

## Israel

### I. Current National Security Situation<sup>1</sup>

Israel was created as a nation in conflict, and its basic security situation has not deviated from that. Survival of the state is an all-pervasive national issue, and the short history of that state has been punctuated by a sequence of serious wars. As a result, the overall mood in Israel is one of constant involvement in warfare, and as a result constant improvement military capabilities, based partly on the general state of the art of armaments, but also specifically in Israeli experience in warfare as it has occurred.

Israeli defense policy has been traditionally shaped by the threat of enemy conventional ground forces supported by aircraft. However Middle East developments, both peaceful and otherwise, have shifted the locus of Israeli concerns. Sources from the Israeli defense establishment now indicate that Israel now sees long range ballistic missiles as the primary long-term threat, possibly delivering non-conventional chemical, and possibly nuclear warheads against military and civilian targets.<sup>2</sup> One senior Israeli official cited the number of ballistic missiles that currently can strike Israel to be in excess of five hundred, with the number expected to double in the next decade. These missiles are based in Iran, Iraq, Syria, and Libya.<sup>3</sup> As a result, enhanced deterrence against weapons of mass destruction and special operations forces will play an increasingly important role. Although border conflicts appear to be less likely in the short term than in the past, Israel is also concerned with Syrian developments to expand her missile force. Israel has also noted the large Egyptian force modernization program centered on Western arms imports comparable in capabilities to those of the Israeli Defense Force (IDF).<sup>4</sup>

Another Israeli national security issue also turns on the intersection of the reduction of its strategic perimeter and the increased strategic depth for Arab nations accrued from the capabilities of new strategic missiles. This phenomena will require Israel to develop increased security arrangements with its traditional as well as its newer “allies” (i.e., Turkey) in the region together with an increased reliance on space based early warning systems. Israel is also concerned that the influx of Western equipment into Arab armies has the potential to cause erosion in Israel’s qualitative edge in weapons technology. Such qualitative superiority is an important element in Israel’s conventional superiority.<sup>5</sup>

#### *Military requirements*

Israel’s Deputy Defense Minister Yisrael Tal, a long time adviser to recently elected Prime Minister Baraq, believes, like his Prime Minister, that Israel’s national survival rests on the concept of “armed peace” in the Middle East. Israel will need military superiority and a technical edge in the region, even after peace agreements are signed and the Middle East enters a long period of appeasement. The fact that distant Arab countries committed to the destruction of Israel now have these missiles undermines one of the most important foundations of Israel’s defense doctrine. Various Israeli military

strategists and commentators define this doctrine as Israel's "monopoly over strategic deterrence."<sup>6</sup>

Deterrence is only possible when it is backed by the ability to strike back and when the enemy knows that it will receive a blow in return. In the past, Israel was able to plan to strike at infrastructure targets and population centers in any neighboring country without worrying that enemy planes would attack Tel Aviv. Such certainty was based on the overwhelming superiority of the Israeli Air Force. The likelihood exists that the Iraqi and, more threatening, the Iranian possession of intermediate range and intercontinental ballistic missiles will change that balance to Israel's disadvantage since it can't prevent the build-up of missile capabilities of its enemy states. Israel must now come to terms with an emerging situation in which the monopoly over strategic deterrence using conventional arms in the near term and possibly nuclear arms in the future may shift to the Arabs.<sup>7</sup>

One solution advanced by Deputy Defense Minister Tal is to establish a Conventional Deterrence Branch that relies less on Israel's air force planes and more on precision missiles that will offer a solution to the threat from distant countries. The urgency for the development and procurement of precision strike long-range missiles is based on Israeli concerns for the capabilities of the Iranian Shahab-3 missile with its 1500 km range when tipped with a 700 kg warhead. The Shahab 4 with a projected range of 2,000 km can be adapted to carry a nuclear warhead and be ready in the first decade of the 21<sup>st</sup> century.<sup>8</sup>

In response to the new realities Israel has developed a "New War Theory" upon which the future missions and force structure of the IDF are being designed. It has five main elements:<sup>9</sup>

- Ensuring that the element of surprise is utilized in any future conflict to achieve a decisive strategic victory for Israel.
- Developing deterrence policies and capabilities, particularly the "deterrence by doubt" factor which aims at intimidating decision makers in countries that might have tense relations with Israel. This type of deterrence would restrict the movements of Israel's opponents and limit their options and reactions as a result of their doubts about the size and type of Tel Aviv's potential response to any military operations.
- Maintaining the technological gap in the fields of armament and military industrialization between Israel and the Arabs and making this gap as apparent as possible to frustrate the Arabs and convince them it is impossible to defeat Israel in a future war.
- Possessing strategic weapons systems that can constitute an effective deterrence capable of reaching any target in the Arab region and the Middle East in general.

- Constant readiness to launch a military retaliation whenever necessary that wages total war on an opponent to achieve major objectives and stabilize the situation for long periods of time. A corollary to this readiness, as circumstances require, is to launch a limited retaliatory strike on a small scale that would not jeopardize the peace process.

#### *Armament requirements*

The achievement of these objectives requires the modernization of air, ground and sea forces and a change in Israeli military force structure. For example, although tank numbers will rise with the arrival of the new Merkava 4 tank by 2010, the overall role of armor in the IDF will decline. This reflects the new fighting doctrine perspective that in the war of 2010 and beyond, the IDF will not win by tanks alone.

New technologies will be used in the force as well. Heading up a list of new technologically superior IDF systems for 2010 and beyond will be a variety of satellites (e.g., optical or communications satellites) which will supply intelligence and communications. Additional means will be deployed, such as missiles, smart munitions and pilot-less drones to attack missile launchers.<sup>10</sup>

#### *Towards a revolution in military affairs*

Israel has taken note of the American Revolution in Military Affairs, and is focused on transforming its own forces to possess similar capabilities in the Israeli context. Israel believes that it has a competitive advantage in this endeavor when compared with her adversaries, since Israel has a broad technological base, an educated labor base, a legacy of R&D in areas that have contributed to the American RMA, and also US aid.<sup>11</sup> Israel has initiated internal restructuring of the Israeli Defense Force (IDF) to facilitate the necessary transformation,<sup>12</sup> and additional organizational changes are pending.<sup>13</sup> Israel's approach to the RMA will be more limited than that underway in the United States, however. Israel intends to insert the most advanced technologies into its existing platforms, and to operate within current force structures.<sup>14</sup>

#### *Defense budget*

In 1997 Israeli military expenditures were \$9.3B (1997\$US) compared with \$7B (1997\$US) in 1991.<sup>15</sup> This placed Israel 14<sup>th</sup> globally.

Approximately 10 percent of Israel's GDP is spent on defense, and twenty-five percent of the yearly defense budget is spent on procurement. In addition to its indigenous armaments budget, Israel also receives a major foreign aid grant from the United States for the purchase of arms imports mainly produced by US industry.

