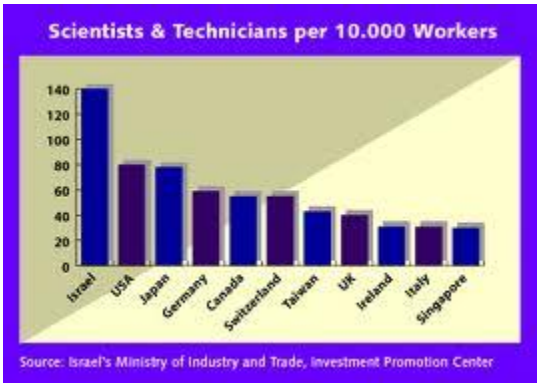
Start Up Nation - Israeli Hi-Tech

It would be difficult to refer to Israel as a “developed” nation considering that it has been in existence for less than 63 years. It would be equally difficult to classify Israel as a “developing” state when it ranks in the 92nd percentile on the 2010 Human Development Index (“HDI”) ahead of 177 other nations including all the countries in the Middle East. Or, when its GDP per capita ranks 25th on the World Bank ranking ahead of such countries as Saudi Arabia, Russia and Argentina.



Israel, probably more so than many developed or even developing nations is facing many challenges and obstacles to its continuing national development. Domestically it struggles with socio-economical disparities, political polarization and orthodox – secular tensions to name a few. Internationally it is facing political isolation, existential threats from hostile neighbors and the imperative of resolving the Palestinian conflict. Notwithstanding the realities of Israel’s challenges there is no denying that Israel’ has attained a world leading position in many areas of its national development. This article identifies and analyzes the major geo-political and social factors that have contributed to Israel’s development and world leadership in many industrial and technological areas, including Internet software, mobile computing and telecommunications systems.

The article asserts that what some have referred to as an “economic miracle” is largely a function of Israel’s unique circumstances, mainly:

Being surrounded by mostly hostile nations thus demanding disproportionate investments in military hardware and technology;

Lack of natural resources, including oil, gas and water resources thus requiring the development of alternative energy sources and advanced agricultural and bio-science technologies

The absorption of hundreds of thousands of immigrants who were expelled or fled from neighboring Middle East countries, survivors of the Holocaust and hundred of thousands of Russian immigrants following the collapse of the Soviet Union thus providing Israel with a highly educated and resourceful reservoir of human capital;

In addition to analyzing the specific circumstances that have led to Israel’s economic growth and technological advancement, this article also considers this issue from the perspective of a universal case study that may be applicable to other nations. The article illustrates through examples how prioritizing policies and investments around higher education, scientific research, innovation, entrepreneurship and commercialization contribute to the growth and development of industries and nation-states.

The article begins with a brief overview of the major milestones in the development of the State of Israel from its inception to present day and its position in the global economy. It proceeds by analyzing the unique geo-political, social and environmental challenges of the State of Israel that continue to threaten its very existence yet, paradoxically have thus far contributed to its growth and prosperity. The article proceeds to highlight the origins, scope and major accomplishments of the Israeli Hi-Tech industry and concludes by analyzing the lessons learned and the applicability of the Israeli model to other developing countries. One of this article's more important conclusions is the need for developing nations to embrace progressive, modernization strategies and policies and aim to achieve a high degree of global economic integration with other developed nations. With democracy rising in the Middle East and with the potential emergence of a Palestinian State, Israel's experience may not only be valuable to othercountries in the region but within the context and construct of a lasting peace agreement, Israel may well become a co-operating and contributing partner to the economic growth and development of the Middle East.

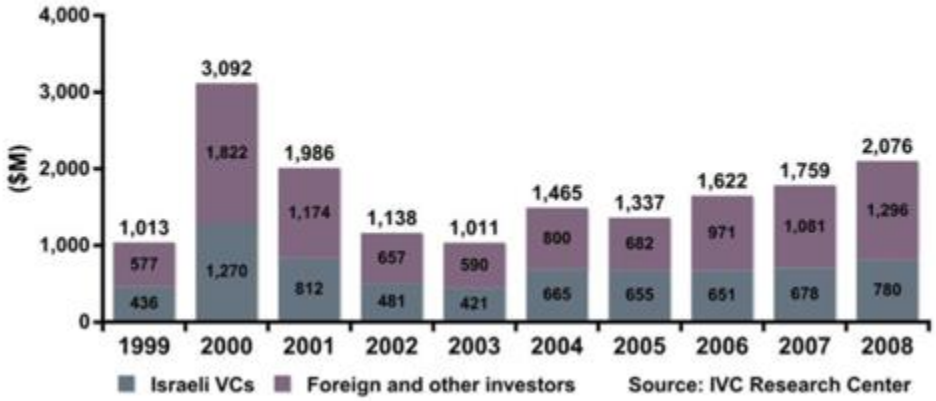
Highlights of major national developments: Facts and Figures

