



Israel's Beleaguered Defense Industry

By Sharon Sadeh*

The Israeli defense industry was formed to meet urgent security needs but ceased to be the main supplier for the Israeli armed forces. It became the world's fifth-largest arms' exporter, competing successfully against leading Western companies, but at the same time is on the verge of collapse. A highly capable industry, which has been regarded as a model of Israeli technological achievements and self-reliance, it is also a sector riven with structural discrepancies and conflict of interests. This article explores the industry's current situation including the considerations that guided its growth and its likely future course.

The Israeli defense industry is a mass of contradictions: it was formed in order to meet urgent security needs but ceased to be the main supplier for the Israeli armed forces. It became the world's fifth-largest arms' exporter, competing successfully against leading Western companies, but at the same time is on the verge of collapse. A highly capable industry, which has been regarded as a model of Israeli technological achievements and self-reliance, it is also a sector riven with structural discrepancies and conflict of interests.

This article explores the industry's current situation starting with the security considerations that guided its growth, continues with the build-up of the industrial complex and finishes by assessing the industry's resilience and its impact on Israel's arms exports and future warfare capabilities.

MOTIVES AND DYNAMICS FOR THE GROWTH OF THE ISRAELI DEFENSE INDUSTRY

The circumstances that led to Israel's establishment, its constant struggle for survival and disappointments with foreign suppliers dictated the development of Israeli domestic arms' manufacturing capabilities. During the pre-state years and after, Israeli leaders were acutely aware of the inherent imbalance between Israel and its Arab neighbors, resulting from its small territory

and population, as well as a lack of natural resources. The constant threat to national survival forced Israel to seek external sources of weapons and military technology.

Initial attempts to buy weapons and warfare-related equipment met with difficulties, as arms suppliers were reluctant to develop a steady relationship. Consequently, a constant uncertainty with regard to external sources of weapons and technology prevailed, and there was a growing fear that the needs of the Israel Defense Forces (IDF) could not be met if Israel remained totally dependent on imported weapons only.

In many cases, though, dealing with arms exports showed Israel that such sales are largely a continuation of diplomacy by other means. Western governments, especially those with a global or regional agenda like the United States, Britain and France, all attempted to use arms supplies to gain diplomatic and political concessions. That reality imposed many limitations on Israel, especially in the 1960s and the 1970s. It also sometimes trapped Israel in bitter feuds between rival ministries of the same foreign governments over arms' procurement choices.(1)

Frequent rejections of Israel's requests for both weapons and technologies, recurrent arms sanctions and the intensified rearmament of Arab nations during the 1960s

convinced the Israeli leadership to embark upon the development of a broadly based indigenous arms production capability. This, in fact, temporarily settled an ongoing debate within the Defense Ministry in the 1950s and 1960s. One camp, headed by then director-general of the Defense Ministry Shimon Peres and former chief of staff Zvi Zur, stressed the importance of self-sufficiency and insisted that all necessary equipment, including platforms and battle systems, be produced indigenously.(2) The other group, led by General Yitzhak Rabin, preferred buying foreign equipment that was already available. Israel, he said, cannot and will not be able to produce everything, therefore it is far more sensible to minimize as much as possible the costly risks of research and development (R&D) programs and foster strong relations with a reliable supplier, preferably the United States. The industry, he maintained, should be confined to maintenance and improving subsystems.(3)

Over the years, Israel developed a dual-policy approach towards defense procurement. While the country continued to exhaust any opportunity to buy weapons abroad, it also invested heavily in establishing a sophisticated defense industry.(4) This system would provide a domestic industry as a logistical back-up for the IDF in war and handle its operational requirements more quickly. In addition, the defense industry would have the ability to tailor weapons and develop new ones not available elsewhere by creating advanced, defense-oriented research and development facilities. Such an industry (see table 1) would also become a source for employment, development in certain parts of the country, and export income. Most importantly, by averting future arms' embargoes, Israel would be able to hold a bigger army with an increased diplomatic and political leeway.(5)

Table 1: Areas of Military Research that facilitated civilian applications in Israel (6)

Field	Subject	Contribution / End product
Aeronautics	Structure and aerodynamics	R&D of Business Jets
Electronics	Radar	Air traffic control radar
Communication	Encoding	Cellular phones and networks
Electro-optics	Image processing	Image processing for printers
Control	Gimbals control	Medical scanners
Micro-electronics	Sensors & signal processing	Medical equipment
Computing	Software	Internet software
Agricultural engineering	Rapid entrenchment	Mechanized digger

The criteria for developing and manufacturing locally made weapons was guided by four key principles:(7)

- * The refusal of foreign powers to sell critical weapons.

- * The achievements of Israeli developers that allowed the IDF to acquire a decisive advantage on the conventional battlefield (i.e., electronic warfare and intelligence equipment).

- * The lower cost of domestic production in Israel compared to imports.

- * The production only of weapons' systems that were needed to facilitate a

regional deterrence posture and were unattainable from other sources.

Independent research, development, and manufacturing were thus a substitute that could free Israel of its total dependency on foreign supply sources for the IDF. Consequently, the Israeli government have allocated many resources, most of them at the expense of other pressing requirements like housing and infrastructure, in order to establish an independent military industrial base.(8) A comprehensive knowledge base was set up in universities and governmental laboratories through global networking and by applying practices such as reverse

engineering, industrial espionage and smuggling of specialists and equipment in covert operations.(9)

The Kfir fighter plane, for example, was based on plans of the French Mirage III acquired clandestinely through a Swiss source in the 1960s.(10) In another operation which took place in the 1960s, the Ministry of Defense brought to Israel an expert in firearms and explosives, a Pole of Jewish origin, who helped to design new types of weapons in Israel Military Industries (IMI).(11)

The operational success of many indigenous products, the quest for additional income, in light of the industry's growth in the 1970s and 1980s, and the rising costs of new developments, have motivated the export endeavors of the Israeli defense establishment.