In 1999, Israel increased its defense budget for the first time in 15 years. This increase is to support a new ten-year armament plan designed to develop and acquire advanced technology armor, missile defense, and space systems.<sup>16</sup>

## II. National Defense Industrial Base

In the Palestinian forerunner to the Israeli state, the defense industry actually began with isolated weapons manufacturing after the first World War, formally transitioning into a military industry in 1933. Israel's defense industry development accelerated appreciably after the Six Day War of 1967. Originally, Israel developed defense products to complement those of her main supplier, France. However when Charles De Gaulle embargoed arms shipments to the Middle East just before the Six Day War, Israel shifted priorities to local development and production. In 1971 Israel shifted to developing complementary weaponry to that supplied by the United States.

Israel historically has had a problem with reliable suppliers of advanced weaponry, which in itself has spurred Israel to try and develop indigenous capabilities in key military areas (e.g., armor).<sup>17</sup> Even recently, Israeli leadership called for Israeli local development of its own cruise missile in the face of US rejection of Israel's request to purchase fifty Tomahawks.<sup>18</sup> Israel defense industry leadership believes that the ability of Israeli industry to produce advanced military systems also contributes to the willingness of foreign countries to sell to Israel systems that are as advanced as the ones she is able to produce domestically.<sup>19</sup>

Israeli defense industries currently develop the full range of modern land, air, and sea armaments, and is also one of the few countries that develops and manufactures space launchers and systems. Israeli strengths include UAVs, assault rifles, smart ammunition, and electronic warfare, radar, and electro-optic systems.<sup>20</sup>

### *Principal defense industries*

Israel's defense industrial complex is a combination of state-owned industries, private corporations, and arsenal organizations of the Israeli Defense Force (IDF) itself. Israel's three main defense industries (Rafael, IAI, and TAAS) were created as publicly-owned industries.

- Rafael Armament Development Authority is the R&D (plus limited production) center for the entire Ministry of Defense. It conducts research and manufactures guided and unguided missile systems, electro-optics, military electronics, and image systems for the Israeli Defense Forces (IDF), as well as for export. Rafael also has developed air-to-air missiles, and fire control systems. The company currently employs 4,000 people with sales of approximately \$US620 million.<sup>21</sup> Rafael is also known for its sophisticated R&D facilities.
- Israeli Aircraft Industries (IAI) employs over 17,000 with sales of approximately \$1.6 billion, 75 percent of which is derived from export. IAI manufactures fighter aircraft, patrol boats, armored cars and missile systems.

- Finally, TAAS Israel Industries (now Israeli Military Industries), originally founded in 1933, employs 6,000 people and generates sales of \$500 million, 90 percent which is derived from exports. The company manufactures advanced weapons and ammunition systems, missiles, rocket motors, small arms, and aviation equipment. TAAS products include the Uzi sub-machine gun.

The IDF itself also contains key defense industrial elements. These include the Ordnance Corps, focused on renovating or developing weapon systems, and the Tank Administration, which developed and manufactures the Merkava tank.

After the Six Day War, Israel began to transfer increasing levels of defense orders to Israeli industry, which also drew the local commercial industrial base more into the defense sector.<sup>22</sup> Important private defense industries include Soltam (ammunition), Tadiran (communications equipment), and Elbit (computers). Israeli commercial enterprises also supply the IDF with non-military products.

#### *Continued development*

The constant threat of war and history of frequent conflict made it easy for the defense industrial base to develop. But other factors also contributed to its continued rapid growth. These included: the need to maintain confiscated Russian-made weapons captured in wartime; the requirements for transition from French arms to American arms in the IDF; the constant need to tailor foreign-made weaponry to Israel's specific security needs; the demands of a regional arms race in selected systems; and increasing interest by foreign companies to buy Israeli-produced armaments.<sup>23</sup>

#### *Israeli Global Top 100 Defense Industries*

In 1991 Israel had two companies in the global top 100 defense industries as measured by annual defense revenue. Those two companies had a combined defense revenue of about \$1.4B (1991\$US).<sup>24</sup> By 1999 that number had grown to five with a combined revenue of about \$3B (1999\$US).<sup>25</sup> Those five companies are Israeli Aircraft Industries, Rafael, Israeli Military Industries, Elbit Systems Ltd, and El-Op Electro-optics Limited. Annual defense revenue for the largest Israeli defense company in 1999 is \$1.2B, compared with \$1.07B in 1991. The largest Israeli company (in terms of annual defense revenue) ranked 27<sup>th</sup> globally in 1999, compared with 39<sup>th</sup> globally in 1991.

### **III. National Armament Strategy**

As the principal threat has shifted from the proximate land forces of Syria and Egypt to the longer-range missile capabilities of Syria, Iran and Iraq, Israel sees the need to upgrade and modernize her forces across the board. This need especially includes extending and upgrading the lifetimes of its weapons platform, developing over-the-horizon strike capabilities, space, and ballistic missile defense.<sup>26</sup> The modernization will be executed by a combination of Israeli-produced or co-developed armaments, and imports, especially those procured using funds provided by the United States.

Israeli industry is adept at upgrading imported systems to meet specific Israeli requirements. For example, the imported US-made MLRS is being modified within Israel to give it a more accurate guidance system and boosted its range to make it more effective against Syrian artillery.<sup>27</sup> IAI developed the upgraded MLRS in partnership with Lockheed-Martin.<sup>28</sup>

In the near term, major Israeli investments will be focused on technology that will improve Israeli firepower, early warning systems, aircraft modernization, and communications equipment.<sup>29</sup> Current force modernization initiatives, designed to support the IDF long-range strategic plan to 2010, are concentrating on developing smart munitions, missiles, UAVs, UCAVs, and information warfare technologies. The intent is to use these new capabilities to upgrade existing platforms that can operation within the current force structures, although the IDF intends to change the mix of combat forces to focus more on high-technology weapon systems and space systems.

Space will receive special emphasis, including the development and deployment of integrated space surveillance and reconnaissance capabilities based on Israeli-developed light mini-satellites launchable from small rockets.<sup>30</sup> A showpiece of Israeli domestic production will be the Merkava 4 Main Battle Tank, intended to replace most of the currently deployed tanks in the IDF. Merkava 4 development involved more than 200 Israeli defense and commercial technology companies.<sup>31</sup>

### *Import strategy*

Israel currently depends heavily on US-produced advanced technology systems. Current plans for the next ten years include an increase in the number of Merkava Main Battle Tanks, the acquisition of 110 new F-16's and either the F-22 or the Joint Strike Fighter, purchasing the Apache Longbow and Black Hawk helicopters, and the development of a National Missile Defense comprised of Israeli-produced Arrow batteries, and complemented by Patriot Pac-3, possibly US Aegis cruisers deployed offshore, and a new joint US-Israeli Boost Phase Interceptor system.<sup>32</sup> Recently, Israel became the first country to receive approval for US export of the Joint Direct Attack Munition, which Israel intends to integrate into the armament suites of its F-15 and F-16 aircraft.<sup>33</sup> Nevertheless, as a part of its procurement strategy for the Apache Longbow, Israel recently insisted that Boeing reduce the price significantly or the procurement would be withdrawn. Israel also asked the US government permit Boeing to provide sensitive Longbows source code software for an Israeli software development center to service Israel's entire fleet of Apache helicopters.<sup>34</sup>

Israel also imports selectively from elsewhere. For example, to bolster deterrence against the threat of weapons of mass destruction against Israel, three German manufactured DOLPHIN-class diesel submarines are being acquired. Germany is gifting two of the \$300 million platforms, and buying half of the final boat, with Israel contributing the final \$150 million. Currently capable of carrying EXOCET anti-ship missiles, it is

expected that Israel will convert the boats to fire nuclear-armed cruise missiles to augment its deterrent force against the anticipated future missile threat.<sup>35</sup>

#### *Military-industrial cooperation*

The Israeli government works to promote close cooperation between the Israeli Armed Forces and Israeli defense industries in the pursuit of common security objectives. For example, the Israeli Air Force has formal annual meetings with industry to explain Air Force goals, hoping to encourage Israeli industry to invest their own R&D funds in important areas to supplement the government R&D budget.<sup>36</sup> The fact that Israel is a small country creates proximity between military and defense industrial installations, and facilitates close cooperation and responsiveness, as does the fact that most defense industries employ personnel with military service.

