

Issue: High-Tech in Israel

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## Will digital health restore its luster?

### Executive Summary

Israel, once dubbed the Start-Up Nation because of its innovative business environment, is relying heavily on digital health to revitalize its high-tech sector. The government is spending \$275 million on a plan that includes making its citizens' medical records and genetic data available to researchers and corporations globally. The goal is to add to the investment that multinational companies such as Samsung and IBM have already made in Israel. But the bet that the digital health initiative will pay off may collide with several nagging problems in Israel's high-tech industry, including a chronic shortage of trained workers and increased foreign competition. The plan also has prompted some privacy concerns, even though participation is voluntary, because of the threat of data breaches.

Key takeaways include:

- Israeli digital health startups attracted \$340 million in investment in 2017 and are on pace to exceed that total in 2018.
- The worldwide market for digital health products will grow to more than \$200 billion by 2020, according to one projection.
- Companies want to use the digital health data for their research and development work, such as understanding the impact and efficacy of medications.
- [Click here to listen](#) to an interview with author Sara Toth Stub or [click here for the transcript](#).

### Full Report



Israel's high-tech sector has attracted foreign investors such as Intel, which acquired the automotive technology company Mobileye. (Sebastian Scheiner/Associated Press)

In March 2018, Israeli Prime Minister Benjamin Netanyahu announced a government project to make Israelis' medical records and genetic data available, with their consent, as an online database to researchers and companies around the world.<sup>1</sup> Netanyahu said he hoped that access to the database will attract more companies and investments to Israel, making digital health one of the driving forces of the country's well-established tech sector and its economy in general.<sup>2</sup>

The project could eventually contain the anonymous medical records of millions of Israelis, going back 30 years. It is part of the

government's ambitious national digital health plan, which calls for spending the equivalent of \$275 million on research and development, international cooperation, data collection and other efforts in the field.

"We are doing something of historic significance," Netanyahu told his cabinet in announcing the plan. "It is gigantic."<sup>3</sup>

The digital records project is the latest Israeli effort to spur development of the life sciences sector in hopes of maintaining a competitive high-tech edge in a country that has been dubbed Start-Up Nation.<sup>4</sup> It has the potential to attract significant amounts of investment from foreign and multinational companies, several of which, including [IBM](#) and [Samsung](#), already have research and development centers in Israel working on digital health. It could make Israel an even bigger player in the global high-tech arena. Those behind the plan say it comes at a critical time, as the United States and other markets around the world are eager to introduce new technology into health care to lower costs.

But the project also has been criticized by some privacy-rights and legal experts because of the potential for data breaches, and because corporations could benefit from data provided for free by ordinary people. And it is being launched against a backdrop of growing problems in Israel's high-tech sector, as a labor shortage drives up pay and reduces its competitive edge while foreign rivals multiply.

There is no question that digital health is a growing business in Israel, producing hundreds of new companies and attracting hundreds of millions of dollars of international investment in recent years.<sup>5</sup> Israeli digital health startups raised about \$200 million in the first half of 2018, which puts them on a pace to exceed the \$340 million raised in all of 2017, says Sharon Shapira, manager of digital health sector strategy at Start-Up Nation Central, a nonprofit organization that promotes and keeps data on the country's startup ecosystem.

The digital health sector encompasses information technology, artificial intelligence, machine learning, big data and interconnected devices, all applied for use in the medical and health fields.

***"Digital health is what connects high-tech and life sciences."***

This growth is expected to continue in coming years, as digital health becomes a more significant part of Israel's overall life sciences industry and, more broadly, its high-tech sector.<sup>6</sup> Israel sees this as a new field in which it can become a global leader, and it is a lucrative field: With demand growing all over the world, the global market for digital health products is projected to be worth more than \$200 billion by 2020.<sup>7</sup>

The plan would make large sets of data collected over time by the Israeli health system available to local companies or foreign businesses located in Israel for use in their research and development work, such as analyzing the effects of certain medications.<sup>8</sup> While the companies would not pay royalties,

the country's economy would benefit from the jobs and other economic effects of the companies locating in Israel, government officials said.

Israel has a nationalized health care system that has kept digital medical records since the 1990s and often cooperates with companies to test new products. This has helped it emerge as a leader in the digital health field and attract foreign investors and multinational companies.