A liberal export policy combined with vast operational experience secured Israel's defense industry position in the world markets. Israel was quick to offer operational solutions thanks to a considerably faster development process. Among the factors involved in Israel's success and speed were the high national priority placed on defense efforts, the quality of the minds involved in this industry, and the fact that the end user was often part of the design and production team bringing to bear practical experience and specific requirements. This has given Israel an important commercial edge over its competitors around the world. In many cases, foreign armies found these advantages to provide good reasons for them to participate in new Israeli weapons programs.

A rapid rise of export revenues in the 1980s assisted to subsidize the cost of the research and development of new weapons, and this has compensated for a sharp cut in the domestic R&D budget.(12) Advanced generations of air-to-air missiles were funded through revenues from arms sales to China(13) while Singapore and Chile paid for most of the development of the Barak, a naval missile.(14) South Africa funded the development of Israel's first reconnaissance

satellite and advanced generations of ballistic missiles.(15)

Arms exports not only played a crucial role in offsetting Israel's trade imbalance but also performed a pivotal role in furthering its clandestine diplomacy efforts. The sale of arms and technology has become one of the most effective techniques to furthering Israeli goals overseas, including as a bribe to rescue some endangered Jewish communities.(16) The discreet ties with China and India and the more salient alliance with Turkey in the 1980s and the 1990s are good examples of strong links based on such cooperation.

Some countries, such as Indonesia and Sudan, have no formal relations with Israel, but supplying them with military systems has maintained a level of dialogue and is sometimes the only way to achieve this goal.(17) Israel Aircraft Industries (IAI) alone has recently reported that its client-base now reaches over 80 countries, while Israel Military Industries (IMI), in its prime, supplied more than 60 foreign armies.(18) The export products included not only used weaponry that was being phased out of IDF service, but also consisted of new, sophisticated arms, such as missiles, battleships and combat aircraft and included co-production in weapons' development and technology transfers.(19)

In many instances, the defense industries came up with innovative designs and creative conceptual solutions, neither foreseen nor suggested by the armed forces. The Lebanon War of 1982 furnished some examples of this innovative development, such as surveillance by unmanned aerial vehicle (UAV) and the Python-3, high maneuverability air-to-air missile, which brought down about 90 Syrian fighter aircraft.(20) Later examples are the IAI's Arrow anti-ballistic missile defense system and the light-weight military reconnaissance satellite Ofeq, Elbit's display and sight helmet DASH for fighter pilots, and Rafael's anti-tank missile, Gomed.(21)

Availability of foreign weapons was also affected by Israel's own technological

and industrial capabilities. The more advanced and self-reliant they became, the less restrictions on arms transfer were imposed, especially by the United States, Israel's chief supplier since the mid-1970s. Paradoxically, the mere fact that Israel has developed the capability to produce similar weapon systems was enough to lift export objections. Previously refused systems, like advanced air-to-air missiles (AMRAAM), thermal imagery systems and electronic warfare kits were offered to Israel. This can be explained by the desire of American producers to remove Israeli rival design from the global market, which becomes easier once the Israeli manufacturer loses its traditional end user, the IDF.(22)

Although Israel has gained wider access to the American arsenal as time went by, it was also subjected to occasional arms embargoes and technology transfer objections, especially in the 1980s. After the Israeli air strike against Iraq's nuclear reactor in 1981--justified by Israel as an act of self-defense--Washington suspended a pending shipment of F-16s aircraft.(23)

To this very day, there are still many restrictions in place. For instance, Israel is prohibited by the United States from using the MLRS rocket system in Lebanon,(24) and encountered many obstacles on requests for technology transfer on commercial or political grounds. A possible breach of international conventions, such as the nuclear nonproliferation treaty (NPT) or the missile technology control regime (MTCR), was also sometimes cited as a reason for an American refusal.

More disturbing from the Israeli point of view was the practice of using arms supplies in an attempt to extort concessions from Israel or dictate restrictive demands on it. During the 1991 Gulf War, for example, Israel was asked to guarantee that it would not attack Iraq, in return for access to U.S. spy satellites photos of Iraqi Scud missile sites. Israel refused.(25) In July 2000 Israel was forced to scrap the sale of a sophisticated reconnaissance aircraft to China, despite her contractual commitments, following a direct

American threat to cut Israel's military aid and downgrade strategic relations with her. The United States also demanded a right to veto Israel's arms export to certain countries--China, Russia and India, among others--a request that is seen as a major threat to the Israeli industry.(26)

THE EVOLUTION OF ISRAEL'S DEFENSE INDUSTRY

A mixture of imported technology and Israeli innovation boosted the growth of the defense industry. The industry evolved through several stages, starting with small arms production and maintenance of more complex weapons, followed by licensed production and joint ventures, adoption and upgrading of licensed systems, and local production and design of components. The French arms embargo of 1967 and the aftermath of the 1973 war served as a catalyst for the next phase, namely independent design and the production of major weapons systems and platforms. This rapid progress backfired during the 1990s, as the industry shrank and focused on the production of niche expertise systems and components due to a sharp fall in domestic and foreign sales.(27)

