unmanned aerial vehicles, mini satellites, and the refurbishment of various types of commercial and military aircraft. It has established joint ventures and partnerships in North and South America, Asia, and India.

Israel’s most groundbreaking defence-related products include:

_Uzi Submachine Gun_ – Designed in 1949 by an Israeli lieutenant, this gun has been adopted by over 90 countries around the world for military use and law enforcement. The design is simple and inexpensive to produce, and with few moving parts it is easy to repair, even on the field.

_Galil Assault Rifle_ – Developed 30 years ago, this short, lightweight assault rifle is highly reliable under adverse and extreme conditions. Air-cooled, gas operated, magazine fed, no tools required to strip the weapon on the field. Used by 27 countries world wide including India, Indonesia, Italy, Mexico, Portugal and South Africa.

_The Corner Shot Gun_ – A gun which allows the user to shoot around corners with its flexible front section, allowing a solider to shoot without being exposed. The gun is equipped with a camera suitable for low light and the ability to also function as a normal handgun. Used by the Beijing SWAT team in China, the Indian National Security Guard, and South Korean Special Forces.

_Multi-Purpose Modular Armored Vehicle_ – A 4×4 tactical vehicle with the strength to “absorb the deformations generated by mines and IED blasts” protecting the soldiers inside.

_Emergency Field Bandage_ – Used widely in the United States and abroad to stop blood loss on the field before soldiers can reach the nearest hospital. These bandages have played a major role in disaster relief, emergency surgery and field medicine.

_Unmanned Aerial Vehicles (UAV)_ – Non-rocket propelled aircraft which do not require humans on board and thus prevent loss of life. Used in counter terrorism and missile defence. Technology sold abroad to Chile, Singapore, India and the Unites States.
Reactive Armor Tiles – Tiles fastened to the outside of tanks allowing them to withstand direct hits from munitions. The tiles use a high-energy explosive causing them to explode outward, protecting the soldiers inside. Tile sets are made specifically for the US Bradley Tank, among others. A congressionally mandated study of these tiles was done in 1999, and in 2010 a $33 million order was placed by the US government.

Iron Dome Missile Defence System – Mobile defence for countering short range rockets. Project given $205 million in funding by the US government this year. …

Israel’s defence companies straddle the line between public and private, applying national security solutions to the private market. Though in many cases founded originally as part of Israel’s government agencies, they have become commercial and facilitated the production of revolutionary products for civilian use:

Israel Aerospace Industries, IAI, is Israel’s largest aerospace and defence company, as well as the largest industrial exporter in Israel. The company takes on projects ranging from aeronautics and nano-materials and processes to space, ecology and security. Its most popular exports include business jets integrated into the Gulfstream family and Unmanned Aerial Vehicles for civil and military use. IAI also considers renewable energy and green-tech in its designs and developments, particularly in the areas of wind and solar technologies, industrial waste-water cleaning systems, and environment-friendly coatings. In January of 2012, IAI signed its largest ever defence deal with India: over $1.1billion worth of missiles, anti missiles systems, UAV’s, intelligence and other systems. According to estimates, defence trade between India and Israel amounts to almost $9 billion. …

As a result of Israel’s unique economy and national security situation, equipment designed for government military use has not only been commercialized, but also adapted for civilian use. Perhaps the best example of this adaptation is Better Place, an Israeli company that uses technology developed for the Israeli Air Force and applies it to a system of battery powered cars. Better Place uses technology developed to load and unload missiles from F-16 fighter jets, and applies it to the efficient and effective installation and replacement of lithium-ion batteries into electric vehicles. … Better Place currently operates in Israel, Denmark, Australia, North America, Japan and China.

Internationally recognized for its aviation security, Israel exports techniques for airline screening to countries all over the world including to the U.S. … Also looked to as global leaders in emergency management, Israeli Defence companies and the Israeli government are consulted by FEMA and the US National Guard for hi-tech solutions in emergency management. … Israel is at the forefront of disaster relief and field medicine. It was one of the first countries to respond and send forces after the earthquakes in both Haiti and Japan and was the first to set up fully functional field surgical tents complete with scanners. …

The face of global warfare is changing rapidly. Direct conflict is becoming less common as armies fight elusive terrorists, and strikes are often carried out by unmanned drones and through technological means. Israel is already ahead of the curve on these fronts, and other nations are beginning to turn to Israelis for their expertise and innovations. …

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ISRAEL REDEFINES VICTORY IN THE NEW MIDDLE EAST

Yaakov Lappin

Gatestone Institute, Dec. 28, 2012
Senior Israeli officials have indicated this month that any round of future fighting with Hezbollah will make last month's Gaza conflict seem minor by comparison. Offense, not defence, is still preferred. Israel is redefining its concept of military victory in a Middle East dominated by terrorist organizations turned quasi-state actors.

