

The global healthcare systems are facing many challenges. Aging populations and burgeoning middle classes along with expectations of higher-quality care and a squeeze on funding have created a drive for new innovative technologies and business models. In such an environment, the need for heightened efficiencies and increased innovation has never been greater.

Israeli life science industry is rapidly and exuberantly growing, while playing an important role in the world healthcare market. Following a decade of significant growth, the Israeli life sciences industry is continually demonstrating encouraging parameters of maturity and promising signs towards a breakthrough decade. Israel's life sciences industry is innovative, where excellence in academic research, government support and increased availability of funding is translated into commercial success. It is based on a combination of highly educated professionals with entrepreneurial culture, innovative spirit and great technologies.

With interest from new investors, mainly from China and the Far East, the Israel life sciences industry has demonstrated significant growth and record investment amounts. Also increased number of companies in advanced stages of clinical trials, the highest number of successful Israeli life sciences companies IPOs (initial public offerings) on the NASDAQ, three record years for life sciences exits as well as an emergence of a prominent sub sector of health IT and digital health support the growth in Israeli life sciences industry.

1. Academic excellence in life sciences

Life sciences represents about 50 percent of Israeli civilian research activities in its seven universities, ten research institutes and five medical schools. Israel has one of the highest concentrations of scientists per capita (145 per 10.000). One of every three Israeli scientists specialized in life sciences, which is the world's highest per capita ratio. Out of 58.210 scientific publications that came out of Israel during 2007-2011, about 45 percent were related to the various life science sub-sectors while 23 percent came from the leading sub-sector clinical medicine.

Out of 49.716 first degree students in 2010-2011 in the universities (46 percent) and colleges (54 percent), a third were in the life sciences. In 2010-2011, 12 percent of the BAs were in biological sciences with that percentage increasing to 26% in the MAs and 46% in the PhDs, demonstrating the high proportion of biological sciences in higher degrees in Israel.

2. Technology Transfer Offices (TTOs)

The role of commercialization companies (TTOs) is to search out, develop and market the know-how accumulated in the institutions mentioned above, to turn a patent into a commercial product, and help in creating startup companies. The TTOs play a major role in the life sciences industry in Israel with many patents, new startups and licensing agreements in the field originating from the research universities and research institutes and hospitals.

Commercialization companies filed 451 original patents applications in 2013, an increase of 34 percent compared to 2008. The dominant fields of the original patent application were medicines (24 percent), bio-technology (17 percent) and medical equipment (13 percent). The role of commercialization companies is to market and deliver the knowledge generated in universities, hospitals and research

institutions. The dominant fields of the active license agreements in 2010-2013 were fields which are related to life science: medicines (26 percent), bio-technology (20 percent) and agriculture and plants genetics (17 percent). In 2012 commercialization companies were involved in the establishment of 72 startup companies.

3. Government support

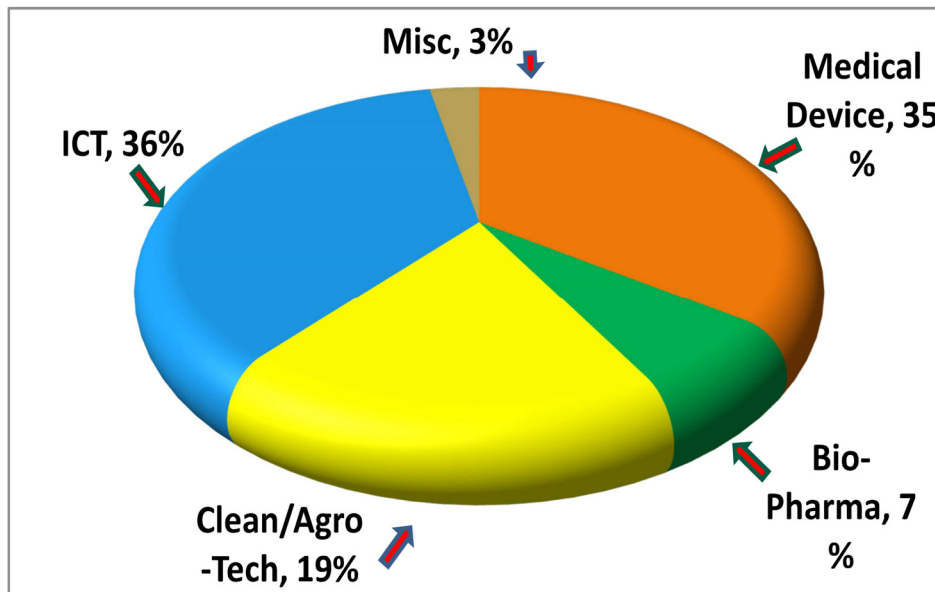
The government of Israel is strongly focused on creating an R&D support network through various grants and investive programs. The Office of the Chief Scientist (OCS) at the Ministry of Economy is responsible for the funding of industrial R&D programs in Israel and contributes up to 50 percent of R&D approved expenses of high-tech companies including that of life sciences companies. During the last decade the OCS invested more than US\$ 100 million annually in the life sciences sector via its different programs including the incubators program, general industrial R&D grants and the magnet program (consortium of academia and industry). There are also binational grants, the EU framework and other marketing grants that life sciences companies are receiving.

