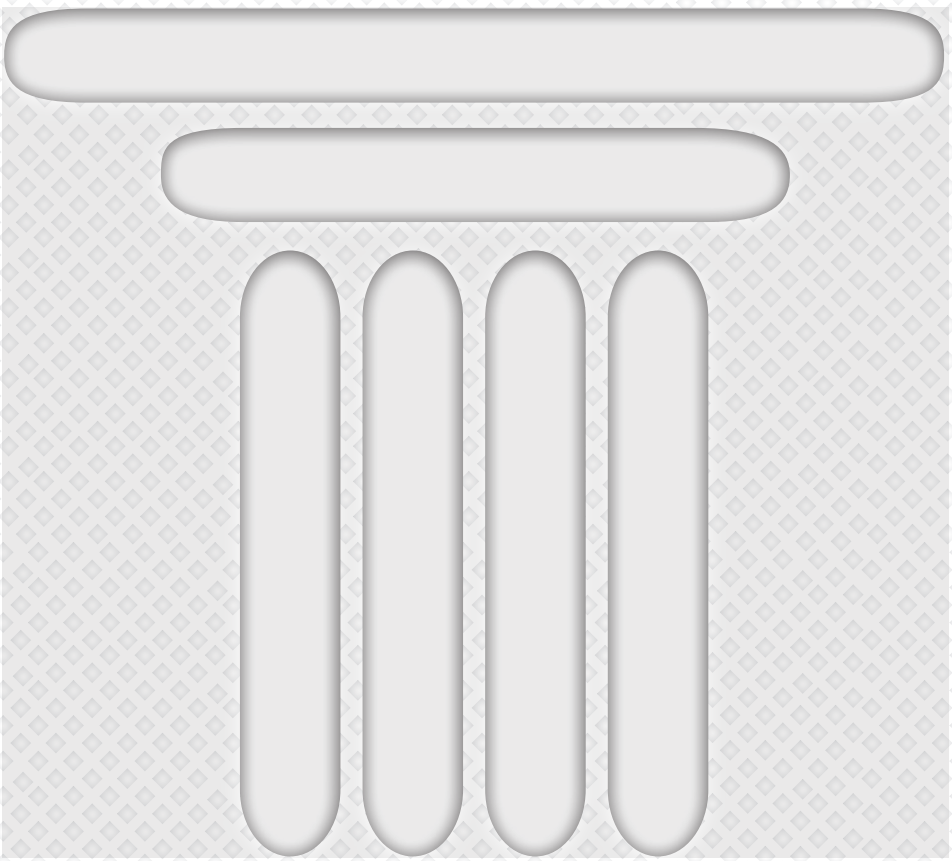
Samuel Neaman Institute
for National Policy Research

Samuel Neaman Institute
Annual Report
2016



Technion - Israel Institute of Technology

About the Samuel Neaman Institute

The Samuel Neaman Institute was established at the Technion in 1978 at the initiative of Mr. Samuel (Sam) Neaman and is working to instill his vision for the scientific-technological, economic, and social advancement of the State of Israel.

The Samuel Neaman Institute is a research institute that focuses on the formulation of national policy on science and technology, industry, schooling and higher education, physical infrastructure, environment and energy, and other topics of importance to Israel's national strength, to which the Institute makes a unique contribution. The Institute conducts policy studies and surveys, the conclusions and recommendations of which are used by decision-makers in the economy at all levels. Policy studies are conducted by selected teams from the academe, the Technion and other institutions, and industry. The teams are composed of the appropriate people, with skills and recognized achievements in their profession. In many cases, the work is conducted in cooperation with government offices, and in other cases the initiative comes from the Samuel Neaman Institute, without the direct involvement of a government ministry. On the subject of formulating a national policy concerning science, technology and higher education, the Samuel Neaman Institute is considered the leading policy research institute in Israel.

So far, the Samuel Neaman Institute has performed hundreds of policy studies and surveys that serve decision makers and professionals in the economy and the government. A review of the various projects performed at the Institute is presented on the Institute's Website. In addition, the Samuel Neaman Institute assists national projects, such as the clusters of the Ministry of Economy, MAGNET in the areas of nanotechnologies, communications, optics, medicine, chemistry, energy, and environment, and other projects of national and social importance. The Samuel Neaman Institute also organizes extensive seminars in the areas of interest it leads. **The Samuel Neaman Institute is headed by Professor Zehev Tadmor, and its Director General is Prof. Omri Rand.**

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Vision and Mission

Vision

To promote informed national decision-making in the State of Israel through research and analysis of well-established information.