The origin of the Israeli defense industries can be traced back to the pre-state years, when the Jewish community in mandate Palestine of the 1930s had some clandestine arms production units that produced and repaired rudimentary weapons.(28) The secret industry was established to support the underground paramilitary organizations opposing British rule in Palestine.(29)

The first stage of local production, from the late 1940s until the mid-1950s, focused largely on the manufacture of small arms and ammunition and the refurbishing of old weapons--World War II surplus--for use by the IDF. An aircraft maintenance facility, Bedek, was founded as a department in the Ministry of Defense, specializing in maintaining and repairing military aircraft.(30) By that time, the workforce in defense facilities had reached 5,000.(31)

Table 2: Israel's Progress in Weapons and Military Technologies (32)

Decade	Product
1940s	Hand grenades, submachine guns, mortars, armoured cars
1950s	Uzi submachine gun, small arms and ammunition
1960s	Fouga Magister jet trainer (licensed production); Gabriel anti-ship missile, Jericho intermediate-range ballistic missiles; first generation non-conventional capabilities
1970s	Unmanned Aerial Vehicles; Laser range-finders and designators; Galil assault rifle; Reshef missile boat family; Kfir fighter; Merkava tank; Barak surface-to-air missile; Popeye air-to-ground missile;
1980s	Electronic-warfare suits, ELINT and COMINT systems; Thermal imaging and electro-optical systems; Ofeq reconnaissance satellite; Jericho ballistic missile mark 2; Harpy attack UAV; Lavi fighter (cancelled); secured communication systems; deciphers and encoders; Python-4 all aspect air-to-air missile; Directed energy weapons; advanced armor techniques and anti-armor weapons; energy weapons.
1990s	Attack multi-purpose UAVs; complex composite structures; cyber-warfare; Arrow anti-ballistic missile; simulators; Electronic Warfare systems; communication systems; remote sensing; anti-tank guided missiles; cruise missiles; upgrade programs; Merkava tank Mk. 4;

The second phase, involving licensed production, lasted between 1955 and 1967. A combination of political and military interests led to close cooperation between Israel and France. During this period, France sold advanced aircraft, armored vehicles, naval craft and other weapons. In addition, the French provided the Dimona nuclear reactor and the technological knowledge for the Israeli ballistic missile program. The French also agreed to provide Israel with technological assistance for the licensed production of combat fighters and trainers, and all this, in turn, brought a major transition in the development of local arms capabilities.

The Sinai war of 1956 brought a rapid inflow of tanks, jet fighters, helicopters and new communication systems that led to a swift growth of the maintenance facilities. The responsibility for research and development was transferred in 1958 from the Research and Planning Branch of the Ministry of Defense and transformed into a separate unit, Rafael, but still as part of the Defense Ministry.(33) As a national laboratory, Rafael was required to address the critical demands of the IDF, including top

secret projects, such as the development of weapons of mass destruction.(34)

At the same time, Israel Military Industries, once a small manufacturer of relatively simple components and light arms, entered into new upgrading projects for artillery platforms, such as battle tanks and self-propelled guns.(35) IAI-Bedek turned from an aircraft maintenance and repair workshop into a full-scale system house, specializing in avionics and missiles, with assembly capabilities for French jet trainers. The expansion of the defense industry was also reflected in the increased number of employees, which by 1967 had reached 14,000 workers.(36)

Following the French arms embargo of 1967, Israel initiated programs for the indigenous production of advanced aircraft, tanks, naval craft, as well as tactical and strategic missiles, electronics and other subsystems.(37) While a policy of self-sufficiency was questionable economically, it was a sound political-military strategy. Israel's search for qualitative superiority over its neighbors underlined the need for technologically advanced systems. This led to

bigger resources becoming available for the defense industries, which became a major component of the Israeli economy. The result, in terms of industrial endeavor was recognized immediately. The industry's workforce soared from 14,000 in 1966 to 34,000 in 1972.

The defense industry continued its expansion right after the War of 1973, alongside the IDF's accelerated process of weapons acquisition and personnel expansion. During this period, total employment (including sub-contractors) doubled to 63,000, most of them organized in strong unions within the state-owned sector(38). This amounted to more than 4 percent of the total workforce and 20 percent of the industrial labor force.(39) At the same time, arms export sales increased 25 times over--from \$40-70 million in the early 1970s, to \$1.52 billion dollars in 1997 (in current values)(40) making Israel the world's fifth-largest arms exporter.(41)

Industrial readjustment in the 1980s and the 1990s

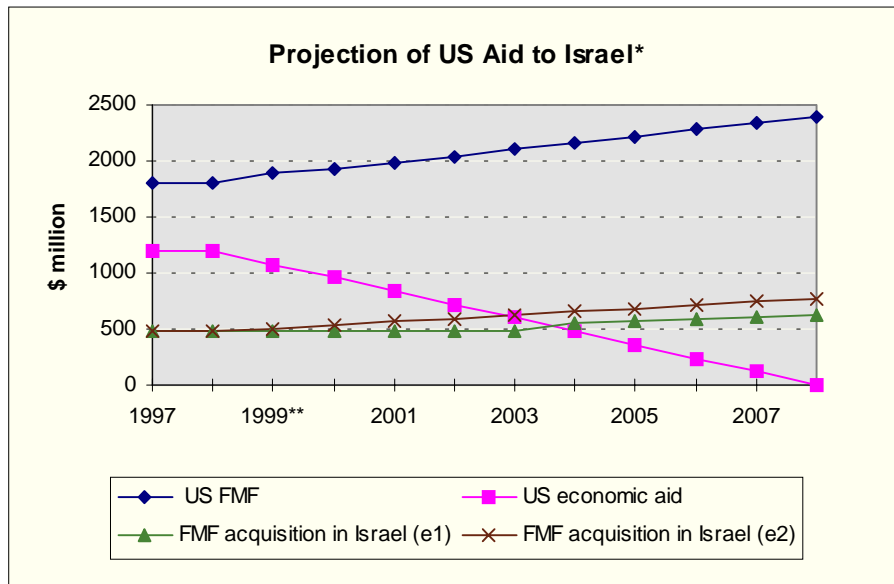
Major events in the second half of the 1980s--an economic crisis in Israel and the end of the Cold War-- had a long-lasting impact on the defense industry.