In order to place Israel's national development in perspective, it is important to understand the scale, scope and diversity of the country's demographic, geographic and political profile. As of the end of 2010, Israel's population numbers approximately 7.6 million. 75.4% of them are Jewish, 20.4% are Arabs and 4.3% are mainly Christians and Druze. 68.8% were born in the country, 21.6 % were born in Europe and America and 9.6% were born in Asia and Africa. Israel ranks number 15 in the world on the 2010 HDI Index by far ahead of many developed countries and all countries in the Middle East. Life expectancy in Israel is 80.17 years (13th in the world) compared to the average life expectancy in the Middle East region including Syria, Lebanon, Iraq, Iran, Egypt, Gaza Strip, West Bank, Yemen of 71.25. Israel's infant mortality rate of 4.7 in 1,000 is ranked 20th in the world and is the lowest in the region. Israel's literacy rate of 95.5% is highest in the region. Israel's current population growth rate is 1.7% and is the lowest in the region, however, its total growth rate since its inception is much higher and is attributed to the absorption of hundreds of thousands of immigrants in recent years mainly from Russia.

In 1948, Israel had 220,000 hectares of fertile land which has since grown almost three-fold largely through the development of the Negev desert. Between 1948 and 1977 Israel's government was led by the social democratic Labor Party and its economy was dominated by the public sector which accounted for over 70% of its GDP. In 1977, a right of center Conservative government began a series of financial reforms and a transition to a market based economy that resulted in a major shift toward private sector enterprises dominated by large corporations both domestic and multi-national.

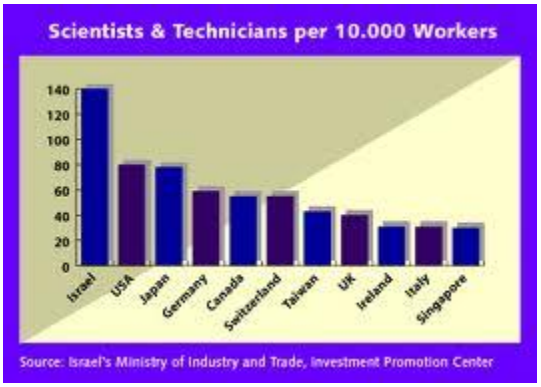
According to the Economist publication ("Miracles and Mirages", April 13, 2008), Israel ranks higher than the average of all developing countries in the world in terms of GDP growth rate from 2004 to 2007. The Israeli economy increased its per capita income relative to the United States from 25% in 1950 to 60% in 1970 thus more than doubled its standard of living in the past 20 years. From an economic and trade balance perspective, Israel is a world leader in desert agriculture and agricultural technologies, such as drip irrigation and desalination technologies which it exports to many developing and under developed countries in Africa and Asia. Israel's second largest industry and its highest net exporter is software. Israel exports 45% of its GDP as compared to Canada's 30%.

Chart 1: Capital Raised by Israeli High-Tech Companies ($m)



Israel's unique economical and political challenges and opportunities

The most important factor affecting all aspects of life and society in Israel is its existential need to maintain military superiority through its Israel Defense Forces ("IDF"). Israel is surrounded by hostile enemy nations. Up until 1979 they included Egypt and Jordan, with whom Israel has since signed peace agreements. Israel's continuous need to maintain military superiority in the region is possibly the most significant contributor to the country's focus on technological advancements and innovation.



For Israel, military superiority means not only the ability to procure and deploy advanced weapons systems but more importantly to become self-sufficient in terms of maintaining, enhancing, adapting and improving military and defense technologies. For example, Israel builds its own tanks and armored vehicles (The Merkava and Namer) and is the only country in the region that has both a military and civilian aircraft industry. Israel is capable of manufacturing its own aircrafts as well as missiles technology.

In order to achieve military superiority Israel places a high premium on training, education, human resource development, promoting and fostering innovation and building world class companies such as Elbit, Israel Aircraft Industries ("IAI") and many others. Interestingly, these are the same qualities that are required to develop private sector industries and companies that are world class and that sustain competitive advantage. Thus the ethos that begins with the necessity to maintain military superiority becomes an incubator for private commercialization, and adaptation of technologies for civilian applications. It is interesting to note that many of Israel' Hi-Tech successes such as ICQ, Comverse and many others, were founded by ex-military entrepreneurs leveraging expertise, technologies and R&D efforts initiated by the military.

