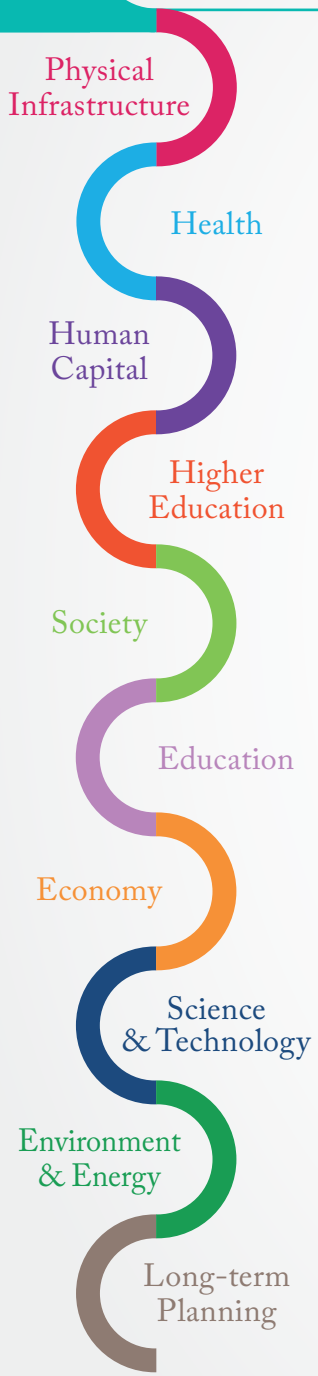
Samuel Neaman Institute
for National Policy Research

Industry & Innovation



Estimation of Intel Israel's contribution to the Local Economy

Executive summary

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Final report

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Executive summary

This research is part of our efforts to examine the contribution of big corporations to the national economy.

The purpose of our work is to review and analyze the total contribution of Intel Israel to Israel's economy. Naturally, we focused on mapping and analyzing Intel Israel's overall contribution to the national economy, rather than assessing its efficiency or business performance. However, we must note that as we delved into Intel's work over the years, we were deeply impressed by the dramatic impact of the local activity in Israel on the global activity of the corporation. It is impossible not to be amazed at how far local operations have come; Intel Israel has gone from a hesitant beginning in a modest R&D center in Haifa to massive investments ($15.9 billion) in Intel sites across Israel, over 10,000 employees, procurement from local suppliers of over $1.5 billion annually for ongoing operations, and nearly $18 billion in acquisitions of local companies. In the past year alone, Intel invested over $15 billion in the acquisition of Mobileye, which continues to operate from Israel. Intel Israel has invested hundreds of millions of dollars to support local research institutions, promote early-stage business ventures, advance math and science education in Israeli high schools, and a range of activities and investments that reflect Intel's commitment and strong engagement with Israeli society.

◀ The characteristics of Intel Israel's activities in Israel

General

Intel Israel is part of Intel Corporation's global operations. This means that the operations in Intel Israel are that of an "Intel Site", which in turn means that its operations are managed and directed by the global business units. On the other hand, Intel Israel's headquarters is officially responsible for Intel's local activities in front of the various authorities in Israel. We communicated with Intel Israel headquarters, which compiled for us the necessary information and coordinated meetings with key figures in the company. In addition, we met with various "Intel alumni", all of whom have held senior positions at Intel. The meetings with them provided us with the necessary long-term perspective.

Intel Israel is active in Israel in two key areas:

Development work is carried out in four main sites: Haifa, Yakum, Petach Tikva, and Jerusalem. Development is the area in which Intel historically started out in Israel, as an initial attempt to harness the knowhow and talent identified in Israel for the needs of the global operations. Over time, the share of this area in Intel's global operations has grown, thanks to breakthroughs and innovations that have had significant impact on Intel products.

Production operations were established in the 1980s in Jerusalem and expanded in the mid-90s to the industrial park in Kiryat Gat, where it serves as the anchor for the

entire park. The Kiryat Gat site has been expanded and upgraded several times since then, in line with the technology that kept developing in response to the increasingly fast changes in market requirements.