Local defense expenditure was reduced as the government tried to rein in hyperinflation through a series of deep cuts in domestic expenditure, thus affecting the IDF's spending power. The armed forces bought far less from the local industry,(42) while increasingly channeling orders to the U.S. market.

Controversial arms exports--mainly to Iran, Chile, South Africa and China-- were sanctioned in order to maintain employment in the industry and to compensate for a sharp fall in the domestic R&D budget.(43) This was a short-lived hope as new arms orders plummeted after the collapse of the Soviet Union and the arms industry struggled with redundant capacity. In contrast to the aspirations of the 1960s and the 1970s, it became clear that Israel was unable to sustain a large and diverse indigenous defense production capability. The self-sufficiency strategy was well beyond Israel's limited means.

The Shift in Procurement Preferences

Following the peace accord with Egypt in 1979, the relationship with the United States stabilized and the level of insecurity with respect to weapons' imports decreased significantly. Reliance on imports from the United States--financed by American grants--increased sharply. The American pledge to back Israel militarily and diplomatically during the peace negotiations in the Middle East(44) convinced Israel's decision-makers that a repetition of the 1967 scenario--when France placed a sudden arms embargo on Israel--was highly unlikely. The IDF and the Ministry of Finance have become so habituated to the American grants, including the stipulation that Israel buy American products, that they began to perceive it as indispensable part of the Israeli defense budget.(45)



Notes: The United States is paying Israel's repayments for loans taken from her in the 1970s through the Economic Aid. In addition to an annual military grant of \$1.8 billion, Israel received additional military aid, including pre-positioning of war reserve stores in Israel, one-time post-Gulf War aid worth \$2.3 billion, funding for programs like the anti-ballistic missile project, Arrow, and commitments of American aircraft suppliers to make indirect offset deals with Israeli firms.

The availability of American funding, which somewhat cushioned the cut in the local ingredient of the defense budget, exposed deep anomalies in the relationship between the IDF, the Ministry of Defense and the defense industry. In the 1950s and the 1960s, the Ministry of Defense was engaged in central planning of military industrialization and this sometimes influenced certain acquisition decisions of the IDF.(46) In the 1980s, the IDF started exercising a principle known to economists as "consumer sovereignty" (or consumer preference), after a 1979 Defense Ministry decision that gave the IDF full control over the defense budget, including long-term weapons' development and acquisition. This meant that the IDF was able to determine not only its needs but also how much it would spend and from which source. Consequently, the IDF's needs took precedence over the interests of the domestic industrial base.(47)

In some Western countries, the responsibility for "preparation," a long-term process of augmenting future capabilities usually guided outside the armed forces but in consultation with them, and "preparedness," the immediate readiness to wage war, are

placed at separate hands. In Israel, they were both at the hands of the IDF.

The military has always favored off-the-shelf equipment and objected to vast investment in costly and risky indigenous programs funded through the defense budget, thus imposing severe limitations on its latitude. Gradually, the IDF allocated less and less to R&D projects, and much more for salaries and pension payments, in order to ensure its competitiveness as a prospective employer.(48)

The Lavi fighter aircraft--the flagship project of IAI and the pride and joy of the entire defense industry--was the most salient casualty of the American aid. The IDF/Air Force preferred the U.S. F-16 aircraft, though senior officials in the Ministry of Defense supported the more expensive Lavi to boost the country's defense industrial base.(49) Soon it was obvious that Israel could not meet the aircraft development costs without substantial financial support from the United States, which clearly had no intentions of doing so for commercial reasons. Another incentive for the cancellation came when the United States allowed Israel to convert one-quarter of the annual military grant to Israeli

currency and to allow for the purchasing of Israeli-made systems with that money. Despite forceful opposition of IAI workers, the Lavi program was cancelled in 1987 under strong pressure from the Israeli Air Force and the American administration.(50)

The cancellation of the Lavi project was a result of a gradual shift of priorities, resulting from the availability of American arms, and marked a watershed in the state's perception as to the purpose of the local defense industry. Its traditional role as the chief weapons' developer and supplier to the IDF was over. The role of the local industry was scaled down in line with that shift, as it now was merely required to guarantee the IDF's qualitative edge. This was to be achieved by upgrading Israeli-made systems, and supplying "power multiplier" systems--weapons that would guarantee superiority in the battlefield and are not available from other sources.(51)

The industries resented this approach. They said they needed a steady stream of orders from the IDF across the board in order to retain the necessary workforce for future developments. But their protests were to no avail.(52)

As of 1999, the IDF has been diverting an increasing portion of the purchasing from locally made goods to those made in the United States because they were paid for by the American military aid. Israel buys low-tech products like shoes, uniforms and food from American manufacturers that were previously purchased from Israeli suppliers.(53) Recent report concluded that this gradual shift would force Israeli suppliers of the Ministry of Defense to dismiss at least 17,000 workers until 2008 and could inflict a cumulative loss of \$2 billion in export revenues.(54) One factor for this high estimate is that foreign clients hesitate to buy Israeli military products if they are not in use by the IDF.(55)

The Crisis in the State-Owned Defense Industry

The drop in foreign orders, following the collapse of the Soviet Union and the end

of contracts with foreign customers, coupled with the growing shift of the IDF toward the American suppliers, affected both the state-owned and private defense industries.