Once, decisive, unmistakable victories, accompanied by conquests of territory that had been used to stage attacks against Israel, provided all parties concerned with a "knockout" image. Victory was seen by the Israel Defence Forces as a clear-cut event, which ended when the enemy raised a white flag. Today, however, the IDF considers this thinking out of date in the 21st century battle arenas of the region, where a terror organization such as Hamas will continue firing rockets into Israel right up until the last day of a conflict, and claim victory despite absorbing the majority of damages and casualties.

Today, the goal of seizing control of the enemy's turf is seen as a short-term initiative, and assuming long-term control and responsibility for hostile populations is a highly unpopular development among strategic planners, who now argue that this should be avoided wherever possible. For decades, the IDF has been facing irregular asymmetric terrorist organizations which can change form, melt away and reform according to their needs.

The last time Israel fought direct battles with organized, hierarchical military foes was during the 1973 Yom Kippur War. Today, as the main goal of most conflicts, victory has been replaced by deterrence. Deterrence, rather than clear-cut conquest or triumph over the enemy, has formed the goal of Israel's last three conflicts: the Second Lebanon War of 2006; Operation Cast Lead against Hamas and Islamic Jihad in 2009 and Operation Pillar of Defence against the same entities in Gaza in November.

Although the Second Lebanon War was claimed by Hezbollah chief Hassan Nasrallah as a "divine victory," six and a half years later, at the end of 2012, Hezbollah has still not repaired all of the damage it suffered in that conflict, and the Lebanese-Israeli border has never been quieter. Despite several glaring tactical and operational shortcomings, as a deterrent the Second Lebanon War was an Israeli victory.

Nevertheless, deterrence-based military achievements are temporary by nature. At some point, deterrence erodes away, and must be re-established all over again. This is what happened in Gaza last month. And the IDF has been preparing for a fresh confrontation with Hezbollah in Lebanon, which today is armed with at least 50,000 rockets and missiles, many of them with a range of 200 kilometres, that can strike deep inside Israel.

Quietly, the Israel Air Force has been upgrading its weapons systems to allow it to face down Hezbollah with enhanced firepower. The new systems currently installed in IAF jets mean that a very large number of targets can be struck in Lebanon from the air within a very short period of time. The 1500 targets struck in Gaza, for example, during November's operation over the course of eight days, could have been struck in 24 hours had the IAF elected to do so.

Israeli intelligence has been mapping out the weapons storehouses in southern Lebanese villages and towns, and building up a long list of targets, for the day that Israel's deterrence runs out. The IDF's evolving new doctrine involves short spells of fighting, in which the IDF hits the other side hard – hard enough to ensure that the Israeli home front will enjoy prolonged calm after the fighting ends. As opposed to the mission of utterly destroying Hamas or Hezbollah, such limited goals can be obtained quickly. Hezbollah is fully aware, meanwhile, that should it begin another conflict, it will reap major destruction on Lebanon.
The Israeli doctrine is flexible. It allows the IDF to choose the severity of the blows it lands on the enemy, depending on the circumstances of each fight, and the adversary involved. Senior Israeli defence sources have indicated this month that any future round of fighting with Hezbollah will make last month's Gaza conflict seem minor by comparison. Even if the goal will not be to destroy Hezbollah, the organization is still susceptible to enormous damage; it is well aware of its exposure to overwhelming Israeli firepower.

The day after a future conflict ends, one defence source said this month, Hezbollah will have to "get up in the morning and explain to their people" why they invited yet more destruction on Lebanon. The fact that Islamist terror organizations Hamas and Hezbollah have formed political entities, and are responsible for managing the affairs of their people, means that they are more vulnerable than ever.

Unfortunately, the rocket and missile capabilities possessed by both means that Israeli civilians are also in the firing line; and the IDF is not counting on rocket defence systems such as Iron Dome to prevent wide-scale damage and secure future victories. Even in the service of the limited goal of deterrence, offense, not defence, is still preferred.