"Israel is well known across the health care ecosystem for its high quality of integrated care and the tremendous amount of technology startups," says Hal Wolf, president and CEO of the Chicago-based Healthcare Information and Management Society, a nonprofit organization promoting the use of new technology in medical care around the world. "There is little doubt that the high quality of care in Israel has had a direct impact on the digital health landscape."

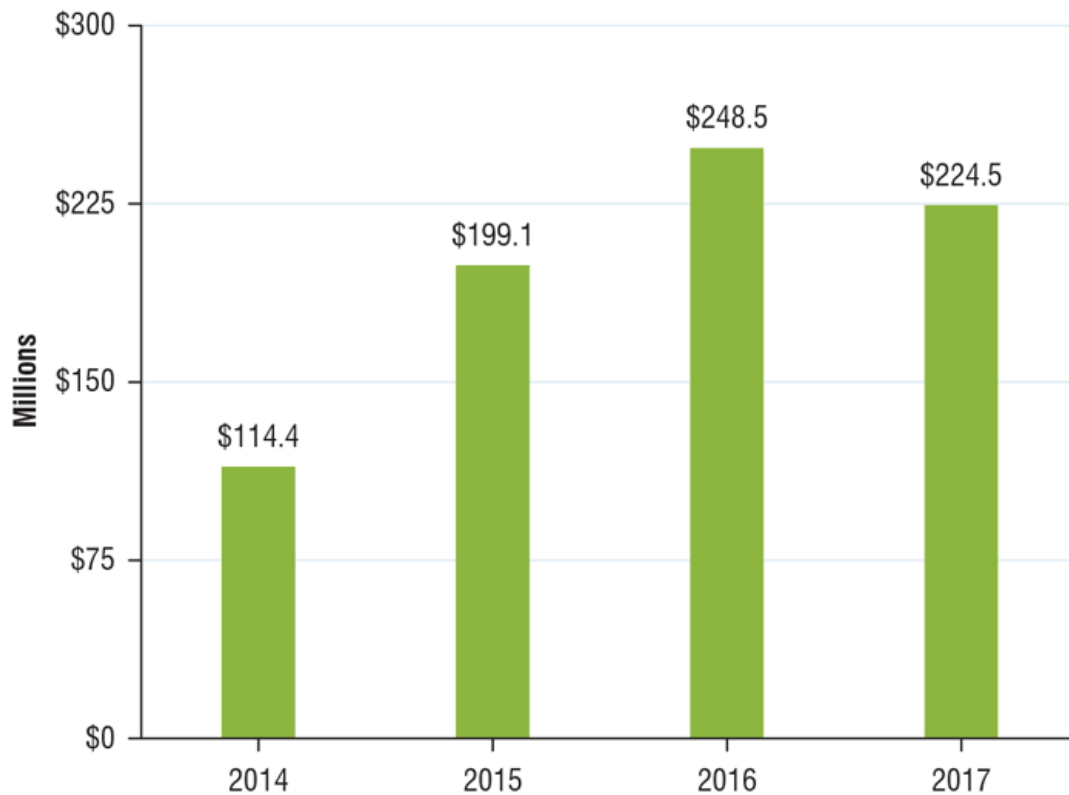
While the recent activity in the digital health sector reveals Israel's potential to be a leader in a globally growing industry, it also reflects the unique characteristics of Israel's high-tech sector, including heavy government support and multitudes of startups, experts and analysts say.

"We see the same phenomenon happening in digital health that we did with the overall Israeli technology sector a few decades ago," says Eyal Ben-Yaakov, head of the life sciences team at Ernst & Young Israel in Tel Aviv. He was referring to Israel's emergence over the past two decades as a global leader in producing successful high-tech startups and attracting large amounts of venture capital, which transformed the country's economy and made Israel an essential part of the international high-tech industry.<sup>9</sup>

And the digital health sector shares the challenges of Israel's overall tech sector, including labor shortages and competition from abroad, said David Rosenberg, the economics editor at the Israeli newspaper Haaretz and author of a new book, "Israel's Technology Economy: Origins and Impact."<sup>10</sup>

## Investments in Israeli Digital Health Rise

### Total investments, 2014 to 2017



Source: "Make an in-depth examination of digital health," Start-Up Nation Central, retrieved June 18, 2018, <http://tinyurl.com/y7ukmcz6>

Total investments in the Israeli digital health sector more than doubled between 2014 and 2016 before dipping in 2017.