The prior military experience of industrial personnel also shortens the development cycle for new systems, and gives Israel a competitive advantage on the world market.<sup>37</sup> At the same time, Israel is concerned that technical expertise will be lost to the growing civilian market, and it will be difficult to maintain an advanced technological defense industrial base.<sup>38</sup> Maintaining sufficient R&D activities to remain competitive internationally is also an important obstacle, since the national R&D budget is shrinking. In 1997 government R&D funds comprised NIS \$1.6B (eight percent of the defense budget), compared with NIS 4.56B (24 percent of the defense budget) in 1985.

#### *Arms import level*

In 1997, Israel's arms import level was \$1.1B (1997\$US), compared with \$1.8B (1997\$US).<sup>39</sup> This placed Israel 10<sup>th</sup> globally.

### **IV. Perspectives on the International Arms Export Market**

From the very beginning of the expansion of Israel's defense industrial base following the Six Day War, arms exports have played a key role in Israeli foreign policy and Israeli military strategy. A deliberate component of Israel's armament strategy is the requirement for the Israeli defense industry to seek funds in the export market.<sup>40</sup> This includes cooperative developments with corporations in foreign countries,<sup>41</sup> and especially the US and European giants.<sup>42</sup>

#### *Export benefits*

Between 1976 and 1981, defense exports increased steadily, eventually becoming the main component of the defense industrial output. Israel saw several direct military advantages: ensuring emergency reserve production capacity; providing an implicit emergency supply of raw materials that could be shifted to Israeli needs in an emergency; facilitating international defense cooperation; and fostering reciprocal agreements that resulted in the acquisition of new technical knowledge and advanced systems for import. As a foreign policy instrument, arms sales also mitigate Israel's frequent isolation among

nations. Politically, arms sales help develop diplomatic relations and support from developing countries, they provide instruments by which Israel can try and secure peripheral support from non-Arab neighbors, they provide bridges to other isolated states (e.g., Taiwan, South Africa), and they facilitate the acquisition of key raw materials. Arms sales have also helped Israel economically as sources of foreign currency and of increased profitability for the Israeli defense industrial base. And the traditional micro-economic advantages from arms exports—reduction of unit costs, increases in the size of production runs, economies of scale—also have benefited Israel.<sup>43</sup>

Besides the historical Israeli rationale for arms exports, there is also new impetus. The Israeli defense industry currently faces problems due to the small size of the domestic market, coupled with the magnitude of US military aid. US aid is restricted for the most part to purchases of armaments produced under the leadership of US companies.<sup>44</sup> As a result, the export market is considered to be essential for survival. In the view of some Israeli leadership, arms exports provide the financial baseline that allow the industry to meet domestic needs.<sup>45</sup> Currently, Israeli defense industry exports on the average about 70 percent of its armaments. This has created a strong reliance on foreign customers. At the same time, Israeli defense products, at least in the past, have been originally developed to meet IDF requirements. Israeli strategy to develop export versions of sensitive systems has recently experienced setbacks internationally from competitors willing to offer the most advanced capabilities.<sup>46</sup>

Dependence on arms exports is viewed to provide a net positive contribution to Israel's national armament strategy. However there is also current concern that the Israeli defense industry is currently so busy with short term marketing efforts that they have not invested sufficiently in the future R&D that will allow them to make innovations that will keep their products competitive with American armaments.<sup>47</sup>

### *Export strategy*

Israel's defense industrial success has been due to the quality of weaponry (designed in light of Israeli actual battle experience), Israel's technologically advanced workforce, an advanced international marketing network orchestrated by the Ministry of Defense, and the comparatively lower cost of Israeli systems on the world market.<sup>48</sup> As a result of Israel's overall strategic approach to arms exports, and the quality and cost of Israeli weaponry, Israel has many international clients in all regions of the world, with the United States traditionally being Israel's largest export market.

### *Competitive advantage*

Israeli armament strategy is consciously based on her belief that her competitive advantages lie in sub-systems, software, and high-technology products. This has led to calls within Israel to purchase platforms using Israel's military assistance program funds received from abroad while concentrating local defense industries on those areas in which they have global competitive advantage. Israeli industry would be used to tailor platform

capabilities to Israeli needs as well as for resale on the world market to meet specific user requirements.

Israel leaders view their specific competitive advantages to lie in the areas of space systems, UAVs, missiles, navigation and radar systems, avionics, EW, and electro-optics.<sup>49</sup>

Israel's success with arms exports has been helped by the presence of a strong high-technology commercial industrial base. Several factors have contributed to the strength of this base: Israel's technological skills in science, engineering, and mathematics; a work ethic strengthened by universal military service and the constant threat of war; and technology and personnel from defense spin-offs. Israel has a world class reputation in microchip design, cryptography, Internet software and data communications hardware. Israeli's scientists and engineers came from the migration of skilled Jewish personnel from all over the world. Israel has more companies listed on the NASDAQ stock exchange than any company in the world except the United States and Canada. Additionally, many western companies are opening research and development facilities in Israel to take advantages of Israeli technical skills.<sup>50</sup>

Israel currently has defense trade relationships with forty-eight countries, including fifteen with which Israel has cooperative defense development or production agreements.<sup>51</sup> Israeli export strategy is focused globally, winning a steady stream of small contracts designed to achieve market penetration, and including a deliberate strategy of industrial partnering with the Western defense giants where possible. In addition to selling those systems in which Israel clearly has a global competitive advantage, her strategy focuses on upgrades, retrofits, and subsystems, which also makes Israel less vulnerable to the regional financial turbulence that affects new platform procurements.

### *Products and services*

The most competitive Israeli defense product areas include advanced technology missiles, aircraft and tank upgrades, defense electronics, and UAVs.<sup>52</sup> Specific product lines offered for export by Israel's defense industry include space systems, upgrades to airborne/ground/naval platforms, air-air/air-ground/anti-tank missiles, EW systems, simulators, communications systems, electro-optical systems, and command and control systems.<sup>53</sup> Israeli industries are also promoting space technology development, and, once the Arrow becomes fully operational, tactical ballistic missiles. Israel is especially strong in the upgrading, modifying, and modernization of aircraft and tanks, and has positioned itself as a respected re-fitter of former Eastern bloc military equipment, especially aircraft. With many countries owning aging fleets of Soviet manufactured aircraft, among other weapons, Israel is ideally situated to take advantage of this market.