The research methodology:

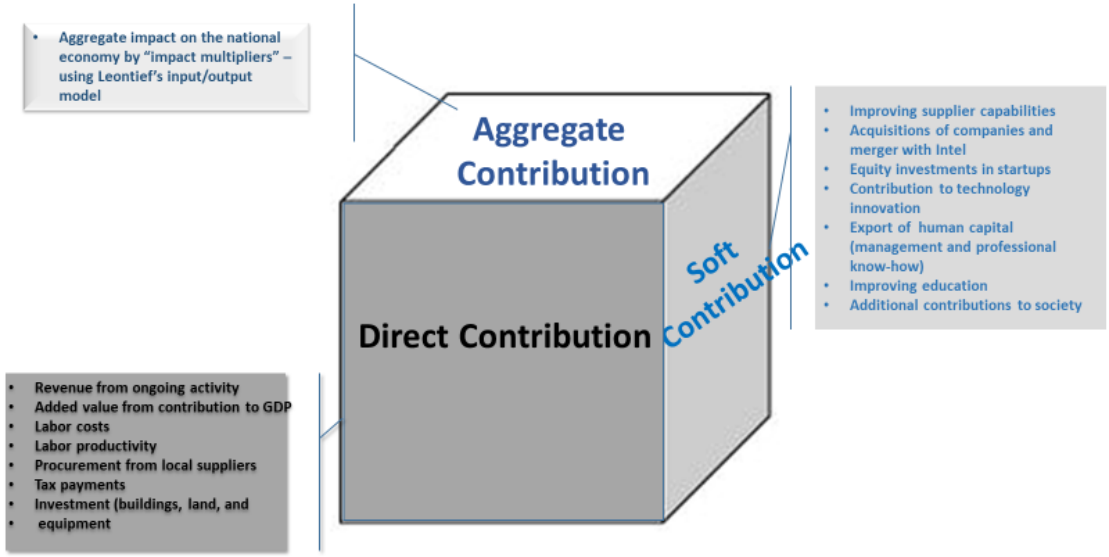
In evaluating Intel Israel's total contribution, we identified three levels of contribution:

Direct contribution - evaluated according to accepted economic and accounting parameters.

Aggregate contribution to the national economy - evaluated by a comprehensive national input-output model developed by Nobel Prize Laureate Prof. Wassily Leontief.

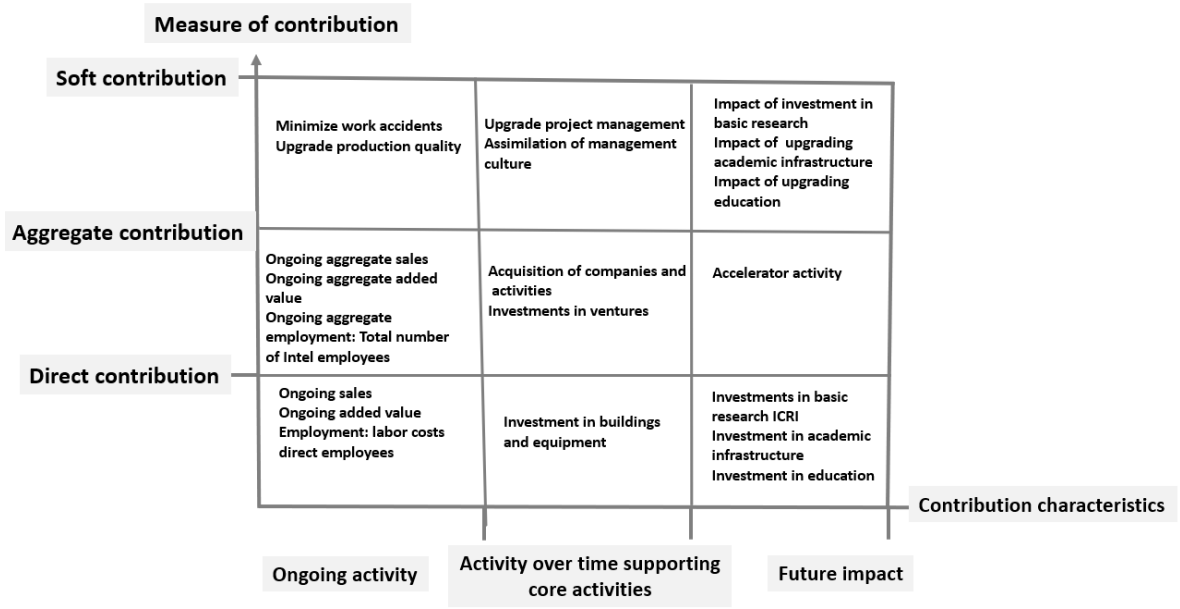
Soft contribution to the economy – this contribution is the most difficult to define and tricky to calculate; however, it is absolutely not the third in its importance.