Finally, the new doctrine is not fixed in stone; should Israel ever find that it cannot deter the enemies on its borders, it may choose to revert to its older method of defending its citizens: fully vanquishing hostile forces, despite the price it may have to pay.

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VOLATILITY IN THE MIDDLE EAST DRIVES ISRAELI DEFENCE INDUSTRY INNOVATION

Rupert Pengelley

Janes Intelligence, June 10, 2008

The past decade has seen considerable restructuring and an expansion of overseas involvements as Israeli concerns have sought to acquire a bigger share of global defence markets. Their success in achieving this is, as ever, not unconnected with their nation's security circumstances. Despite the Middle East peace process, events have continued to prompt development of a new generation of innovative 'combat proven' military equipment, this time forged in the heat of contemporary asymmetric conflict. These are finding wide acceptance within the armed forces of other nations, most of whom are similarly being required to modify their earlier exclusive focus on preparation for conventional inter-state conflict.

To take but one example, 20 years ago the Israel Defence Force (IDF) pioneered the tactical use of full-motion video (FMV) systems, and Israel now appears to have a superabundance of companies engaged in this particular field. Suffice it to say, FMV has since proved to be one of the crucial factors in the correct application of the (non-kinetic as well as kinetic) effects being used by coalition organisations in the prosecution of stability operations and 'wars among the people', not least in Afghanistan and Iraq.

One of Israel's smaller defence companies is Azimuth Technologies, employing 140 personnel and having a turnover of USD29 million. It has an established tradition of addressing the needs of special forces, and today has four main areas of activity, including manportable target acquisition systems, navigation and orientation systems for armoured fighting vehicles (AFVs), the networking of sensors and weapons, and homeland security.
Among the company's better-known products is the Comet GPS-based north finding and positioning system, or 'smart compass', which has now been adopted by 10 different armies. Comet is particularly suited to attitude measurement in armoured vehicles, where normal magnetic compasses are degraded. According to Azimuth representatives, its uptake has been driven by its low cost and by contemporary rules of engagement that require every firing platform to be able to provide accurate target position information, particularly in urban settings.

In its standard form Comet embodies three GPS receivers and an integral processor unit in a unitary, plank-like configuration, and is used to calculate azimuth, elevation, pitch and roll. The latter is determined by an internal tilt sensor, while a calculation based on the phase difference of the received GPS signal is used to determine azimuth and elevation.....

ON TOPIC

**How Israel's Defense Industry Can Help Save America:** Arthur Herman, *Commentary*, Dec. 2011—Israelis are realizing that a strong and independent high-tech defense sector may be more crucial to Israel’s future than relying on U.S. help. The Israeli way of doing defense business is changing the shape of the military-industrial complex. Smaller, nimbler, and entrepreneurial, Israel’s defense industry offers a salutary contrast to the Pentagon’s way of doing things.

**Trapped Under the Iron Dome:** Ariel Harkham, *Jerusalem Post*, Dec. 1, 2012—This month, all of Israel was subjected to an unrelenting eight-day missile blitz, disabusing middle Israel of the notion that there is any distinction between the periphery and the center of Israel in its ongoing war with Hamas. Israel’s Iron Dome anti-missile system, which featured prominently in the conflict, is being hailed as a great success. In reality, however, it represents a total failure of strategic vision and erodes the concept of deterrence for the State of Israel.

**Israeli Technology Turns Air Into Drinking Water:** *Jerusalem Post*, March 17, 2012—Military troops around the world, no matter where they are instated, know that even with the best training, personnel and arms, they cannot survive battle if they are lacking one vital thing: water. Among the concerns of military heads is to ensure water sources are always available, even in the most arid of places. Rishon Lezion-based company Water-Gen takes up challenge to ensure troops have access to water at all times.

**Bankrupting terrorism – one interception at a time:** Akiva Hamilton, *Jerusalem Post*, Nov. 24, 2012—The strategic implications are that the current rocket-based terror strategy of Hamas and Hezbollah has been rendered both ineffective and economically unsustainable. I estimate it is currently costing Hamas (and thus its patron Iran) around $5m. (500 rockets at $10,000 each) to murder a single Israeli. When Iron Dome reaches 95% interception rate these figures will double and at 97.5% they will double again.