### *Markets*

Concurrent with Middle East peace initiatives, Israeli defense industries have sought expanded markets in Asia, especially focused on aircraft and tank upgrade programs, and

joint missile-technology ventures.<sup>54</sup> Israel's Defense Ministry assists companies in marketing Israeli products, and has targeted significant growth in Israeli arms sales to the Asian countries.<sup>55</sup> Recently an accord was reached with South Korea to purchase the RAFAEL designed POPEYE air-to-air missile, at \$1 million per unit.<sup>56</sup>

Israel has a strong historical relationship as a supplier to Singapore and Myanmar. Recently Israel contracted to upgrade Myanmar's fighter aircraft, including several Chinese-supplied F-7 fighters, which themselves are derivatives of the Russian Mig-21. Recently IAI was successful in taking the contract for modernizing Russian MI-24/35 armed helicopters away from the Russians because Israel could perform the same function with only minimal increase in cost and with less graft and corruption. This has also opened up market opportunities for IAI to perform similar services in Columbia, Zimbabwe, and Sri-Lanka.<sup>57</sup>

In recent years, Israel has had significant success marketing India.<sup>58</sup> In the aftermath of the Kargil conflict, Israel has engaged in a broad range of new initiatives to provide new armaments and/or system upgrades to India. Initially Israel offered to sell three Phalcon AWACS.<sup>59</sup> However this has been superseded by discussions of a broader program to rapidly deliver weaponry, munitions, and surveillance and communications systems, including upgrades for India's helicopters, tanks, and fighters.<sup>60</sup> Recently eleven Israeli defense firms, including all of the major ones, went to India to participate in a defense trade show to promote exports.<sup>61</sup> Recent Israeli reporting states that Israeli developments for future delivery to India include fighter, tank, and aviation upgrades, UAVs, early warning technology, anti-radiation drones, fighter targeting pods, and patrol boats.<sup>62</sup>

Prior to 1992, Taiwan was a major Israeli export market. Since then, Israel has concentrated on China as a more politically and economically lucrative target. Israeli firms provide technology assistance, integration, and direct sales of weaponry, technology, and defense electronics to China. Part of the reason is a foreign policy argument that strong collaborative relationships will allow Israeli to hopefully discourage China from exporting armaments to the Middle Eastern states that Israel views as potential threats.<sup>63</sup>

Operating out of a base in Singapore, Israel has also been successful in penetrating the Chinese arms market.<sup>64</sup> Recently, Israel has been working to develop a several cooperative initiatives with China focused not only on technology and arms trade, but also a broader set of issues. This is because of the rising strategic importance of China.<sup>65</sup> Israel, working in a cooperative arrangement with Russia,<sup>66</sup> has agreed to fit at least one Russian-made Ilyushin-76 aircraft with the Phased Array L-Band Conformal (PHALCON) radar system, originally developed by IAI for the Boeing 707, to create a Chinese AWACS. Israel reportedly also will give China options for three additional AWACS conversions. An Israeli newspaper also reported that in his recent visit to Israel, Chinese Defense Minister Chi Haotian discussed the possibility that IAI could upgrade Chinese Mig-21 fighter aircraft.<sup>67</sup> According to the Jaffe Center in Tel Aviv, Israel has also agreed to provide Python air-to-air missiles to China, as well as the cooperative

development of thermal imaging tank sights, fighter avionics, and air-to-ground and cruise missiles.<sup>68</sup>

In addition to Asia, the European and US markets are being pursued mainly via joint ventures. South American markets represent steady Israeli business. Israeli technology has also recently been wedded to Russian platforms to offer new lower-cost options to the global market.<sup>69</sup> In 1999, Israel also approved the exporting of light arms and ammunition to Jordan, which is the first authorization of arms exports to an Arab state.<sup>70</sup>

### *Government marketing assistance*

The Israeli Ministry of Defense explicitly focuses on the promotion of arms exports by a variety of means. The intent is to promote the exports of the entire defense industry—government institutions, public companies, or private companies—in support to the overall policy of the Israeli government, which perceives defense exports as a “central objective.” Industrial cooperation with foreign countries is required now and in the future.<sup>71</sup> Although export arrangements are made by individual companies, the MOD has to approve each case of technology transfer to a third party. SIBAT, the Foreign Defence Assistance and Export Organization of the Ministry of Defence, has overall responsibility for promoting defense exports, providing marketing assistance to Israeli defense industries, licensing, and helping foreign governments resolve procedural issues associated with purchases.<sup>72</sup> SIBAT also has responsibility for selling the large amount of existing Israeli surplus armaments. This process has proven to be very difficult because of a combination of US restrictions on third-country sales for US developed technology, competition in the world market, and internal competition from other authorized Israeli arms dealers.<sup>73</sup>

### *Export controls*

Recently, Israel’s State Controller issued a call for more stringent export controls. The report called for a number of procedural changes, while at the same time recognizing the difficulties of balancing security needs with growing pressures to export high technology armaments. The report also cited a January, 1999, General Staff study that argued that “the industries are becoming increasingly dependent on defense exports, and the [Mod] is pressured to sell sensitive advanced technology more than ever before...even to problematic nations that had never been cleared for approval in the past.”<sup>74</sup> Subsequently, draft legislation was introduced to provide tighter controls on the number (2000) of registered individuals and companies currently allowed to sell Israeli arms abroad.<sup>75</sup>

Israel has also been involved in a long-running battle with the United States, one of her principal sources of arms imports, about intellectual property rights. Israel argues that if her industries modify imports, they create new value added, and therefore the products become Israeli intellectual property, and hence can be resold abroad.<sup>76</sup>

### *Arms export level*

Israel's arms export level in 1997 was \$370M (1997\$US), compared with \$850M (1997\$US) in 1991.<sup>77</sup> This placed Israel 14<sup>th</sup> globally. Starting in 1997, however, export sales have suffered because of the Asian financial crisis.

## **V. Transformations in the Defense Industrial Base**

As the Cold War ended and global defense budgets began to drop, the demand for Israeli defense exports also dropped. The Israeli defense budget also was dropping, and IDF procurement funding became more focused on the acquisition of advanced systems (even from imports), and less for R&D and platforms. These two trends created an additional round of problems for the Israeli defense industrial base, and initiated defense-industrial restructuring efforts and major workforce cuts. The Israeli defense industry in the early 1990's was about 25,000-30,000 workers, compared with a workforce of about 65,000 in the 1980's.<sup>78</sup> The three large, state-owned companies (IMI, Rafael, and IAI) have been most affected, requiring bailouts from state funds to keep the companies viable.