Israel's high-tech industry generates about 12.5 percent of the country's GDP and 50 percent of its industrial exports.<sup>11</sup> The sector traces its roots to military and agricultural innovation in pre-independence Palestine, and later to the extensive government support in these realms.<sup>12</sup> Israel has been a global leader in agricultural technology research and products since the 1960s, and even longer in defense systems.<sup>13</sup>

The country's lack of natural resources, fragile or hostile political relationships with neighboring countries and a highly educated population also contributed to the foundation and subsequent growth of a high-tech sector.<sup>14</sup> In the 1970s, multinational technology companies such as IBM and Intel, encouraged by tax breaks and other incentives, began locating in Israel, giving the industry a further boost and helping put ideas and technology developed in Israel on the global market.<sup>15</sup>

By the 1990s, a strong private sector, promoted over the years by government policy, along with an influx of immigrants, transformed the Israeli economy "from a sleepy backwater into a leading center of global innovation," authors Dan Senor and Saul Singer wrote in their book on the development of Israel's tech industry, "Start-Up Nation."<sup>16</sup> By the early 21st century, they wrote, it had become "impossible for major technology companies to ignore Israel, and most haven't; almost half of the world's technology companies have bought start-ups or opened research and development centers in Israel."<sup>17</sup>

Israel's high-tech industry includes a large number of startups, the presence of many multinational companies' R&D arms, and heavy government support. Known as Silicon Wadi – the Arabic word for valley – Tel Aviv's startup ecosystem is often listed among the most vibrant in the world.<sup>18</sup> Israel attracts an outsized proportion of venture capital investment, equal to about 0.35 percent of its GDP in 2016, compared with less than 0.05 percent of GDP in most of the other 33 countries belonging to the Organisation for Economic Co-operation and Development (OECD).<sup>19</sup> There are also about 300 multinational R&D centers in Israel.<sup>20</sup> These centers contribute about 53 percent of total business-sector R&D, more than double the OECD average.<sup>21</sup>

The Israeli military maintains several programs to develop technology, which often spills over to the private market in the form of commercial products and produces thousands of trained professionals who go on to found or work in civilian technology ventures.<sup>22</sup> The government continues to encourage the high-tech sector through a department called the Innovation Authority that oversees grants for R&D, a network of government-backed incubators and public policy to maintain and increase growth in the private high-tech sector.<sup>23</sup> Government spending on civilian R&D totals 4.2 percent of GDP, the second highest rate in the world, after South Korea; the OECD average is about 2.3 percent.<sup>24</sup>



## Life Science Attracts Funding

The life-sciences field, which includes pharmaceuticals and medical devices as well as digital health, made up 40 percent of all Israeli high-tech exports and 9 percent of the country's total exports of goods and services in 2017. The trend is modestly upward; in 2014, life sciences made up 37 percent of high-tech exports and 8 percent of total exports, according to data provided by the Israel Export and International Cooperation Institute. Life sciences companies attract about 26 percent of all high-tech funding in Israel each year, according to industry reports.<sup>25</sup>

Other drivers of the high-tech economy that have attracted significant investment include software, semiconductors and communications.<sup>26</sup> In recent years, Israel's talents in data collection and analysis have generated growth in several other areas, including cybersecurity, agricultural and automotive technology. Intel recently acquired the Israeli auto tech company [Mobileye](#) for \$15 billion and established its main R&D center for the automotive industry in Israel. Mobileye makes sensor- and vision-based technology that helps drivers avoid collisions.<sup>27</sup>

But the Israeli government and many in the industry worry about its future, mainly due to labor shortages in the fields of engineering and programming.<sup>28</sup> This imperils Israel's growth potential in the high-tech sector and has also resulted in higher salaries, threatening Israel's competitive edge.<sup>29</sup> "The hi-tech industry ... is facing significant challenges," Aharon Aharon, the director of the Innovation Authority, acknowledged last year.<sup>30</sup>

The shortage of engineers, programmers and other professionals is one of the main reasons that average salaries for IT workers have increased 21 percent between 2013 and 2017.<sup>31</sup> "It's a major crisis in the high-tech industry," says Yamit Naftali, an economist at the Jerusalem Institute for Israel Studies think tank who has conducted research on the high-tech sector.