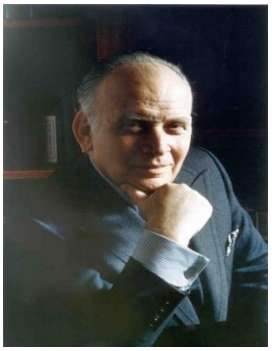
Mission

To be a leading research institute that identifies, synthesizes, and analyzes policy issues of national importance in the field of scientific-technological development, economics, and social issues in the State of Israel in order to encourage informed public debate to promote and assist in the decision-making process of the State of Israel.

The Institute focuses mainly on formulating national policy on the issues of science and technology, industry, schooling and higher education, physical infrastructure, environment and energy, and other matters of national importance in which the Institute makes a unique contribution.

Founder: Samuel (Sam) Neama

1913-2002



"I was born in Rosh-Pina in 1913 as the firstborn of my parents, Esther and Pinchas Neaman. My mother was also born in Rosh-Pina and my father was a pioneer who came to Israel with the Second Aliyah. My wanderings began when I was three years old." This is how Samuel (Sam) began his autobiographic story in the book *Israel in and Out*, published by the Ministry of Defense.

The book portrays the life story of Sam Neaman, describing his wanderings from Palestine to Lebanon, Syria, France and back to Israel – to the battlefield of the Second World War in the Middle East and Europe.

During his wanderings, Sam Neaman never forgot his homeland, to which he felt strongly attached. His love for the land of Israel and the state of Israel motivated him to establish the institute for policy research, the "Samuel Neaman Institute", in the Technion, which is considered a leading non-profit research center in Israel, with the goal of transferring academic knowledge, from the vast store accumulated in the State's academic institutions, to applicable routes concerned with delineating a national policy, thus connecting research and the academe with national decision makers.

Samuel Neaman died on November 13, 2002, at the age of 89. To the last, he stayed involved in the Institute's activities, contributing significantly through his ideas and bestowing his vision. He left behind him a life work that continues to breathe and live, and to stimulate Israel's leading researchers and its decision makers.

The Chairman:
Prof. Zehev Tadmor

This year, on 30.6.2017, Professor Omri Rand will retire from his position as Director of the Institute after five years of service. Prof. Moshe Sidi will replace him as of July 1, 2017.

Prof. Omri Rand served for two terms. The first, of three years, was extended by another two-year term. This is the maximum that the regulations of the Neaman Institute allow for the tenure of the Institute's Director.

On behalf of the entire Board of Directors, and in my capacity as Chairman, I would like to extend my thanks to Professor Rand for his important contributions to the Institute during his years of productive tenure in both administrative matters and academic content. Through his work, Prof. Rand left his mark on the Institute for many years to come. Professor Rand's tenure was a period of change and upheaval because of the frenzy and repeated changes in governmental decisions regarding commissioned policy studies, and yet Prof. Rand managed to lead the Institute safely along the bumpy road dictated by the government.

Moshe Sidi is a tenured professor at the Faculty of Electrical Engineering. For the past nine years, he has been a senior member of the Technion's Management team, serving as Vice President for Academic Affairs and Senior Vice President. Prof. Sidi's scientific work focuses on computer communication systems, with an emphasis on wireless networks and evaluating their effectiveness. I wish Prof. Sidi success in his new position. He brings with him extensive experience from his membership of the Technion Management team and a close acquaintance with national academic and scientific-technological policies.

Over the past year, the Institute has dealt with a range of important policy issues, which Prof. Rand will review in his introduction to the Annual Report. Here, in a few lines, I want to focus on three projects that the Institute has initiated over the past 15 years. All three have one common denominator: namely to try to look forward to medium range and long time-spans, and to ask ourselves the question where the State of Israel is heading?

The first project was "**Conditions for the Prosperity of the State of Israel"**, headed by Prof. Aviezer Ravitzky, which began in 2004. The team members were Prof. Shlomo Avineri, Prof. Ruth Gavison, Prof. Moshe Halbertal, and Prof. Zehev Tadmor. It was an ambitious project of contemplating some of the fundamental problems facing the State of Israel. Each of the participants took upon him/herself the task of writing an independent essay, analyzing the current reality, with the intention of presenting recommendations for the future, while focusing on the opportunities and dangers facing the Jewish people and the State of Israel. The complete results of the studies can be found in a series of thoughtful articles on the SNI website.

The second project is "**Israel 2028: Vision and Socio-Economic Strategy in a Global World**". The project was co-sponsored by the United States Commission for Science and Technology and the Neaman Institute, and was led by a steering committee headed by Mr. Eli Hurvitz and chaired by Mr. David Brodet. In addition to these, the Steering Committee included Mr. Eli Opper, Maj. Gen. (res.) Isaac Ben-Israel, Mr. Yoram Yahav, Prof. Joshua Jortner, Mr. Raphael Maor, Mr. David Miron-Wapner, Mr. Sami Friedrich, and Prof. Zehev Tadmor.