3a. The incubator program

There are nineteen incubators in Israel to date, out of which seventeen are technological incubators, one is a technology based industrial incubator and one is a designated biotech incubator. Nine of the incubators accepts companies in the life sciences sector.

In the last 10 years (2005-2014) 696 companies were accepted into the incubators program, out of which 33,2 percent were medical device companies and 14 percent were biotech/pharma companies. At the beginning of 2015, 35 percent are medical device companies and 7 percent are biotech/pharma companies

Figure 13 – Percentage of Life Science Companies in the Incubators program 2015



Source: Incubator Program. Office of the Chief Scientists Ministry of Economy

Several successful life sciences companies started in the incubators program and many of them also received additional funding from various programs of the Office of the Chief Scientists.

An example of a medical device company is ReWalk Robotics, a company that is designing, developing and commercializing exoskeletons allowing wheelchair-bound individuals to stand and walk again. The company was founded in 2001 and went public in 2014.

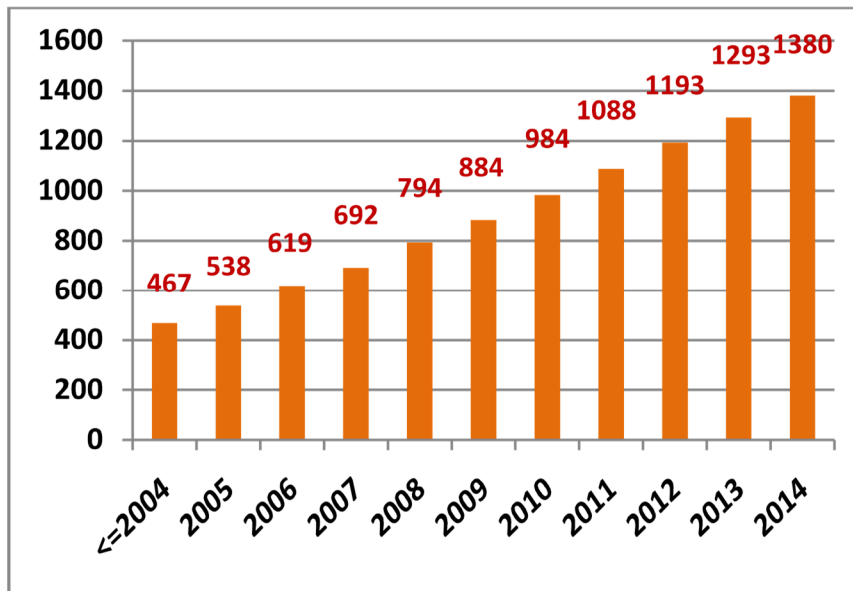
3b. Accelerators

Accelerators typically run twelve-week programs to get startups quickly from concept to product. Several large multinational companies opened accelerators in Israel. For example, Microsoft Ventures opened the first medical accelerator in Israel as it realized the growing potential in this relatively untapped domain as far as it goes to early stage startups. Microsoft’s accelerator included life sciences companies in all its batches since they started the program in Israel (overall eleven life sciences companies).

2005-2014: A decade of growth

According to multiple different databases, there are about 1.380 active life sciences companies in Israel. The Israeli life sciences industry is heavily biased towards the medical device sub-sector with 53 percent of the companies. Biotech and pharma is the second largest sub-sector with 23 percent and healthcare IT and digital health is the third with 20 percent of all life sciences companies. The healthcare IT and digital health sub-sector has demonstrated the most significant growth in the last four years. 36 percent Of the companies established in 2011-2014 were from the Healthcare IT and digital health sub-sector.

Figure 7: Cumulative Number of life sciences companies: 2004-2014



Source: IVC, IATI, SNC Data Bases and IATI Data Analysis

Global multinational life sciences R&D centers in Israel

With almost 280 multinational R&D center in Israel, the country has become a sought after hot spot. There are dozens of global multinational life sciences R&D centers in Israel of global medical device, healthcare IT and pharmaceutical companies. Many of the corporates venture capital funds also invested in Israeli companies in order to get early exposure to their technologies.