Figure 1: Three areas of contribution, which we used to estimate Intel contribution to the national economy



After mapping the various areas in which the company contributes to the national economy, we realized that they have different characteristics, and that we have to define and quantify the contributions of each area in different ways. We made efforts to quantity the contribution of each identified area. However, we believe it would be wrong to normalize the diverse types of contributions into a single figure that reflects the annual contribution, or the contribution over time.

Figure 2: The complex contribution matrix to the local economy of Intel Israel



In Fig. 2 we demonstrate the complexity of Intel Israel contribution to the local economy. We adopted an approach to two different dimensions:

I. **Method of measuring the contribution**

II. **Characteristics of Intel Israel's contribution**

I. Measuring Intel Israel's contribution:

We identified three levels of Intel's contribution to the local economy:

1. **Direct contribution**: Measured with accepted accounting and economic tools that are based on agreed principles.
2. **Aggregate contribution to the economy**: Measured with a national input-output model, which relies on a complex economic-mathematical methodology. This measurement is meant to assess the overall impact of Intel Israel's ongoing operations on the Israeli economy. The measure has received professional recognition in the field of macroeconomics. Wassily Leontief, who developed the methodology used for calculating this contribution, received the Nobel Prize in Economics for this development in 1973.
   The results of running the aggregate model reflect the year 2016. This was the last year for which complete annual information was available at the time of research.
3. **Soft contribution**: This contribution encompasses a range of additional contributions that are expressed by intangible parameters. While the existence of these parameters enjoys broad recognition and consensus, they are hard to quantify and may be subject to interpretation. For example, the value assigned to efficient project management (which is reflected in reduced costs, fewer work accidents and shorter project implementation), is not easily quantified. Another

example is estimating the added value of Intel's investment in Israel's academic infrastructure and its support of basic research aimed at future technologies.

Table 1: Results of running the model: Aggregate Intel multipliers, as of 2016

Activity parameter / Impact multipliers	Output	Employment	Added value
Derived multiplier	1.41	3.53	1.25
Induced multiplier	2.29	4.39	1.95

Table 2: Results of running the model: Aggregate impact of Intel's activity in 2016, in USD millions

Aggregate impact of Intel Israel's **sales**, in USD millions

2016 Sales	**Derived Sales** **Derived multiplier** **1.41**	**Aggregate Sales** **Induced multiplier** **2.29**
3,345	4,716	**7,660**

Summary of the results:

Intel's activity in 2016 generated $7.7 billion in aggregate output to the economy!

Impact of the added value generated by Intel Israel's operations, in USD millions

Added value in 2016	**Derived added value** **Derived multiplier** **1.25**	**Aggregate added value** **Induced multiplier** **1.95**
2,514	3,142	4,902

Intel Israel's 2016 operations contributed about $5 billion to Israel's GDP, accounting for over 1.6% of Israel's total GDP!

Aggregate impact of Intel Israel on the employment in USD millions:

Number of employees in 2016	Derived multiplier **3.53**	Induced multiplier **4.39**
10,194	35,985	44,750

Intel Israel's 2016 operations are directly and indirectly related to 44,750 employees in the local economy!