While the private sector handled its problems internally, the state-owned sector sought the help of the government. In 1994, IAI reported a deficit of \$450 million for the previous year and IMI presented losses of \$70 million in 1994 and \$85 million in 1995. Prime Minister Rabin commented on the crisis in IMI that "there is no escape other than restructuring and adjustment in the defense industry. It is cheaper to maintain IMI's workers in Hilton hotels than in the factory itself."(56) Rafael--funded by the defense budget--reported a loss of 855 million shekels between 1989 and 1993 (roughly \$315 million).(57)

The Finance Ministry convinced the government that the state-owned defense industry had become bloated and that--thanks to government bailout and subsidies--it was characterized by waste, inefficiency and duplication.(58) In part, the restrictions imposed on the state-owned firms--which are required by law to be profit-driven entities--simply prevented them from addressing their problems promptly. Their rigid labor structure meant that they were unable to diversify or lay-off redundant employees as freely as privately owned companies. Their pay structure was linked to that of the public sector, irrespective of their actual financial condition.

At the same time, they could not offer special wage advantages to some employees or hire short-term contract workers without the consent of the unions. They also lacked managerial flexibility, as they needed authorization from the bureaucracy and the political echelon for almost every step, from arms sales to joint ventures. This meant a slow process that led to a loss of business opportunities. In extreme cases, as was so evident in the case of IMI, the company's financial condition deteriorated because the government hesitated or declined, for political reasons, to approve large-scale dismissals.(59)

Israel's state-owned defense industries were forced to undertake massive layoffs--from 43,700 in 1985 to about 23,000 in 1997--a phase that was protracted and confrontational.(60) Their research and production interests shifted from major platforms to technologically advanced systems and components for the military and the civilian markets.(61)

The contraction process was paid directly by the state's treasury at a cost of almost \$3 billion.(62) The Ministry of Defense played a minor part in the discussions with the industries, as it did not want to contribute for the downsizing from its own dwindling budget.(63)

At the same time, the privately owned defense and civilian companies in the electronics and software sector gained prominence and spearheaded the local industry, thriving on the advances seeded by government research laboratories. The technology boom and the lure of the private sector and its many start-up companies attracted the most skilled and talented employees who opted for better financial rewards, less security restrictions and state-of-the-art research. The average age of scientists in the state-owned industry reached 47, and the attrition rate of young scientists continued to escalate.(64) The influence of the defense industry in Israel's economy has slowly declined.

The diminishing position of state-owned companies has been further undermined by the fact that privately owned defense companies have developed competing expertise, gradually attracting a larger portion of Defense Ministry orders. This was facilitated by the introduction of the Compulsory Tender Law that required the Ministry of Defense (and all other governmental branches) to introduce competition into the bidding process of services and products. This has effectively ended the Ministry of Defense's preferential disposition toward state-owned firms, while posing it with serious conflict of interests (as proprietor, client and regulator at the same time).

Privately-owned companies stepped into the state-owned industry's traditional territory of expertise, such as UAV, upgrade packages and Electronic Warfare systems, and demonstrated that their leaner and more efficient structure pose a real challenge to the state-owned sector.(65) Soon a disturbing phenomenon emerged: Israeli companies started slandering and accusing each other in front of the client, while competing on the same order. The Ministry of Defense was unable to prevent this behavior, which led in many cases to a decision to award the contract to a supplier from another country. Rarely and only after a direct appeal by the Ministry of Defense did the industries agree to join forces abroad.(66)

The private industry, which accounts for only 30% of the defense industrial base, also started a process of mergers and acquisitions. Elbit Systems and El-Op Electro-Optics merged in July 2000(67), while the Koor Group consolidated its defense businesses, which include Tadiran Electronic Systems, Tadiran Spectralink and BVR, under the umbrella of Elisra Electronic Systems.

In sharp contrast to this development, the government has not been furthering any concrete plan for a far-reaching merger or privatization in the state-owned sector.(68) The plan to transform weapons maker Rafael, which is part of the Ministry of Defense, into an autonomous government-owned company started in 1994 but the government is still negotiating with the unions, unable to reach a conclusive agreement. The privatization plans of IAI and IMI were never seriously considered, due to prohibitive demands of the workers' unions and the reluctance of the management. The potential ramifications of clashes with the bureaucracy and the strong unions had deterred politicians from both sides, despite a proclaimed policy of privatizing the state-owned sector.(69)

Another obstacle was the refusal of the Ministry of Defense to relinquish its control over these industries until a law is in place that safeguards the nation's interests by establishing procedures regarding foreign

ownership, control and influence.⁽⁷⁰⁾ For this and other reasons, the Ministry of Defense blocked the sale of IMI's heavy ammunition division to the American firm Lockheed-Martin in 1996.

CONCLUSIONS AND IMPLICATIONS FOR THE FUTURE

The growth of the Israeli defense industry was a combination of policy and circumstances. The realization that, despite the traumatic experience of the Holocaust, the Jewish state was still subjected to existential threats by the Muslim world, have led to the psychological as well as material institutionalization of the Centrality of Security concept. This perception has been strengthened by various arms embargoes and broken agreements inflicted by foreign suppliers.