The government wants to increase the participation in high-tech fields of groups such as Orthodox Jews. (Eyal Warshavsky/Associated Press)

Only about 12 percent of Israelis are employed in the tech sector, a percentage that has declined slightly over last 10 years.<sup>32</sup> The government last year announced a series of steps to address this problem, including subsidized coding boot camps and outreach to groups such as women, ultra-Orthodox Jews, and Arabs, whose rates of labor force participation are below average.<sup>33</sup>

Entrepreneurs in the digital health sector, like in other high-tech sectors, say they feel intense competition to recruit.

"It's terrible. We simply don't have enough potential employees," says Eran Ofir, the founder and CEO of [Somatix](#), a wearable gesture-detection platform that gathers and uses data on people's hand movements to treat conditions ranging from smoking to alcohol addiction.

to overeating. He says small startups are competing with large multinationals such as Google that have also ventured into the health space. “But I have found that I have managed to attract talent because people want to do something that is really helping people,” Ofir says.

Competition from abroad is increasing as more countries recognize the importance of innovation and invest in it, according to the Innovation Authority.<sup>34</sup> South Korea has doubled its government investment in R&D since 2000. In 2016 it surpassed Israel to place first in the Bloomberg Innovation Index, a ranking by the news organization of the 50 most innovative nations; in 2018 the index ranked South Korea first and Israel 10th.<sup>35</sup> While growth in Asia is especially rapid, new tech hubs are emerging all around the world.<sup>36</sup>

Another challenge is maintaining the domestic economic value of locally-developed technology. Many new ideas that are developed in Israel are owned by multinational or foreign companies operating local research and development centers, or developed by startups that are acquired before maturing, according to the Innovation Authority.<sup>37</sup>

It is against this backdrop that Israel’s digital health sector has expanded and become a more significant part of the life sciences sector, a trend that Ben-Yaacov at Ernst & Young and other experts and industry leaders expect to continue.<sup>38</sup> In fact, health care IT has emerged as the second largest component of the life sciences sector.<sup>39</sup>

“It is one of the fastest-growing sub-sectors,” says Karin Mayer Rubinstein, president and chief executive of Israel Advanced Technology Industries, an umbrella organization for the country’s high-tech and biomedical industries. “And it makes sense. Digital health is what connects high-tech and life sciences.”

As of mid-2018, there were about 500 digital health companies in Israel, according to Shapira of Start-Up Nation Central. Most are relatively new: More than half of Israel’s digital health companies were established in the last six years, and about 70 percent are small, with less than 10 employees.<sup>40</sup> “It’s a pretty young vertical in Israel,” Shapira says.

## Better Health Care Delivery Sought

The development of digital health in Israel and elsewhere stems from a growing realization that more efficient ways need to be found to deliver care, in the United States and elsewhere, says Wolf, the Chicago health executive. “The opportunities are increasing as the need for better outcomes at lower cost remains the mantra,” he says.

The attention of tech entrepreneurs to the medical field has increased since the U.S. government dedicated \$30 billion to digitizing all health records and Medicaid and Medicare began paying incentives to health care providers with better patient results, says Levi Shapiro, founder of mHealth Israel, a non-profit organization supporting Israel’s health technology industry.<sup>41</sup> “As a result, Israeli IT talents noticed that the money was flowing to help solve that crisis,” and high-tech professionals have pivoted to health care from other fields, Levi says.

The growth of digital health also has been driven by key technology breakthroughs and developments in recent years, including the rise of cloud computing, artificial intelligence, machine learning, blockchain record-keeping technology and the ability of anyone with a smartphone to collect data, says Ben-Yaacov at Ernst & Young.

Ofir, the Somatix CEO, is one of many Israeli high-tech professionals who recently entered the digital health sector, bringing to bear his experience in telecommunications, software subscription services and other sectors. “I’ve applied the same principles to digital health, using big data and creating efficiency,” Ofir says.

In 2016, the country’s first venture fund dedicated to digital health, Qure, was founded to meet the unique needs of the industry. Unlike drugs or traditional medical devices, many digital health products, such as wearable devices that collect data or programs that analyze medical data, are not subject to the long timelines and high costs of regulatory approval, says Yossi Bahagon, a doctor and managing partner at Qure. “Digital health follows a different pathway both on amounts needed to be invested and how much time it takes a company to mature,” Bahagon says.