II. The characteristics of Intel Israel's contribution to the local economy:

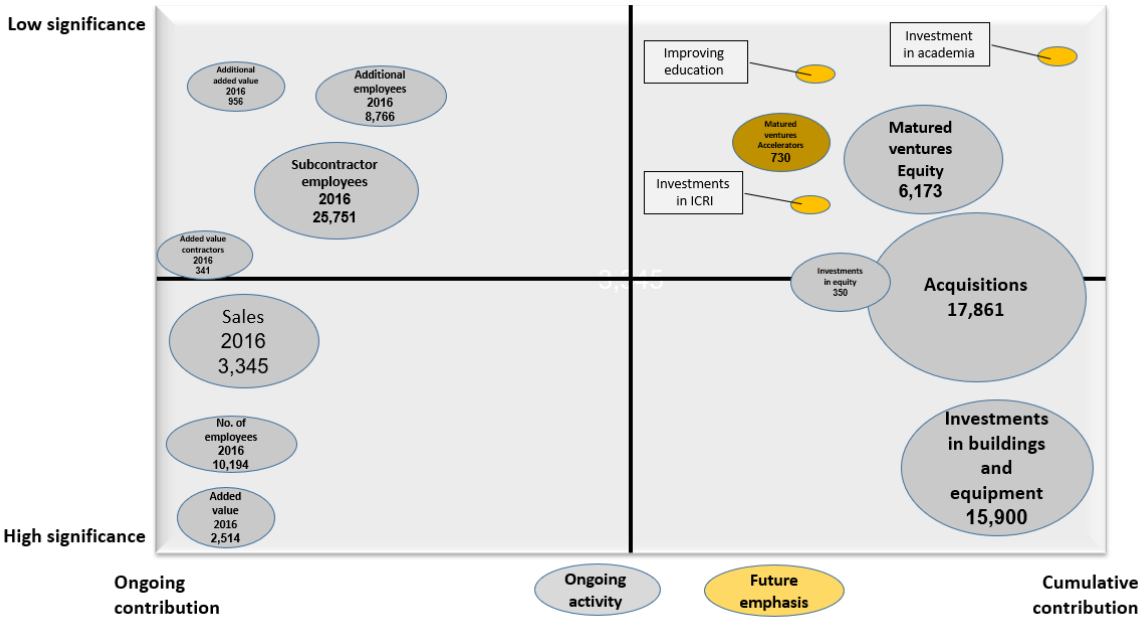
We identified three characteristics of the total contribution:

1. **Contribution through ongoing operations**: We reviewed the impact of Intel's current operations on the local economy. Current operations are reflected in accepted performance parameters such as sales, added value, number of employees, tax payments, characteristics of the aggregate contribution (with the help of the input/output model described above) and finally through quantification and presentation of intangible performance parameters.
2. **Support for core activities:** This support is expressed in a range of investments made throughout Intel's 44-year history in Israel to support, enhance, and align the nature of the activity to the changing business environment. Our analysis identified three types of investments:
    i. Investments in land, buildings, and equipment: Intel has invested over $16 billion over the years.
    ii. Investments in companies and knowledge acquisition, and their integration into Intel's current operations: around $18 billion.
    iii. Investments in early stage ventures: over $350 million.
3. **Impact on the future of Israeli society and the economy:** This activity takes place under the umbrella of Intel Corporation and includes:
    i. Investment in academic infrastructure and in long-term basic research that aims to predict the type of technologies that will shape the future economy and society.
    ii. Investment in shaping and enhancing Israeli society with better science and math education and a range of other social projects.
    iii. Accelerators: Development of early-stage companies.

In Fig. 3 we mapped and quantified all the analyzed contributions on two different axes

- The significance or clearness of the measured contribution
- Characteristics of the contribution time frame

Figure 3: Mapping of Intel's contribution to the local economy in Millions of Dollars



◀ Summary of the findings: Intel Israel's quantified contribution

Table 3: Quantification of Intel Israel's contribution without labor costs

	Contributions with absolute quantification		Aggregate contribution	Soft contribution							Total contribution in $M
Type of contribution / Measure of contribution	Direct contribution	Improving subcontractors	Aggregate contribution (Leontief model)	Acquisitions	Investment in equity	Accelerators	Applied research ICRI	National savings thanks to safety and lean construction	Contribution to academia	Improving education	
Sales 2016	3,345	1371	7,660								7,660
Added value 2016	2,514	630	4,902								4,955
No. of employees 2016	10,194	25,791	44,750								44,750
Investments over time	15,900			17,861	350	2	15		21.5	8 annually and aggregate 5-years 120	34,270
Economy comparison 2016						POC90% (compared to 20%)					
Maturation successes			$369M		6,173	730					7,272
Annual savings to economy								Construction 300 safety 117			417
Improvement measurements						40 companies raised an avg. of $7.5M	Future contribution of over $90M annually				300

Legend

Data over years of activity in Israel	Measures reflect 2016 only	Evaluation over 5 years focus on 2016

Table No. 4: The significance of Intel's contribution to the local economy, in USD millions