Two of many illustrations of this phenomenon are being offered:

Talpiot (8): Each year the top 2% of Israeli high school students are asked to try out for this program. From 2,000 students only one in ten passes a battery of tests mainly in math and physics. The remaining 200 are then put through intensive personality and aptitude tests. Those admitted to the program receive an accelerated university education and are introduced in a hands-on capacity to all the technological needs of the different IDF branches. If they survive the first two or three years of the program they become "Talpions" a title that carries prestige in both military and civilian life. Many of Israel's Hi-Tech "tycoons" are "Talpions". This program is just one manifestation of the ethos of meritocracy that is part of the fabric of Israeli culture and society.

The Second Lebanon War (12): This by all accounts was not the most successful campaign in IDF's history. In a formal post mortem of the campaign a significant conclusion was:*"One of the problems was the exaggerated adherence of senior officers to the Chief of Staff decisions."* In his report, Giora Eiland, a top retired general recommended that the IDF should consider drastic measures to reinforce its classic anti-hierarchical, innovative and enterprising ethos. He advocated the empowerment of lower ranking officers to plan and lead security operations with *less control from above*.

Notice that in both examples the focus is on the human factor. Military superiority is not only a function of the hardware, but more so the human factors that are utilized in its deployment. The IDF as a mirror of the Israeli society has been able to nurture, foster and promote the spirit of entrepreneurship, encourage "out-of-the box" thinking and innovation, promote risk taking and tolerate failures as valuable learning experiences.

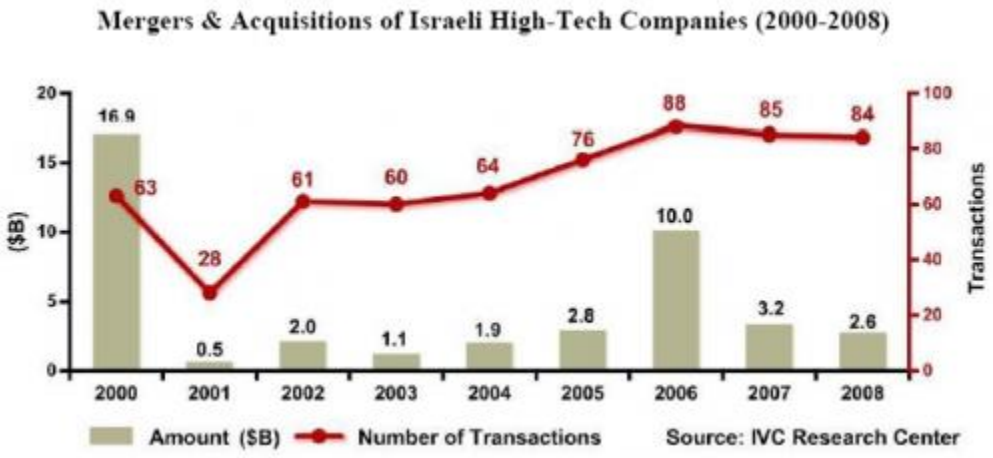
As critical to Israel's survival as its military strength has been the need for Israel to manage, harness and overcome the unique environmental conditions within its national boundaries. Paramount has been the

need to cultivate the mostly arid land of the Negev desert and the Dead Sea region. The National Water Carrier of Israel is the largest water project in Israel (2). Its main task is to transfer water from the Sea of Galilee in the north of the country to the highly populated centers and arid south and to enable efficient use of water. Most of the water works in Israel are combined with the National Water Carrier, the length of which is about 130 kilometers (80 miles). The carrier consists of a system of giant pipes, open canals, tunnels,reservoirs and large scale pumping stations. Building the carrier was a considerable technical challenge as it traverses a wide variety of terrains and elevations. However water supply was not the only factor. Soil salinity affected most of the lands in the Negev. In 1965 an Israeli water engineer approached one of the settlements in the Negev (Hatzerim) whose inhabitants were getting ready to abandon the land, with an offer to commercialize his invention, drip irrigation. This was the beginning of what ultimately became Netafim a global drip irrigation company. Consequently Israel is now a world leader in desert agriculture and agricultural technologies such as drip irrigation and desalination which it exports to many developing and under developed countries mainly in Africa and Asia. From an ecological point of view, Israel recycles 70% of its waste water for use in its agricultural and fishery industries – the highest in the world.