### *TAAS/IMI*

TAAS, which became a government-owned company (Israeli Military Industries) in 1991 after previous existence as defense ministry element, commenced further restructuring. This included the replacement of key leadership personnel and reorganization of the company into independent profit centers to set the stage for at least partial privatization. TAAS has received strong international competition in its strong suits—arms and ammunition—and has focused on the emerging markets of Eastern Europe and the upgrading of former Soviet equipment. Nevertheless TAAS had to close production facilities and cut its workforce from 12,000 to 3,000.<sup>79</sup>

Over the last three years IMI has increased its export sales every year to its current level of 57 percent of revenues. IMI expects that level to reach 70 percent within the next decade. IMI focuses on selling advanced weaponry, including smart products and precision munitions. IMI has also switched from being a product supplier to being a prime contractor and systems integrator. IMI currently exports to more than 80 countries. However IMI leadership believes that Israeli export control policies create significant constraints to the companies performance in the export markets.<sup>80</sup>

### *Rafael*

Rafael, the traditional Israeli national laboratory, had not previously managed to bottom line profitability objectives. Rafael traditionally also has been sheltered from full participation in international markets because of the sensitivity of its technologies. Rafael had expanded to include production in the 1980's after IDF R/D funding dropped, but its production facilities are generally outmoded. Nevertheless Rafael tried to market defense systems externally, and also to diversify to civilian markets. Rafael's strengths

include missile and airborne systems, some of which were developed as a part of international joint ventures.<sup>81</sup>

Rafael has deliberately tried to reach strategic teaming agreements with partners in the United States and Europe, and has joint activities for regional and global sales with companies in the United States, Germany, France, the Netherlands, Turkey, and Switzerland. The agreements cover marketing, as well as local assembly/production arrangements. Rafael views these arrangements as the best way to obtain market entry into previously inaccessible markets.<sup>82</sup> Rafael has latitude to independently pursue cooperative agreements, but must obtain government approvals during the process. Rafael receives about 20 percent of its funding from the Israeli government to provide ministry-wide R&D, but it has to compete for the rest of its funds.

About five years ago Rafael started the process of transitioning from a government institution to a government-owned company. The move was contentious, with debate focused on how to best balance between the commercial competitive culture that concentrates on short-term profits, and the high-risk long-term investments that are essential for future national security. Rafael believes that it is necessary to focus narrowly on business areas in which it can maintain excellence (e.g. missiles), and has also learned that price is increasingly becoming the decisive criteria in product sales.<sup>83</sup> Ironically, although Rafael currently has two years worth of work from contract orders, it is not profitable because it has not yet restructured to cut staff and reduce overhead costs so as to be able to operate more efficiently in the international market. (International sales currently consume 45 percent of Rafael's output, compared with 10-20 percent in the past).

Within Israel, many feel that it is critical to start the process of privatization by taking the first step of shifting Rafael to a government-owned company. Others believe that the Israeli defense industrial base should be reorganized and privatized, and so the middle step for Rafael is not needed.<sup>84</sup> Nevertheless, the conversion of Rafael to a government-owned company has been scheduled for completion in 2000. Rafael leadership views the principal challenges to be the expansion of exports to hedge against domestic and international market instabilities, creating a lean posture, and further fostering strategic cooperation between Rafael and the leading companies of the US and Europe.<sup>85</sup>

### *IAI*

State-owned IAI also experienced difficulties subsequent to the termination of the Lavi fighter program in the mid-1980's, being generally unsuccessful in its efforts to diversify into civilian markets. IAI began restructuring, and has focused heavily on the upgrading of former Soviet equipment and also US-produced fighter upgrades. Other IAI strengths include UAV technologies, avionics, and space systems (especially small satellites and launch vehicles). IAI's only subsidiary, Elta, has remained profitable exporting radar and other defense electronics equipment.<sup>86</sup>

After a long period of financial difficulties, IAI became profitable in 1999. Diversification efforts have resulted in a 60/40 split between commercial and defense work, and 80 percent of IAI's business is in foreign markets. To further improve IAI's competitiveness, privatization initiatives are under discussion, although the mode of privatization is an issue because of IAI's special role as a national defense asset.<sup>87</sup>

Recently the three large government-owned companies (IMI, Rafael, and IAI) began negotiations to consolidate the functions of purchasing, logistics, marketing, and research and development, as well as the satisfaction of offset obligations, in order to improve efficiency and profitability. Leadership of the companies view them to be more complementary than competitive, and all are under pressures to improve profitability.<sup>88</sup>

### *Other companies*

Israel's privately-owned defense companies have also been restructuring and diversifying to commercial markets, and have been somewhat successful, but they did it by downsizing and reworking their export strategies to focus on specific customer needs. They concentrated also on building customized export products tailored to the requirements of specific customers rather than pushing the limits of technology.<sup>89</sup> Elbit, traded on the US stock market, focused on aircraft platform modernization, avionics, helicopter systems, UAVs, and trainer upgrades, has been aggressively marketing these capabilities globally. Elbit has been able to increase its defense sales while at the same time diversifying to the point that non-defense markets account for over 70 percent of Elbit's revenues.<sup>90</sup> Skilled manpower that left the defense sector also gave a significant boost to the capabilities of Israel's commercial electronics industry, which has since become Israel's largest source of exports.

The largest merger in Israeli defense industrial history is also underway. El-Op Electro Optic Industries and Elbit Systems Ltd are merging under the Elbit Systems Ltd name. The new company, intended to be operational in 2000, will have annual revenue of about \$800M per year, with subsidiaries in the United States, Singapore, Romania, and Austria. The company will concentrate on new defense and space technology development and on future mergers and acquisitions globally in order to improve its product line and its access to targeted markets.<sup>91</sup>

Currently, the Israeli defense industrial base is suffering from a fall in demand, especially from its key domestic customer, the Israeli Defense Forces (IDF). This relative decline has exposed duplicity in the arms industry, as many companies have provided similar, if not identical, products and services. Falling demand has encouraged competing firms to work together on joint projects. Joining with foreign manufactures, e.g. RAFAEL's partnership with the giant Lockheed-Martin on the POPEYE AAM, is another solution. Although there has been a global trend toward the evolution of single providers for particular weapons systems, this is difficult in the Israeli environment since Israeli defense manufactures are a mix of state-owned, semi-state owned and private companies. It is believed that amalgamating these concerns will be a political, as well as a business issue.<sup>92</sup>

### *Competition*

Internal competition is also a major issue. Although Israel has a national policy that heavily favors arms exports, strong competition between Israeli companies competing in international markets has not helped export sales. This led the Israeli Ministry of Defense to try and orchestrate bidder teams that would agree either not to compete with each other, or would compete only within defined rules that would benefit all parties.<sup>93</sup> There are also internal difficulties with working together. For example, a recent attempt by Israel's training and simulation company, BVR Systems, to cooperate with IAI ended in a failure and eventually costly litigation (for BVR Systems) because the companies could not agree on cost sharing, development approaches, and marketing initiatives.<sup>94</sup>

International teaming to promote competitiveness has also led to some anomalies that have been costly to the IDF. For example, in order to purchase the Rafael-produced Popeye and Python 4 missiles, the IDF actually had to purchase the systems through the US company that provides marketing services to Rafael, which in turn retains some of the purchase funds for their services.<sup>95</sup>