	Ongoing activity in 2016	Activity over time	Future impact
Direct contribution	Intel sales: $3,345 million Intel's added value $2,514 million No. of people directly employed by Intel: 10,194	Investment in infrastructure: $15,900 million	Investment in research: $15 million Investment in academia: $21.5 million
Total aggregate contribution generated by Intel	Intel's aggregate sales: $7,660 million Intel's aggregate added value: $4,902 million Additional suppliers' sales: $369 million Total people working for Intel: 44,750. [1]	Acquisition of companies: $17,861 million Investments in ventures: $350 million	
Soft, non-quantified contribution		Managerial and technological knowledge transfer to other companies through Intel alumni Assimilation of management culture	$300 million raised by 40 companies mentored by Intel Research potential
Soft quantified contribution		$6,173 million in matured ventures $117-$167 million a year in costs to the Israeli economy saved by cutting the number of accidents	$300 million a year saved in construction expenses through better manufacturing quality. $8 million a year in better education ($120 million aggregate over 5 years) $90 million a year in ICRI (Intel Collaborative Research Institutes) potential

◀ Concluding remarks

When we embarked on researching Intel's contribution to the Israeli economy, we sought to reach a comprehensive quantitative assessment that would reflect Intel's overall contribution to the local economy.

[1]Not all are full-time positions

However, the more we delved into all the areas of contribution that characterize Intel's operations in Israel and its growing commitment to Israel's economy, we realized that the assessment is more complex than we originally thought. We also realized that it would be impossible to quantify the contribution with a single overall figure. Hence, since we found no way to express the full range of contributions with a common quantitative denominator, we opted to identify the areas in which Intel has been active in Israel throughout its 44-year history (via Intel Israel).

The research on Intel's contribution to the Israeli economy raises the question from the perspective of the Israeli government, of the viability of awarding benefits to multinational companies in order to attract them to Israel. After being exposed to the entire scope of Intel's work in Israel, we would like to present the following points:

- Intel Corporation is a global business company. As such, its past as well as continued operations in the future depend on the proven business advantage of its operations in Israel. Having started its operations in Israel with a modest R&D center in Haifa, over the years Intel has identified the great potential of Israeli researchers, managers, and skilled production workers, who adopted the Intel culture more quickly and easily, and apparently more efficiently than the norm in the USA and in other places.
- The long-term existence of the manufacturing operations in Israel requires massive investments in upgrading the production lines every few years. It is undoubtedly related to the scope and nature of government grants given to local operations (otherwise, the new facilities will be established elsewhere in the world). The continued existence of current operations that rely on older technology is just a matter of time before they are shut down.
- While there is no clear connection between the development work carried out in Israel and the manufacturing operations, the co-existence of these two operations reinforces Intel Corporation's plans to preserve and reinforce its presence in Israel, especially in view of President Trump's efforts to relocate operations to the USA (through tax and customs alleviations).
- Summarizing Intel's contribution to Israel beyond the quantitative aspects (direct and semi-direct), would not be complete without further emphasizing additional aspects that are harder to quantity, or whose quantification is not trivial, such as:
    - The assimilation of the Intel culture in sub-contractors, which yielded multiple improvements, including:
        i. Adoption of lean construction methods with an estimated potential of up to $300 million a year, if implemented by the companies exposed to it as part of the current expansion project.
        ii. Improved work safety: estimated savings of $167 million a year.
        iii. Enhancing the quality of sub-contractor products, which opened new markets for them: estimated at $370 million in 2016.

- Leveraging the skill and the global presence to identify and mentor early-stage companies through:
- Investing in some 40 companies through minority holdings in startup companies and nurturing them to established companies at the forefront of technology, with IPOs or exits.
    i. Accelerator project – support and mentoring of some 40 ideas all the way to independent companies
    ii. Acquisition of over 20 companies in amounts ranging from a few millions to over $15 billion (Mobileye).
- Management knowledge transfer to many companies and ventures in Israel through managers and professionals who acquired their skills and experience at Intel.
- Engagement and assuming responsibility in areas that overlap with areas that the government usually takes responsibility for, such as:
    i. Supporting academic infrastructure (with no demand for IP ownership) through:
        - The ICRI-CI project, which strengthens Israel's scientific research and capabilities in the field of artificial intelligence.
        - Investment in infrastructure and experienced professors in Israel's academic and research institutions.
    ii. Enhancing science and math education in Israeli high schools (5*2 Program).
    iii. Engagement in a range of social initiatives.

In view of these findings, Intel can be considered as a cornerstone on which Israel's elite industry is built

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