Consequently, Israel's policymakers allowed a rapid expansion of the state-owned arms industries and their involvement in the production of indigenous state-of-the-art weapon systems. The industries became the largest manufacturing and technological sector in Israel, employing tens of thousands, most of them organized in strong unions, and contributing enormously to the Israeli military qualitative edge, the nation's diplomatic efforts and its economy.

The shift in the IDF's procurement policy, following the 1979 Camp David peace treaty with Egypt, effectively ended the industry's *raison d'être*. The growing dependence on American weaponry deprived the Israeli companies of their most important client and sales promoter, and forced them to rely on foreign customers to ensure sufficient revenues. This exposed them to the cyclical nature of the arms exports market and to fluctuations in the official rate of exchange.

The simultaneous drop in domestic and foreign orders in the late 1980s and at the beginning of the 1990s revealed the industries' vulnerability. Their inherent weaknesses threatened their very existence and contributed to their financial downfall. The government stabilized their financial condition but refrained from addressing their

basic structural and labor deficiencies due to a combination of political cost calculations, incoherent policies and a chronic problem of agenda congestion. Restructuring, consolidation and privatization of the state-owned sector have been kept firmly off the agenda despite their commercial and financial benefits. Policymaking toward this sector was (and still is) crisis-driven and responsive rather than pro-active.

Following the government's massive handout, the state-owned industries showed signs of recovery in the second half of the 1990s, but there are major question marks as to their long-term viability. Privately owned industries emerged as strong and viable competitors, both domestically and internationally, while the IDF continued to reduce its local purchasing considerably across the entire industry.

The substantial cut in Israel's defense R&D budget and the decline in research partnerships with foreign clients will restrict the industry's capacity to develop successful--and export worthy--weapons systems. The arms exports restrictions imposed by the United States, Israel's patron and main benefactor, will deter foreign consumers, while the Israeli industries, both private and state-owned, would have to face as competitors the giant firms now existing in Europe and the United States. Israeli companies are not permitted to join or merge with multinational alliances in the defense sector, and this position is unlikely to change in the near future.

In light of the above, the long-term viability of the Israeli defense industry remains questionable. Unless the government would devise and implement a plan for the restructuring and preservation of the state-owned industries, which seems improbable under the prevailing circumstances, their demise--especially in the case of the technology-starved IMI--is likely.

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This article is partly based on his interviews with more than 100 officials and experts.

NOTES

1. Two famous cases were the cancelled sale of British Chieftain tanks in 1969 and the selling of American Hawk anti aircraft missile in 1960.

2. Declassified American intelligence reports and interviews with former Defense and Foreign Minister Moshe Arens, 24.6.1998 and former Prime Minister Shimon Peres, 2.12.1997.

3. Y. Greenberg, Defense Budget and Military Power, (Tel Aviv: Ministry of Defense publishing, 1987) p. 98-99; Interviews with former Chief of Staff (1961-1963) Zvi Zur, 21 December 1999 and Shimon Peres, 2 December 1997.

4. Y. Lifshitz, Defense Economics - The General Theory and the Israeli Case (Tel Aviv: The Jerusalem Institute for Israel Studies and Ministry of Defense Publishing House, 2000), p. 359

5. Interview with Peres, 2 December 1997; Z. Bonen, The Israeli Defense Industry - Past and Future, (Technion, Yad Neeman, 16 February 1994), Lecture transcript, p. 35.

6. Z. Tadmor, Lecture transcript, Neeman Institute, Technion, September 1997

7. Israel Tal, National Security - The Few against the Many (Hebrew) (Tel-Aviv: Dvir, 1996), p. 72. Maj. Gen. (res.) Israel Tal, formerly deputy Chief of Staff, has served as a senior assistant to the defense minister (1975-2000). Efraim Inbar, Rabin and Israel's National Security, (Baltimore: Johns Hopkins University Press, 1999), p. 79.

8. Interviews with Israel Tal, 14 January 1998 and with Michael Shor (IMI's Director-General 1972-1990), 30 June 1998.

9. Report by Defense Investigations Service (DIS), the field security branch of the American Department of Defense, quoted in Ha'aretz, 31 January 1996. The Bureau of Scientific Relation (Lakam) in the Ministry of Defense was responsible for collecting scientific and technical intelligence abroad from both open and covert sources. Lakam was disbanded in 1986 after it was identified

as the agency responsible for recruiting and running an American naval intelligence employee, Jonathan Pollard. See also 'Israel - a country study', Federal Research Division, Library of Congress, December 1988, Internet edition

<<http://leweb2.loc.gov/frd/cs/iltoc.html>>.

10. Interviews with Israel Tal and Michael Shor. See also on the Mirage 3 affair in CRS Report; A. Oren, Ha'aretz 9 May 1997 and 2 March 1998 and S. Reiser, The Israeli Arms Industry (New York: Holmes and Meyer, 1989), p 104.

11. See: Interview with Tal, 14 January 1998.

12. See interviews with David Ivry, 7 October 1997 and 28 June 1998. Major General (res.) Ivry, formerly Air Force Commander, deputy Chief of Staff, Chairman of IAI and Director General of MoD (1987-1996), head of the National Security Council and currently (2000) serving as the Israeli Ambassador to Washington.

13. Ha'aretz, 5 February 1999.

14. Ha'aretz, 19 October 2000

15. See: Ha'aretz, 17 July 1994.

16. A. Kleiman, Israel's Global Reach, p. 35; Israel bribed Sudan and Ethiopian leaders with arms to enable rescue operations of Ethiopian Jews in the 1990s.