In spite of the difficulties, as the 1990's drew to a close, the transformation efforts underway since the beginning of the decade bore fruit. When compared with the situation earlier in the 1990's, Israel's defense industries are currently healthier than ever. After a record year in 1997, sales dropped in 1998 as a result of the financial Asian crisis, but Israeli's companies, offering principally upgrade and retrofit services, were still in high demand. Two of the three leading state companies are profitable, and private defense companies have gained share on the world market.<sup>96</sup>

### *Further restructuring*

Nevertheless, there are still calls within Israel for major further industrial restructuring. Many believe that although significant transformations have occurred in the Israeli defense industrial base, the current situation is unstable. The largest Israeli defense industries remain state-owned companies, working heavily on programs provided by military assistance funds from the United States. The companies are not suited to the true market competition that they now face on the international market. Israeli industry is also now faced with competition from the large defense giants that have been formed in the United States and Europe. Interest in further mergers is growing. The government supports privatization of defense industries, and understands the implicit requirements for foreign ownership, but views this to be a gradual process which also must safeguard Israel's vital defense interests.<sup>97</sup>

A recent government panel recommended consolidation of the industry and privatization of many divisions of the government companies. One option for consolidation would be to form two large vertical companies that would have a better chance of competing globally with the US and European defense giants. One company would concentrate on aerospace, and the second would concentrate on armor, ammunition, and missiles.<sup>98</sup>

Another restructuring variant would segmenting the industry horizontally into three main elements, one focused on R&D, a second on production, and a third, that would remain government-owned, would focus on production of systems of strategic importance.<sup>99</sup> Still another solution may be to increase the depth and scope of relationships with foreign partners.<sup>100</sup> At the same time, there is some fear that even a full concentration of Israeli's defense industry into a single enterprise would result in a company only about 10-20 percent the size of the defense giants. If this strategy should fail there could be a major loss of Israel's current competitive edge in some global markets areas.<sup>101</sup>

## **VI. Risks and Concerns**

- The magnitude of US military aid to Israel, coupled with the requirement to normally expend those funds for the purchase of US equipment, makes it difficult for Israeli defense industry to be seen as the normal IDF supplier in the face of a shrinking defense budget.
- Israel's defense industry, on the average, depends on receiving about 70 percent of its funding from the export market. Yet the industry is having difficulty in maintaining the level of R&D necessary to remain competitive on the world market, even when private funds are added to the R&D funding provided by the shrinking Israeli defense budget.
- Israeli industrial leaders anticipate serious difficulties in effectively competing with the large defense companies that have been formed in the United States and Europe.
- Israeli government and industry leaders are concerned that the concentration of the efforts of Israel's defense industrial base on marketing current products at the expense of future R&D investments will not result in the innovations necessary to keep Israel's products competitive with American systems.
- Israel is concerned that technical expertise will be lost to the growing civilian market, and it will be difficult to maintain an advanced technological defense industrial base.
- Although Middle East peace initiatives have shifted the locus of Israeli concerns away from border conflicts to the more distant threats of Iran and Iraq, nevertheless Israel has noted the large Egyptian force modernization program centered on Western arms imports comparable in capabilities to those of the IDF.
- Prior to 1992, Taiwan was a major Israeli export market. However since then, Israel has concentrated on China as a more politically and economically lucrative target. Part of the reason is a foreign policy argument that strong collaborative relationships will allow Israel to discourage China from exporting armaments to the Middle Eastern states that Israel views as potential threats. In general, Israel has a strong fear that the ease of arms imports will arm the Middle East countries.

## VII. Some Observations

- Israel's constant threat to national survival, frequent history of warfare, and robust technical skill base of emigrated personnel, have been a major factor in the growth and quality of her defense industrial base.
- Israel has traditionally viewed arms exports to be an important component of foreign policy and military strategy, and not simply as a complementary source of revenues for her defense industrial base.
- Israeli armament strategy is consciously based on her belief that Israel's general competitive advantages lie in sub-systems, software, and very high-technology products. This has led to calls within Israel to purchase platforms using Israel's military assistance program funds received from abroad. Local industries will concentrate on those areas in which they have global competitive advantage, and which can be used to tailor platform capabilities for Israeli needs as well as for resale on the world market to meet specific user requirements.
- A deliberate component of Israel's armament strategy is the requirement for Israeli defense industry to seek funds in the export market. This includes cooperative developments with corporations in foreign countries, and especially the US and European giants. The intent is to promote the exports of the entire defense industry—government institutions, public companies, or private companies—in support to the overall policy of the Israeli government, which perceives defense exports as a “central objective”. Exports are intended to further R&D in Israel, and also strengthen the capabilities of Israel's defense industrial base to provide armaments for the IDF.
- Israeli defense industry is dependent on the export market for survival and to provide the baseline from which the industry can support IDF needs. Traditionally, the industry developed systems to meet IDF requirements, and produced special versions for export. However recently international competition has resulted in Israeli losses to competitors willing to offer their most advanced systems for sale.
- Israel's privately-owned defense companies have been somewhat successful by downsizing and reworking their export strategies to focus on specific customer needs rather than pushing the limits of technology.
- Israel is moving toward a niche strategy in which they domestically produce armaments in those areas in which they have a global competitive advantage, and import, using military assistance funds, platforms that can be modified to meet their own need and those of their export customers.
- When the Israeli defense budget began to shrink, private defense companies reoriented part of their efforts to the commercial market, and concentrated also on building customized export products tailored to the requirements of specific customers rather than pushing the limits of technology.

- Export arrangements are worked out by individual companies. However the MOD has to approve each case of technology transfer to a third party. Industrial cooperation with foreign countries is required now and in the future.
- Israel is walking a fine economically-motivated line between the need to continue arms exports to new markets such as China and India, and the parallel need to receive US aid and armaments in the face of US objections to Israeli arms exports those countries.

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#### ENDNOTES

<sup>1</sup> This chapter is based upon information and analytical judgments from the following sources: Barbara Opall-Rome, "Israel Begins Revolution to Modernize Its Military," *Defense News*, March 22, 1999; David Saw, "Defence Industry Developments in Israel," *Asian Military Review* September 1998; Arie O'Sullivan, "Mofaz's Immediate Challenges," *Jerusalem Post*, July 10, 1998; Amnon Barzilai, "Military Reviews Nuclear Policy, As Israel Called 'Vulnerable' to Missile Attack," *Ha'aretz*, August 25, 1998; Amos Harel, "IDF Wants More Money to Combat Iranian Threat," *Ha'aretz*, August 3, 1998; Unattributed, "Mordechai: We Need Resources to Meet Iranian Missile Threat," *Jerusalem Post*, August 3, 1998; Sholmo Gazit, "Defensive Concept," *Jerusalem Post*, August 4, 1998; Ze'ev Schiff, "The Permanence of Surprise," *Ha'aretz*, October 2, 1998; Amos Harel, "IDF Calls 1999 Full of Uncertainty: Worries of Missiles," *Ha'aretz*, February 3, 1999; AP, "Weizman: Syria's Missiles More Dangerous to Israel Than Iran's," *Ha'aretz*, April 28, 1999; Ze'ev Schiff, "New IDF Assessment Sees Regional Missiles As Main Threat to Israel," *Ha'aretz*, May 1999; Arie O'Sullivan, "OC Air Force: We Can Deal With Enemy Missiles," *Jerusalem Post*, June 28, 1999; Amos Harel, "Non-Conventional Warfare Becomes Conventional," *Ha'aretz*, July 20, 1999; Ross Dunn, "Warning By Israeli General," *The Times*, August 3, 1999; Aluf Benn, "Syria Building New Long-Range Missiles," *Ha'aretz*, August 10, 1999; and Arie O'Sullivan, "Egypt the New Enemy?," *Jerusalem Post*, August 16, 1999. Other sources are also cited on specific points. Also, portions of the first section have been adapted from Bruce Jackson, J. Battilega, et al, *Trends in Foreign Perspectives on Foreign Military Operations and Associated Space Dependencies*, Science Applications International Corporation SAIC-99-6014&FSRC, Denver, November 1999.