Funds focused on pure technology are also investing more in Israel’s digital health sector, says Ben-Yaacov. Like the tech sector overall, most funding in the digital health sector is foreign, according to Shapira.<sup>42</sup>

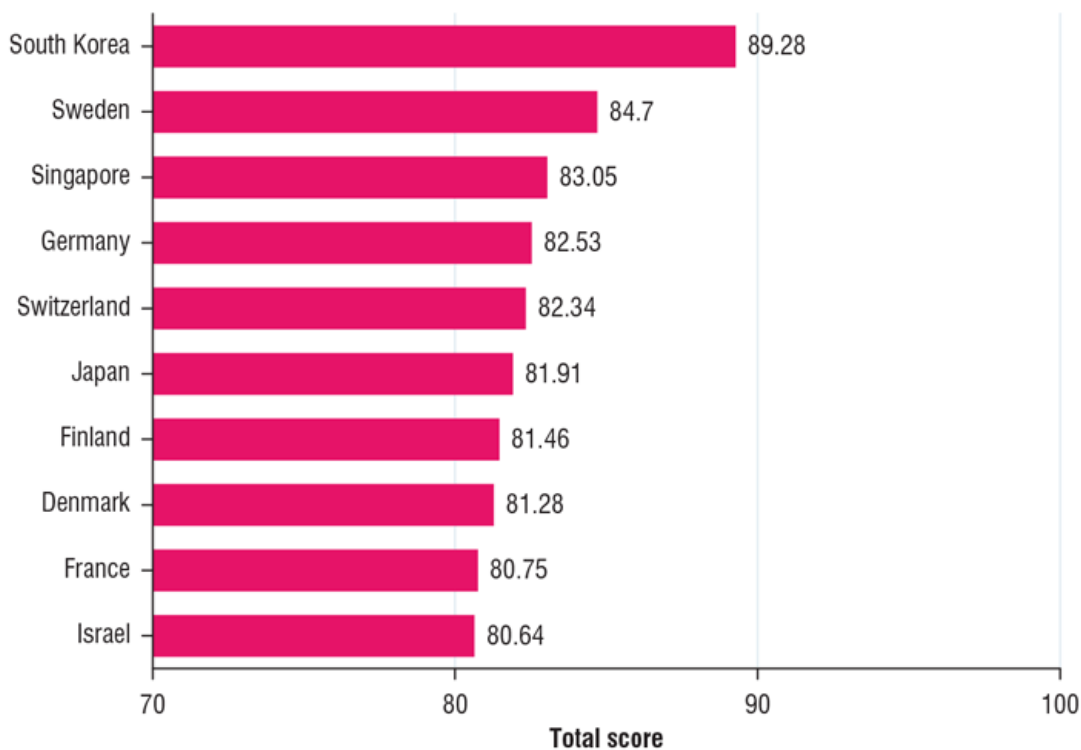
Multinational technology companies have begun to establish and expand digital health R&D centers in Israel. These companies are drawn to Israel for the innovations produced by digital health startups, the country’s proven record in high-tech and the unique structure of its nationalized health care system, says Michal Rosen-Zvi, director of health care informatics (the science of data storage and retrieval) at IBM Research in Haifa. It is one of 12 IBM labs around the world that have increased their efforts in the field of health care, she says.

“Israel plays a key role among those labs,” Rosen-Zvi says. The infrastructure of the country’s system, which is built around four health maintenance organizations that are both payers and providers of health care services, provides a good place to test new ideas, she says. In addition to Samsung, [General Electric](#) and [Microsoft](#) have health care R&D centers in Israel.<sup>43</sup>

The multinationals play a vital role in generating new ideas and keeping the digital health sector vibrant, says Shapira at Start-Up Nation Central. “This makes the ecosystem here much richer,” she says.

## Israel Ranks 10th in Innovation

### Top countries in Bloomberg's 2018 Innovation Index



Note: Total score is based on seven weighted categories: R&D intensity, manufacturing value-added, productivity, high-tech density, tertiary efficiency, research concentration and patent activity.

Source: Michelle Jamriso and Wei Lu, "The U.S. Drops Out of the Top 10 in Innovation Ranking," Bloomberg, Jan. 22, 2018, <http://tinyurl.com/yafqj3fp>

Israel, which enjoys an international reputation for its startup-friendly business culture, now places 10th in the world in innovation, according to a Bloomberg ranking.