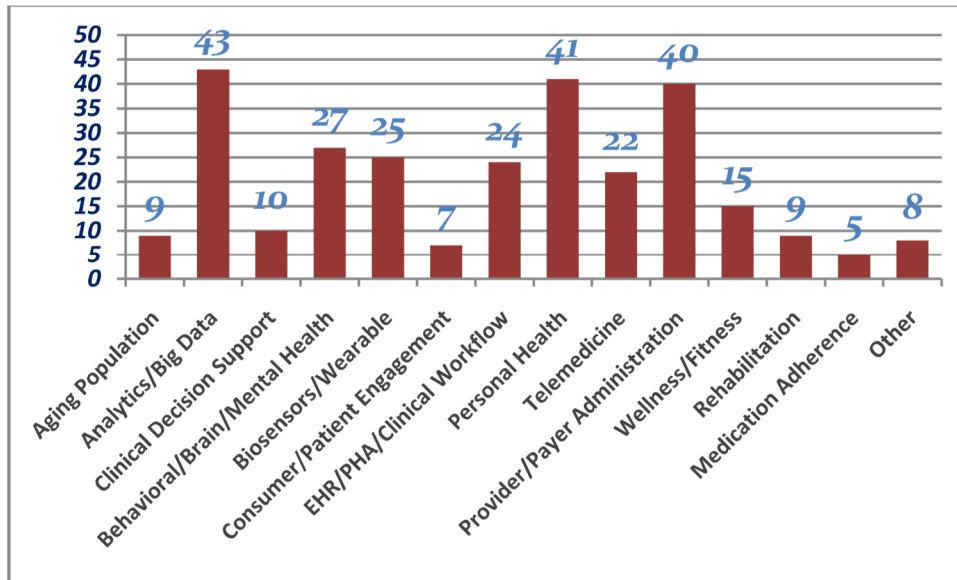
Figure 15: Notable Life Sciences Multinational R&D centers in Israel



An example of a joint venture between Israeli and Dutch multinationals is Sanara Ventures. Sanara Ventures is an innovation investment platform for technological innovation in life sciences that was founded by Teva Pharmaceuticals and Philips. It provides funding and mentoring for entrepreneurs in healthcare technologies. The platform was opened in May 2015 in collaboration with the Office of the Chief Scientist of the Israeli Ministry of Economics who act as an independent joint-venture and co-investor in entrepreneurial projects at Sanara Ventures.

Subsectors

Israeli companies are active in almost all sub-sectors of healthcare IT and digital health. Analytics and Big Data (43 companies), personal health (41 companies) and provider and payer administration (40 companies) are the largest subsectors. Many of those companies gained experience in the Israeli healthcare system while expanding globally to represent Israel's strength in these areas. They are followed by biosensors (25 companies), behavioral/brain/mental health (27 companies), HER/PHR/clinical workflow (24 companies), Telemedicine (22 companies), wellness and fitness (9 companies) and aging population (9 companies).

Figure 46- Israeli Health IT and Digital health – Subsectors

There are more than 280 companies active in healthcare IT and digital health. Half of them were established in the last four years with an average of 36 per year. Most of the companies are small with less than 10 employees (66 percent), 26 percent are 10-50 employees and only 8 percent are relatively large companies with more than 50 employees.

Israeli companies are demonstrating specific strengths in biometric sensing and some of the technologies that were developed in Israel are based on military technologies. There are several companies that monitor heart rate and other biometrics. A recent trend within the healthcare IT market involves engaging consumers for healthier living and maintaining their treatments by using information and social tools.

Israel's health IT and digital health companies are offering different solutions in areas such as big data, business analytics and decision support systems. Based on the vast experience that Israeli companies gained in the local market for implementation of Electronic Health Record (HER) they are also successful in the global market. Among them is dbMotion, a company that provides data aggregation and semantic interoperability by normalizing both data structure and content.

New business models

The healthcare systems in many countries are facing significant challenges such as increased cost, aging population, increase in the prevalence of chronic diseases, empowered consumers, fragmented care, insufficient use of information and shortage of healthcare professionals. The challenges are to serve large patients' populations with fewer resources. On the other end, a new healthcare consumer is born. Patients are taking healthcare into their own hands by leveraging new technologies, using various devices to access health information anytime anywhere. These developments are part of the evolution of the healthcare industry from reactive to proactive health management, which is based on empowering the

patients, enabling the physicians, enhancing wellness and curing the well before they get sick with an emphasis on personalization, prevention and patient responsibility.

It is clear that new business models require collaborations between traditional healthcare providers and new entrants while aligning economic incentives. In the traditional Israel life science industry companies mainly developed products, medical devices and drugs, for the providers and very few developed directly to consumer products. Driven by this transformation, the healthcare IT market opportunity is huge. Quality and efficient healthcare delivery is highly dependent on information and communication, anytime and anywhere. On the other hand, mobile services are becoming the center of life. The mobile industry is a major enabling force and one of the biggest platforms in the history of mankind, resulting in the dramatic change in the way people live, work and play. Now it also revolutionizes the way people receive medical care. IT is reimagining the ways we receive, experience, consume and deliver healthcare, enabling health and wellness to be delivered through mass personalization, anywhere and anytime.

As a leading innovation hub in information and communication technologies, mobile and cyber technologies, Israel can play a major role in this reform of healthcare services. With more than twenty years of expertise in implementing health IT, electronic medical records, business analytics and digital health in its four healthcare funds, this sector is thriving in Israel.

Source: Israel Advanced Technology Institute (IATI) Life Science Industry Report 2015

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