The same spirit of innovation and entrepreneurship driven by the need to reduce Israel's dependence on foreign oil resulted in the founding of Better Place, the first company in the world to build an electric car battery recharging grid across an entire country. This will make it possible to transform virtually all of Israel's private and commercial vehicles to electric power within a few years. In fact, it will create a domestic automotive industry in Israel for domestic and export supply. In an interview with its founder Mr. Agassi he was quoted as saying: "*Israelis understand not only the financial and environmental costs of being dependent on oil but also the security costs of pumping money into the coffers of less-that-savory regimes*".

The third most significant factor in the development of the state of Israel is its desire and ability to absorb millions of immigrants and to integrate them in the Israeli society. David Ben-Gurion the first prime minister of Israel once said: *"A nation of immigrants is a nation of entrepreneurs"* The Law of Return is the cornerstone of Israel's immigration policy. Israel offers immigrants not only financial incentives, housing assistance, accreditation of foreign education but most significantly Hebrew language proficiency through the Ulpan program where immigrants are housed in a language immersion school for several weeks to facilitate their integration into the Israeli society and its workforce.

It has been said that "necessity is the mother of all inventions" In this chapter we attempted to illustrate through some examples the linkage between the state's existential needs and priorities, its fostering of innovation and entrepreneurship to address them, and its ability to leverage them through export, exchange and co-operation with other nations.



The makings of the Israeli Hi-Tech industry

The origins of the Israeli Hi-Tech industry can be traced back to a number of factors. While some may not be transferrable to other nations because of Israel's unique circumstances as described above, others may well be transferrable to other nations who plan to make Hi-Tech a national priority industry (e.g. India, Singapore). The most significant factors include:

(1) The early adoption of advanced computer technology and software development. The Ministry of Defense formed MAMRAM (translated it means: The Center for Computation and Automation) as early as 1959. MAMRAM is a computer academy for high school graduates joining the ranks of the IDF and deployed on behalf of many branches of the IDF and the Ministry of Defense in the development and implementation of computer and communications based technologies. MAMRAM is in effect an incubator for talented computer software engineers many of whom became founders of software "start-ups".

(2) The absorption of many well educated and experienced computer professionals, many of them Russian immigrants, into the Hi-Tech workforce.

(3) The national priority that places a premium on original research and development through grants, scholarships, matching funds and other financial incentives, combined with the educational and vocational training and learning infrastructure. Since the foundation in 1923 of the Hebrew University of Jerusalem that today ranks in the top one hundred universities in the world seven more universities were established. This in addition to the Israeli Technion (The equivalent to the American MIT) and the Weizman Institute of Science all world renowned for many scientific advances and inventions,

(4) The recognition by the software giants of the world including Google, Intel, Microsoft, Cisco and others of the culture and talent of Israeli software engineers (many trained in the United States) that are fluent English speakers and match the culture of innovation and entrepreneurship worshiped by Silicon Valley venture capitalists and CEOs of multi-national software giants. In partnering with Israeli companies or by establishing the only core technology R&D centers outside of the United States these companies do not only take advantage of local talent and innovation but also of a convenient time zone difference. Some of Microsoft best known products were developed by joint teams from Redmond and Tel-Aviv working around the clock. This is truly an innovative, efficient and productive way to bring new inventions and products to market.

(5) Israelis are notorious early adopters of technological innovations. Israel has the highest saturation of cell and smart phones per capita, the highest penetration of high speed Internet and the highest per capita Internet usage. This factor is not only significant from the perspective that the Israeli society is "technology friendly" but that early adaptation fosters innovations and inventions as to how to improve, enhance, adapt and utilize technologies. As a result many software start-ups have sprung in Israel and many were subsequently acquired by the manufacturers or producers of the original technology.

(6) There is a video on Youtube that has recently gone viral and is addressed to the promoters of Israel's BDS (Boycott, De-legitimization and Sanctions) "movement". It is a sarcastic reminder to BDS advocates to avoid the use of the following to name a few:

- Laptops including Intel Micro Chips and Core 2 Duo – Invented in Israel

Windows Office Products - co-developed by Microsoft Israel

Windows 7 – developed by Microsoft Israel

Virus protection software of any kind – invented in Israel

Cell phones and cell phone camera - Ditto

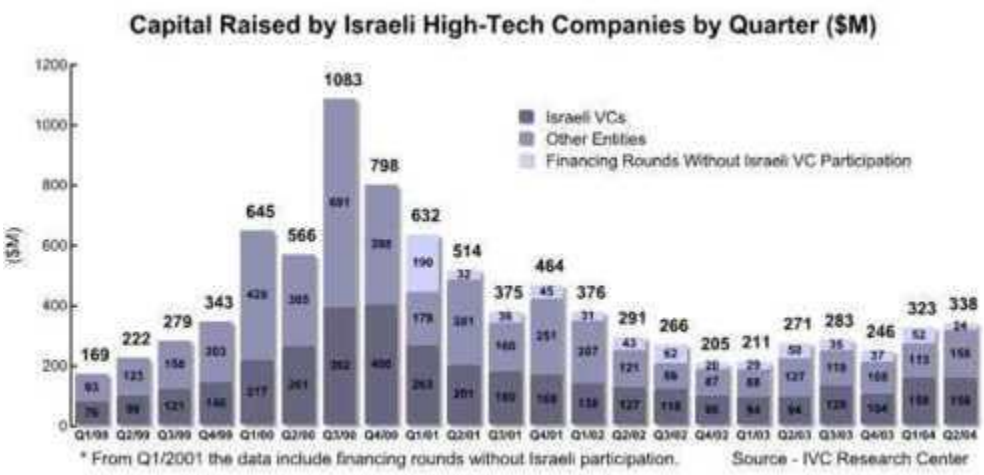
VoiceMail – Israeli invention

Computerized Medical Records – Ditto

PillCam – optical technology to eliminate need for invasive radiation technology

Mirabel – T-Scan – non invasive early detection of Breast Cancer.

It is for the multitude of reasons, unique circumstances, core values and attitudes that the Israeli Hi-Tech industry has become a global powerhouse. Most compelling of all statistics is the fact that during the two Intifadas and the first and second Lebanon wars foreign venture capital in Israel actually *grew* and Israeli companies continued to deliver products and projects to global markets on the original schedule.



Israel is boasting the highest density of high-tech "start-ups" per capita (3,850 start-ups, one for every 1,844 Israelis). More Israeli companies (63) are listed on the technology focused NASDAQ exchange than all companies from the entire European continent. In 2008 per capita venture capital investments in Israel were 2.5 times greater than in the United States. Civilian R&D Expenditures (2000-2005) were 4.5 % of GDP highest in the world with Japan second at 3.2% and the United States third at 2.7%. Google, Microsoft and Intel, and Cisco have strategic core R&D centers in Israel the only such centers outside the United States.

Many observers have attempted to understand what is behind this global success story of the Israeli Hi-Tech industry. In a tongue and cheek manner, Yosi Vardi, one of Israel's first high-tech entrepreneurs attempted to answer the question:

"The two real fathers of Israeli hi-tech are the Arab boycott and Charles de Gaulle, because they forced on us the need to go and develop an industry."

http://www.youtube.com/watch?v=NhwrGH74anE

Lessons learned and conclusions

Notwithstanding Israel's unique circumstances that drove it to apply technology and innovation as a major pillar of its national development, a general case can be made for other nations to emulate the Israeli model. This article illustrated how the Israeli society has been able to nurture, foster and promote the spirit of entrepreneurship, encourage "out-of-the box" thinking and innovation, promote risk taking and tolerate failures as valuable learning experiences all facilitated by its open, democratic and non hierarchical organizational structure and culture.

Nobel Prize winner Robert Solow was quoted saying: *"technological innovation is the ultimate source of productivity and growth"* This in itself is likely the most important lesson for developing nations seeking to improve the lives of their citizens and ascend on the HDI ranking. As we are witnessing around the world and particularly in the Middle East, we are in the midst of extremely rapid technological innovation cycle that affect all aspects of social economical and political life. Developing nations must recognize the need to embrace progressive, modernization strategies and policies and aim to achieve not only technological self sufficiency but also a high degree of global cooperation and economic integration with other developed nations. As demonstrated through the Israeli experience it requires setting national priorities, building the necessary infrastructure, change the culture and attitudes and create the incentives needed to achieve success. The time to begin technology co-operation, technology partnerships and technology utilization is *now*.

The following quote is attributed to the famous playwright George Bernard Shaw: *"If you have an apple and I have an apple and we exchange apples, then you and I will still have one apple. But if you have an idea and I have an idea and we exchanged these ideas, then each of us will have two ideas"*

If there were to be peace in the Middle East, Israel and it Arab neighbors could begin sharing many ideas, resources and technologies to benefit the entire region and its citizens' quality of life. May this be the most important outcome of regional co-operation in the Middle East.