17. It has been repeatedly reported that IAI has sold aircraft fuel tanks to Saudi Arabia, and maintained links in Indonesia and Morocco.

18. 1998/1999 IAI's official calendar; Interview with Michael Shor, IMI Director-General 1972-1990, 30 June 1998

19. Among the most prominent countries: China, co-developing its future combat fighter, based on the Lavi, see: Defense News, 2 September 1996, p.6; South Africa, under the apartheid regime, was a major client that financed advanced projects, such as reconnaissance satellite, ballistic missiles. It also bought redundant Kfir aircraft, which were phased out of the Israeli Air Force service. Some of the projects resulted in heavy losses, for example the development of Early Warning aircraft inflicted a loss of \$120 million upon IAI. See: Ha'aretz, 1 April 1997 and 25 April 2000.

20. See: interview with Col. (res.) Dr. A. Sela, former head of Air Force operations, 5 July 1998.
21. Interviews with Moshe Arens, 24 June 1998 and with Dr. A. Sela, 5 July 1998.
22. Interviews with Israel Tal (Assistant to the Defense Minister) 14 January 1998; David Ivry, 7 October 1997 and 28 June 1998; and Amos Horev (Chairman of Rafael), 30 June 1999.
23. 'Israel - a country study', Federal Research Division, Library of Congress, December 1988, internet edition <<http://leweb2.loc.gov/frd/cs/iltoc.html>>
24. Ha'aretz, 11 February 2000.
25. Full account of this episode appears in the memoirs of Israel's defense minister: Moshe Arens, *Broken Covenant (Milkhama Ve Shalom Bamizrah Hatikhon, 1988-1992)*, (Tel Aviv: Yedioth Ahronoth, 1995), pp. 179-180.
26. Ha'aretz, 13 July 2000.
27. D. J. Louscher and A. N. Schwartz, 'Patterns of Third World Military Technology Acquisition', in K. Baek, R. D. McLaurin and C. Moon (eds.), *The Dilemma of Third World Defense Industries: Supplier Control or Recipient Autonomy?* (Boulder: Westview, 1989), p. 51; Interview with M. Shor, 30 June 1998; Interview with S. Peres, Interview with A. Sela, 5 July 1998, Interview with David Ivry 7 October 1997; Congress Research Service report on Israel's Defense Industry.
28. J. Evron, *Shield and Spear* (Tel-Aviv: The Ministry of Defense publishers, 1992), p. 19.
29. S. Sadeh, *Israeli Defense Procurement* (London: SMI Publishing, 1999) p. 85.
30. Y. Evron, *Defense Industry in Israel*, (Tel Aviv: Ministry of Defense, 1980), p. 407.
31. A. Yaniv, *Politics and Strategy of Israel* (Tel Aviv: Sifriyat Poalim, 1994), p. 145.
32. The list is based on declassified American intelligence reports and other open sources, such as Aviation Week and the Israeli press.
33. State Comptroller Annual Report No. 45, pp. 842.
34. Jane's Intelligence Review analysed Rafael roles, and asserted that it assembles nuclear warheads in a certain facility in northern Israel. See: Ha'aretz, 13-14 November 1994; Rafael was involved already in the 1950s in secret unconventional project. See: M. Mardor, *Rafael* (Tel Aviv: Ministry of Defense, 1981) pp. 120-129, and A. Benn, 'The project before the nuclear option', Ha'aretz, 2 March 1995, p. B3.
35. A. Yaniv, *Politics and Strategy of Israel*, p. 145.
36. *Ibid.* p. 146.
37. A. Yaniv, *Politics and Strategy of Israel*, p. 217.
38. In 1987, IAI had 20,000 workers, IMI - 14,000 and Rafael - 6,000. The rest were in Tadiran with 12,000 employees, Elbit, El-Op and other companies.
39. A. Kleiman, *Israel's Global Reach: Arms as Diplomacy* (Washington DC: Pergamon-Brassey's, 1985), p.73; Eliot Cohen et al, *Knives, Tanks and Missiles*, (Washington: The Washington Institute for Near East Policy, 1998), p. 45; Bank of Israel Report for 1997, p. 294.
40. A. Yaniv, *Politics and Strategy of Israel*, p. 288; Interview with Zvi Zur, former Chief of Staff and Assistant to Defense Minister, 21 December 1999; Ministry of Defense figures; Ha'aretz 19 March 1999 and 18 November 1999. The term 'arms exports' refers to products and services - mainly of military nature - approved by the MoD. See State of Israel, Official Statutes, no. 5410, 31.12.1991, 'Regulating Order for Commodities and Services (Export of Defense Equipment and Defense Knowledge) - 1991', pp. 609-611
41. International Institute for Strategic Studies, *Military Balance 1997/98* (Oxford: Oxford University Press, 1997), p. 265.
42. IMI's sales to MoD fell by 45% from an average of \$ 200 million a year between 1982-1984, to \$109 million a year between 1985-1988. See State Comptroller Special Report, June 1994, p.17. During the same period, IAI sales to the MoD dropped by 22% from \$641 million a year to \$500 million. See State Comptroller Report 45, p. 868.
43. Interviews with Yitzhak Shamir, (Israel's Prime Minister 1983-1984, 1986-1992), 30 June 1998 and with David Ivry, 7 October 1997, 28 June 1998. The military R&D budget was reduced by 43% between 1986-