Foreign health care providers have also teamed up with local technology incubators in search of digital solutions for improving care. The United Kingdom's National Health Service is partnering with IBM to mentor startups at a digital health incubator in Israel.<sup>44</sup> Michigan-based [Henry Ford Health System](#) announced that it will work with Israeli startups to develop new, advanced technology products for use in the medical field and help bring them to the U.S. market.<sup>45</sup> The Mayo Clinic announced an initiative to scout and invest in Israeli digital health startups.<sup>46</sup>

The Israeli government has been a major participant in the growth of the digital health sector through funding mechanisms such as Innovation Authority grants. Aharon, the Authority director, calls digital health "the main growth engine of the Israeli economy."<sup>47</sup>

Eli Groner, director general of the prime minister's office, says the government is putting money into this sector because the global health care industry is a ripe area for disruption and cost reduction. Even if Israeli companies capture only a tiny fraction of the global health care market, the potential is great because of the sheer size of that market, he says. "It will grow Israel's economy in a significant way," Groner says.

Groner says the government is aware of the privacy concerns, especially for the part of the plan that calls for expanding and opening Israel's medical record databases for scientific research. But only the data of individuals who volunteer will be included, and steps will be taken to make sure the data is anonymous, secure and not misused, he says.

Although there hasn't been a large public outcry against the plan, some experts in privacy rights and law have voiced concerns. Tehilla Shwartz Altshuler, an expert on technology law at the Israel Democracy Institute, a think tank in Jerusalem, said the database would violate the right to privacy and dignity and should be approved through the legislative process, something the government is not planning to do.<sup>48</sup>

"We're preoccupied with the benefits that will emerge from the plan, but on the other side there is a constitutional right that is being violated," Altshuler said.<sup>49</sup>

Rosenberg, the Haaretz editor, says only time would tell how effective the government's privacy measures are. He adds, however, that Israelis are accustomed to providing the government with private information and to other intrusive measures, such as having their bags searched on entering malls, grocery stores and other public places for security purposes.

## ***"Who will be the Google or Uber of digital health?"***

"Israelis have a pretty high threshold for privacy invasion," Rosenberg says. "There's not the sensitivity that there is in the U.S. or Europe."

Government support is key to growth, many in the industry say. "All in all we have been enjoying the push from the Israeli government. It has really helped us to grow," says Gidi Stein, CEO of Israel-based [MedAware](#). Stein says his company, which makes software using big-data analysis to identify prescription errors, has received more than \$800,000 in government research grants during the last two years.

But there are growing concerns within the industry that the government is not doing enough to attract multinational companies or reduce the emigration of scientists and other experts. And many business executives say there is still too much bureaucracy inhibiting business in Israel, which has been dropping in the World Bank's annual Ease of Doing Business rankings in recent

years.<sup>50</sup>

"I think the government support is important, but the government should not intervene when not needed," says Mayer Rubinstein, the Israel Advanced Technology Industries president.

Although Israel has a proven record in other areas of high-tech, entering the digital health field is challenging, partly because the field itself is so new, says Angela Rabinovich, director of the life sciences department at The Israel Export & International Cooperation Institute, a quasi-governmental agency that helps market Israel's industries abroad.

"Now our challenge is to make a shift from being recognized as the startup nation to the digital health nation," Rabinovich says. And when it comes to selling health products abroad, she says, scale is more difficult than in other industries due to differing government regulations and health care systems in every country.

"The business model is different everywhere for medical products," Rabinovich says.

Shapiro, the mHealth Israel founder, says that while most people believe global health care industry is ripe for technological disruption, no one yet knows what the disruption will look like. And Israel's digital health sector has not yet produced a real industrywide game-changing solution, he says.

"Israel has the skillset to apply IT to the health sector," Shapiro says. "But the real question is, who will be the [Google](#) or [Uber](#) of digital health? Who will redefine the broken American health care system? And so far Israeli high-tech is just putting Band-Aids all over the problems."

## **About the Author**

Sara Toth Stub is a Jerusalem-based U.S. journalist who has written for The Wall Street Journal, The Atlantic, U.S. News & World Report and other publications. She usually covers business, culture and travel, and you can follow her work at @saratothstub. She previously reported for SAGE Business Researcher on [the Palestinian economy](#).

## **Chronology**

**1900–1985**

**Government investment lays industry groundwork.**

**1900–1947**

Jewish residents in Palestine begin developing innovative agricultural and military techniques and products to further the Zionist cause of creating a Jewish homeland in the biblical land of Israel. The establishment of universities, including the Technion-Israel Institute of Technology, and the high numbers of immigrants from Europe contribute to the emerging economy.