<sup>2</sup> Ze'ev Schiff, "New IDF Assessment ...," op. cit.

<sup>3</sup> Uzi Rubin, Israeli National Security Council official, in Barbara Opall-Rome, "Israeli Official Charts Threat," *Defense News*, March 13, 2000.

<sup>4</sup> Arie O'Sullivan, "Egypt the New Enemy?," *Jerusalem Post*, August 16, 1999.

<sup>5</sup> Efrayim Inbar, Director of the Begin-Sadat Center for Strategic Studies, "National Security," *The Jerusalem Post*, July 13, 1998, p. 8.

<sup>6</sup> Aluf Benn, "The Defense Ministry's Elder Statesman," *Ha'aratz*, August 3, 1999.

<sup>7</sup> Ibid.

<sup>8</sup> Ibid.

<sup>9</sup> Jamal al-Din Husayn, "Israel: Peace and Arms," *Cairo Rose Al-Yusuf*, August 21-27, 1999, [FBIS Document ID: FTS19990826001012].

<sup>10</sup> Amnon Barzilai, "Three Phases, One Revolution," *Tel Aviv Ha'aretz*, August 6, 1999. [FBIS Document ID: FTS19990811001220].

<sup>11</sup> Shlomo Brom, "Operation Desert Fox: Results and Ramifications," Jaffee Center for Strategic Studies, *Strategic Assessment*, Vol. 2, June 1999.

<sup>12</sup> Arie O'Sullivan, "IDF Launches New Ground Forces Service," *Jerusalem Post*, June 30, 1999.

<sup>13</sup> "Israel's Future Forces," *Janes Defence Weekly*, August 25, 1999, p. 21, and Lt. Gen Shaul Mofaz, "The IDF Toward the Year 2000," Jaffee Center, *Strategic Assessment*, Vol. 2, October 1999.

<sup>14</sup> Unattributed, "Israel's Future Forces," op. cit., p. 21.

<sup>15</sup> *Worldwide Military Expenditures and Arms Transfers, 1998*, Department of State Bureau of Arms Control, Washington DC, January 2000.

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- <sup>16</sup> Steve Rodan, "Israel's Defence Ministry: Preparing for the Merger Plunge," *Military Technology*, June 1999, p. 57.
- <sup>17</sup> Mintz, op. cit., pp. 116-118.
- <sup>18</sup> Barbara Opall-Rome, "U.S. Nixes Israel Tomahawk Plea," *Defense News*, March 20, 2000, p. 1.
- <sup>19</sup> Moshe Keret, President of IAI, in Aharon Lapidot, "The Israeli Air Force and the Defense Industry," *Military Technology*, May 1999, p. 43.
- <sup>20</sup> Lapidot, op. cit., p. 42.
- <sup>21</sup> Unattributed, "Rafael: Ideas into Action," *Military Technology*, May 1999, p. 40.
- <sup>22</sup> Mintz, op. cit., pp. 115-116.
- <sup>23</sup> Ibid., p. 119.
- <sup>24</sup> Unattributed, "Worldwide Defense Companies Ranked by Estimated Defense Sales for 1991," *International Defense Review*, Defense '93, pp. 33-55.
- <sup>25</sup> Unattributed, "Defense News Top 100," *Defense News*, August 7, 2000, p. 14.
- <sup>26</sup> Unattributed, "Ready and Robust," *Armed Forces Journal International*, August 1996, p. 34.
- <sup>27</sup> Arie O'Sullivan, "IDF Unveils Rocket Guidance System," *The Jerusalem Post*, September 23, 1999.
- <sup>28</sup> Barbara Opall-Rome, "Israel Upgrades MLRS," *Defense News*, October 18, 1999.
- <sup>29</sup> Unattributed, "The Peace Business," *International Defense Review*, December 1993, p. 968.
- <sup>30</sup> Barbara Opall-Rome, "Israel Aims to Expand Use of Space," *Defense News*, April 17, 2000.
- <sup>31</sup> Barbara Opall-Rome, "Israel Readies Debut of Merkava 4," *Defense News*, October 15, 1999, p. 6.
- <sup>32</sup> "Israeli's Future Forces," op. cit., p. 21.
- <sup>33</sup> Barbara Opall-Rome, "Israel Air Force Set for JDAM," *Defense News*, October 15, 1999, p. 14.
- <sup>34</sup> Barbara Opall-Rome and George I. Seffers, "Israel Pushes for Apaches," *Defense News*, October 11, 1999, p. 1.
- <sup>35</sup> David Rudge, "Dolphin' Stretches Navy's 'Long Arm'," *Jerusalem Post*, July 28, 1999.
- <sup>36</sup> Gen. Avner Naveh, IAF Chief of Staff, in Lapidot, op. cit., p. 44.
- <sup>37</sup> Lapidot, op. cit., p. 44.
- <sup>38</sup> Mofaz, op. cit.
- <sup>39</sup> *Worldwide Military Expenditures and Arms Transfers, 1998*, op. cit.
- <sup>40</sup> Rodan, May 1999, op. cit., p. 55.
- <sup>41</sup> Maj. Gen (ret.) Ilan Biran, Director General of the Defence Ministry, in Rodan, op. cit., p. 55.
- <sup>42</sup> Rodan, June 1999, op. cit., p. 55.
- <sup>43</sup> Kintz, op. cit., p. 120.
- <sup>44</sup> Israeli defense industrial leaders point out that the magnitude of US military funds, coupled with Israeli defense industrial participation in the resulting US-sponsored co-development/production programs, implicitly require Israeli companies to spend a significant fraction of their own R&D funding on these programs (Lapidot, op. cit., p. 47). Recently, as a part of the Wye River pledges that were made to Israel during the Israeli-Palestine negotiations, the US agreed to allow Israel to spend a portion of US military assistance funds for indigenous research, development, and production. Although this was intended as a one-time exception to US foreign military assistance policy, Israel hopes that this will set a precedent for similar waivers in the future (Barbara Opall-Rome, "U.S. Agrees to Allow Israel to Spend More Aid at Home," *Defense News*, July 19, 2000, p. 20).
- <sup>45</sup> Maj. Gen. (IAF, Ret.) David Ivry, Senior Advisor to the Defence Minister for Planning and Strategic Matters, in Lapidot, op. cit., p. 46.
- <sup>46</sup> Israel's Python-4 advanced air-to-air-missile was not selected by Australia after Israel refused to fully disclose all of its technical capabilities. The winner of the competition was the Matra BAe Dynamics ASRAAM (Lapidot, op. cit., p. 46).
- <sup>47</sup> Rodan, June 1999, op. cit., p. 67.
- <sup>48</sup> Kintz, op. cit., p. 120.
- <sup>49</sup> Lapidot, op. cit., p. 47.
- <sup>50</sup> Dan Gilmoor, "High Tech Market Blooming In Israel," *Mercury News*, [http://www.sjmercury.com/business/israel/docs/techo427698a.htm] posted April 27, 1998.
- <sup>51</sup> *Middle East Military Balance 1999-2000*, Jaffee Center for Strategic Studies, in Barbara Opall-Rome, "Tel-Aviv Flexes Military, Commercial Muscles," *Defense News*, January 17, 2000.
- <sup>52</sup> "The Peace Business," op.cit., p. 967.
- <sup>53</sup> Biran, op. cit., p. 56.