1994. See State Comptroller Report no. 44, p. 1028.
44. See testimony of the Director of the Defense Security assistance Agency before the House of Representatives' Appropriations Subcommittee on Foreign Operations: 'Defense Department Testimony on US Aid to the Middle East', United States Information Service, 6 May 1994, p.1.
45. State Budget Proposal for 1994, Ministry of Finance, p. 63; This basic assumption is the basis of every long-term work plan of the IDF and the Ministry of Finance. See interview with Ilan Flato, chief economic advisor to Prime Minister Rabin, 21 June 1999.
46. The Air Force was forced to buy the Israeli-made Kfir fighter aircraft despite its resistance. Interview with MK Dan Meridor, member of foreign Affairs and Defense Committee, the Knesset, 1 July 1998.
47. Interview with Prof. Pinhas Zussman, 6 July 1998. Prof. Zussman, an economist who served as the MoD Director-General between 1975-1979, decided to implement this principle on economic grounds. In retrospect, he regretted this move, as it lacked from the outset some necessary checks and balances.
48. 2.3 billion shekel were allocated for IDF's pension payments in 1998, compared to 0.9 billion shekel in 1986 (in 2000 prices) - a rise of 255%. During the same period, the portion allocated for salary in the defense budget grew from 35% of the defense budget to 45%, while the portion for services and acquisition fell from 50% to 40% between 1987 and 1997. See: Ministry of Finance, Budget 2000 and Budget 1998 proposals.
49. Interview with Lt. General Dan Shomron in *Le Figaro*, 28 October 1988.
50. For a detailed account see: D. Zekheim, *Flight of the Lavi: Inside a US-Israeli crisis* (Washington: Brassey's, 1996); 'The Decision Making Process of the Lavi', State Comptroller Annual Report no. 37 (Jerusalem: Office of the State Comptroller, 1987), pp.1291-1325.
51. State Comptroller Report no. 45, p. 910; Y. Lifshitz, *Defense Economics - The General Theory and the Israeli Case*, p. 362.
52. Interview with Dr. Gabi Komisar, (IMI Managing Director, 1991-1995), 11 June 1998
53. *Ha'aretz*, 28 January 2000.
54. According to companies' reports, 80% of IAI's revenues derive from exports, IMI has 50% exports revenues and Rafael around 30%.
55. El-Op, a defense electro-optics firm, has cut its asking price for laser designator, in order to secure a contract for a European army. The move came following a claim by the customer that El-Op's product was inferior because the IDF did not buy it as well. See *Ha'aretz*, 31 August 2000, 12 September 2000.
56. Quoted in *Ha'aretz*, 24 December 1992.
57. State Comptroller Annual Report 45, p. 842.
58. Israel has two companies, which upgrade jet fighters, three companies that produce UAVs, three companies that produce missile and rocket engines, and four avionics and electronic warfare systems companies. In Britain, there is only one missile manufacturer, which is part of a joint venture with a French company. *Aviation Week*, 10 April 2000; interview with Lord Peter Levene, 21 November 1997. Lord Levene was Chief of Defense Procurement, UK Ministry of Defense, 1985-1991, and former consultant to the Israeli government.
59. See: IMI - Current State of Affairs (internal document), IMI Planning and Control Department, January 1995, p.3.
60. IAI workforce dropped from 22000 in 1985 to 13000 today; IMI cut its labour force from 14600 in 1985 to 4500 today and Rafael reduced its workforce from 7000 in the mid 1980s to 4800 today. Arens et al, *The Israeli Military Industries*, BESA Centre for Strategic Studies - Bar-Ilan university, *Colloquia on Strategy and Diplomacy* (Hebrew), No.9, August 1995, p. 25.
61. See interviews with Imri Tov, MoD's chief economist, 8 October 1997; Haim Adar, MoD's Procurement director, 18 January 1998 and 25 June 1998. IAI is heavily involved in research and production for the civilian market. IAI reported that 39% of its revenues

in 1999 were from the civilian sector while Rafael's and IMI's had only 2% and 5% respectively. See: Ha'aretz, 6 April 2000, and Defense News, 9 August 1999.

62. Ministry of Finance, Budget proposal for 2000, Internet Edition
<<http://www.mof.gov.il>>

63. See interviews with Abraham Shokhat MK, Finance Minister (1992-1996, 1999-present), 26 June 1999, and David Ivry, 28 June 1998.

64. Interviews with Dr. Gabi Komisar (IMI Managing Director, 1991-1995), 11 June 1999, Yossi Snir (former IMI deputy managing director), 8 October 1997, Igal Sarbero (Rafael Vice President for Strategic Planning), 18 January 1998.

65. Interview with Aviem Sela, 5 July 1998.

66. Interview with David Ivry, 7 October 1997.

67. The merged company, which became the second largest defense group in Israel,

employs 4000 workers with an annual turnover of US \$750 million. Ha'aretz, 3 October 2000.

68. Doron Cohen, Director of Governmental Companies Authority, resigned in February 2000, protesting against the government's indifference towards the privatization plans in the state-controlled sector. Ha'aretz, 3 February 2000.

69. Ministry of Finance, Budget proposal for 2000, Internet Edition; 'A proposal for an official policy in the Defense Industry sector', a statement published by the Director-Generals of the Ministry of Defense and Ministry of Finance, 9 May 1993; Interview with David Ivry (the then MoD's director-general and signatory to the document), 7 October 1997.

70. Interview with Zvia Gross, legal advisor to the Ministry of Defense, 15 March 1998; Ha'aretz, 23 September 1999 and 2 February 2001.