**1947**

The United Nations adopts a partition plan for Palestine that designates part of the territory for a Jewish state and part for an Arab state.



<b>1948</b>	Fighting breaks out in the Middle East after the state of Israel is declared following the withdrawal of British troops.
<b>1950s–60s</b>	The Israeli government invests heavily in research and development in agriculture and military products, laying the foundation for the high-tech industry.
<b>1967</b>	Israel takes control of all of Jerusalem, the West Bank and Gaza after its victory in the Six-Day War against Egypt, Jordan and Syria.
<b>1970s</b>	International technology companies, including IBM and Intel, open research and development centers in Israel.
<b>1985</b>	An economic stabilization plan ends more than a decade of rapid inflation and sharply cuts the government budget; this and other measures ultimately turn a highly centralized socialist-oriented economy into a capitalist one.
<b>1990–Present</b>	<b>High-tech takes center stage.</b>
<b>1990s</b>	The advent of the internet and mobile phone, along with the proliferation of the personal computer, spurs Israeli high-tech startups. High-tech exports generate strong economic growth.... A chief scientist's office, which later becomes the Israel Innovation Authority, is founded; it increases government investment in research and development.
<b>2000–2003</b>	A Palestinian uprising, known as the Second Intifada, breaks out. The resulting regional violence and the bursting of the international dot-com bubble send Israel's economy downward, with gross domestic product shrinking 0.1 percent in 2002 after growing nearly 9 percent in 2000.
<b>2010</b>	Israel joins the Organisation for Economic Co-operation and Development, officially securing its position among the world's developed economies.
<b>2010s</b>	Israel carries out two major military operations in Gaza after militants launch hundreds of rockets into Israeli territory. The deployment of the Iron Dome anti-missile system prevents many rockets from landing in Israel and in so doing helps avoid disruptions to the economy.
<b>2017</b>	Intel buys auto technology company Mobileye for \$15 billion, the largest high-tech sale in Israel's history, and establishes a research division in Israel, further cementing the country's leadership position in automotive technology. ... The Innovation Authority announces a plan to double the number of people who work in the high-tech sector, to ensure growth of the industry and the overall economy.
<b>2018</b>	The government announces a \$275 million national digital health plan to encourage the development of this new sector.

## Resources for Further Study

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## The Next Step

### Digital Health

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## Organizations

### Central Bureau of Statistics

66 Kanfei Nesharim St., P.O. Box 34525, Jerusalem 9546456, Israel  
+972 2 659-2666  
Fax: +972 2 652-1340  
[http://www.cbs.gov.il/reader/?Mlval=cw\\_usr\\_view\\_Folder&ID=141](http://www.cbs.gov.il/reader/?Mlval=cw_usr_view_Folder&ID=141)

info@cbs.gov.il

Israeli government department tracking and analyzing data on trade, the economy, industries, tourism, population characteristics and other topics.

### **Israel Advanced Technology Industries**

Medinat HaYehudim 89, Building E, 11th floor, P.O. Box 12591, Herzliya Pituach 4676672, Israel

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<http://www.iati.co.il>

hadas@iati.co.il

Umbrella organization made up of members of Israel's high-tech and life sciences industries, including startups, local branches of multinational companies, incubators, technology transfer companies, academic institutions and municipalities.

### **Israel Export and International Cooperation Institute**

29 Hamered St., P.O. Box 50084, Tel Aviv 68125, Israel

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<http://www.export.gov.il>

lironh@export.gov.il

Nonprofit quasi-governmental organization that promotes Israeli goods, trade and cooperation with international companies and industries.

### **Israel Innovation Authority**

4 HaYarden St., P.O. Box 1099, Airport City, 7019900, Israel

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<http://www.matimop.org.il>

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Israeli government department overseeing the development and implementation of policy to promote innovation, and making government grants for research and development.

### **IVC Research Center**

99 Ha'Hashmonaim St., 2nd Floor, P.O. Box 20067, Tel Aviv 6713316, Israel

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<http://www.ivc-online.com>

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Business information company tracking capital-raising, sales of companies and other aspects of Israel's high-tech sector.

### **Startup Nation Central**

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Nonprofit organization supporting and tracking in detail Israel's startup ecosystem, producing regular reports and maintaining databases of startups, multinational companies and incubators in various sectors.

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Think tank researching Israeli social and economic challenges and the impact of government policies on the population.

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