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- <sup>54</sup> “The Peace Business,” op. cit., p. 967.
- <sup>55</sup> Steve Rodan, “Israeli Firms Set Sights on Asia-Pacific Defense Market,” *Defense News*, July 9, 1997, p. 6.
- <sup>56</sup> Amnon Barzila, “S. Korea Buying 100 Israeli Missiles,” *Ha’aretz*, August 22, 1999.
- <sup>57</sup> Yekaterina Kostikova and Andrei Kaloshin, “India is Gradually Elbowing Russia off the World Arms Market,” *Versiya*, June 22-28, 1999, p. 7.
- <sup>58</sup> Ranvir Nayar, “Paris Air Show: Israel Woos India With Its Hardware,” Rediff on the Net, June 16, 1999.
- <sup>59</sup> Unattributed, “Israel Offers 3 AWACS to India,” *Deccan Chronicle*, August 6, 1999.
- <sup>60</sup> “Ties with Israel Improve, Defense Deals in Pipeline,” *The Asian Age*, September 24, 1999.
- <sup>61</sup> Arie O’Sullivan, “US Upset by Israeli Arms Sales to India,” *The Jerusalem Post*, October 28, 1999.
- <sup>62</sup> *Middle East Military Balance 1999-2000*, op. cit..
- <sup>63</sup> Barbara Opall, “Israeli Defense Business Shifts from Taiwan to China,” *Defense News*, September 28, 1996.
- <sup>64</sup> Unattributed, “Israel Sets Sights on Myanmar,” *Asian-Pacific Defence Reporter 1999 Annual Reference Edition*, p. 23.
- <sup>65</sup> Barbara Opall-Rome, “Israel, China Enhance Ties,” *Defense News*, October 25, 1999, p. 3.
- <sup>66</sup> Steve Rodan, “USA Again Presses Israel to Stop Technology Sales to China,” *Jane’s Defence Weekly*, April 5, 2000.
- <sup>67</sup> Unattributed, “Israeli to Supply Chinese with AWACS,” *Defence Systems Daily*, November 10, 1999.
- <sup>68</sup> *Middle East Military Balance 1999-2000*, op. cit.
- <sup>69</sup> Rodan, May 1999, op. cit, p. 55.
- <sup>70</sup> Yossi Melman, “Defense Ministry Gives Firm Go-Ahead to Sell Arms to Jordan,” *Ha’aretz*, October 18, 1999.
- <sup>71</sup> Maj. Gen (Res.) Ilan Biran, Director General of the Israeli MOD, interview, “Defense Export as a Central Objective,” *Military Technology*, May 1999, p. 56.
- <sup>72</sup> Rodan, June 1999, op. cit., p. 61.
- <sup>73</sup> Barbara Opall-Rome, “Israeli’s Call for Export Shake Up,” *Defense News*, February 14, 2000.
- <sup>74</sup> Barbara Opall-Rome, “Israeli Comptroller: Tighten Export Procedures,” *Defense News*, October 18, 1999.
- <sup>75</sup> Barbara Opall-Rome, February 14, 2000, op. cit.
- <sup>76</sup> “The Peace Business,” op. cit., p. 968.
- <sup>77</sup> *Worldwide Military Expenditures...*, op. cit.
- <sup>78</sup> “The Peace Business,” op. cit., p. 968.
- <sup>79</sup> Ruth Kaminer, “Israeli Defense Industry Revamps,” *International Defense Review*, July 1995, pp. 81-83.
- <sup>80</sup> Shlomo Milo, President of IMI, in Barbara Opall-Rome, “IMI Reaches New Markets with Smart Technology,” *Defense News*, March 13, 2000, p. 16.
- <sup>81</sup> Kaminer, op. cit., pp. 81-83.
- <sup>82</sup> “Ideas into Action,” op. cit, p. 40.
- <sup>83</sup> Giora Shalgi, President (Acting) of Rafael, in “Ideas into Action,” op. cit, pp. 41-42.
- <sup>84</sup> Amnon Barzilai, “The Ticking Bomb at Israel’s Weapons Authority,” *Ha’aretz*, October 3, 1999.
- <sup>85</sup> Giorgi Shalgi, President, Rafael, in “One on One,” *Defense News*, January 17, 2000, p. 30.
- <sup>86</sup> Kaminer, op. cit., pp. 81-83.
- <sup>87</sup> Clifford Beal, “IAI Prepares Path to Privatization,” *Jane’s Defence Weekly*, July 7, 1999, p. 17.
- <sup>88</sup> Giori Shalgi, Acting president of Rafael, and Shimon Eckhaus, Corporate Vice President for Marketing of IAI, in Barbara Opall-Rome, “Israeli Government-Owned Firms to Arrange Historic Consolidation,” *Defense News*, January 17, 2000.
- <sup>89</sup> “Ready and Robust,” op. cit., p. 30.
- <sup>90</sup> Kaminer, op. cit., pp. 81-83.
- <sup>91</sup> Barbara Opall-Rome, “Merger Marks Record for Israeli Defense Industry,” *Defense News*, February 2000.
- <sup>92</sup> David Saw, “Defence Industry Developments in Israel,” *Asian Military Review*, September 1998.
- <sup>93</sup> “Ready and Robust,” op. cit., p. 32.
- <sup>94</sup> Steve Rodan, “BVR Faces Losses After Years of Growth,” *Jane’s Defence Weekly*, November 10, 1999, p. 3.
- <sup>95</sup> Lapidot, op. cit, p. 46.
- <sup>96</sup> Rodan, May 1999, op. cit., p. 52.

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<sup>97</sup> Biran, op. cit, p. 57.

<sup>98</sup> Rodan, June 1999, op. cit., p. 68.

<sup>99</sup> Report of committee chaired by Maj. Gen (Res.) Moshe Peled to develop government criteria and policy for privatizing the defense industries, discussed in Amman Barzilai, "Military Industries Need Overhaul in Order to Survive," *Ha'aretz*, November 15, 1999.

<sup>100</sup> Lapidot, op. cit., p. 47.

<sup>101</sup> Giori Shalgi, in "Ideas into Action," op. cit., p. 42.