The vision was defined as follows:

By the year 2028, "the State of Israel will be one of the ten to fifteen most developed countries in the world in terms of per capita income. It will work for the benefit of all its citizens, for quality of life, and for the future of the young generation. There will be an open and enlightened society whose economy is free, balanced, and fair, based on its cultural, scientific, and technological ability, and on the wealth of Israel's human capital, innovation, and entrepreneurship. The State will achieve all this in cooperation with all its sectors, while maintaining its values and strengthening Israel's image in the eyes of its citizens, partners around the world, and the Jewish people".

It should be noted that this vision was defined in 2006. That is, five years before the great protest that swept over Israel in 2011 focused around social inequalities. The strategic plan was submitted to the Israeli government headed by Mr. Ehud Olmert, with the intention of adopting it as a national policy, but before it was implemented, the government fell. The summary document of the project, in Hebrew and English, can be downloaded from the Neaman Institute Website.

The third and most comprehensive project in the "trilogy" about the future of the State of Israel, which is currently being published, is "**Grand Strategy for the State of Israel: Studies and Directions**",

conceived and headed by Prof. Uzi Arad. The project was overseen by a **Forum** of 120 leading individuals from all walks of life in Israel. This project has just ended. The 400 page long Hebrew version has just been published and its English translation will be published in the coming months. It contains three major topics, each the results of intensive discussions by large working-groups of experts. “Grand Strategy an Outline for Regional and Global Policy and Arrangements” coordinated by Prof. Uzi Arad, Mr. Ephraim Halevi and Maj. Gen. (res.) David Ivry. “Science, Technology, and Education” coordinated by Prof. Yadin Dudai, Dr. Irit Edan, Prof. Dov Schwartz and Prof. Zehev Tadmor and “Economics, Society, and Government” coordinated by Prof. Avi Ben-Bassat and Mr. Dror Strum.

The first public press reference to this work was published by the journalist Ben Caspit in the Ma'ariv newspaper on March 19, 2017 Quote:

"*After the publication of my article [Ben Caspit], which drew quite a few responses, I discovered the "Forum for Israel's Grand Strategy". It turns out that for several years the best experts and brains have been at work on the raw idea I expressed somewhat cumbersomely in that article. An elite group of 120 scientists, professors, and experts in various fields, the pinnacle of the Israeli intelligentsia, has already been meeting for three years, working on a founding document whose essence is to formulate a Grand Strategy for the State of Israel. The founder and initiator of the idea is the feverishly working mind of Prof. Uzi Arad, the former national security adviser and head of the NSC law Israel needs a grand strategy. This is understood by almost everyone. Now, this document already exists. Uzi Arad's group have created an impressive, comprehensive, detailed, reasoned, and brilliant document. It will be published soon.*

One can only hope that the content of this recent document dealing with the future of the state will be adopted, in whole or in part, by the decision makers".

The Director General: Prof. Omri Rand

The activity of the Samuel Neaman Institute in the past year has yielded many research products and policy recommendations in various fields. The achievements of the Institute during this period have once again demonstrated its uniqueness as an Israeli think tank led by experts capable of investigating, discussing, and formulating an informed policy, on a wide range of issues. By virtue of the fact that the Samuel Neaman Institute has championed the principles of impartial and non-interest research, it attracts many organizations and institutions that seek to provide a standard for the research and objective analysis of various subjects and their products.

The independence of the Samuel Neaman Institute in choosing a variety of research topics, in combination with its action principles of excellence, leadership at the national level, and full transparency of all its outputs, attracts to the Institute activities from both governmental and private institutions and organizations. The Samuel Neaman Institute also succeeds in recruiting leading figures in their fields in Israel, who bring with them extensive experience and a broad systemic vision. As a result, these leading researchers are able to formulate national policy recommendations that are accepted and valued by all stakeholders.

The researchers at the Samuel Neaman Institute include a permanent staff, some faculty members in academia in Israel, as well as former and current industry executives who devote a significant portion of their time and effort to the Institute's activity. The researchers are successfully competing for government grants and are winning government tenders; they receive research grants from non-governmental foundations and organizations, and their requests for participation in the national policy studies of the European Community are accepted.

The Samuel Neaman Institute's studies are extensively cited in all media outlets: reports, opinion articles, Knesset committee resolutions, newspaper articles, on the radio and television, and on the Internet. In the past year, especially, the Institute's researchers

have been widely involved in the publication of opinion columns in the print and electronic media, which received considerable attention.

The Samuel Neaman Institute today covers a wide range of topics, including national policy research in the field of science and technology, which include indicators for innovation in Israel and international comparisons, R&D output in Israel, innovation in different sectors, learning infrastructure, human resources training, and human capital development in various fields in Israel, the promotion of R&D and innovation in the periphery, Israel's external relations in R&D at the national and institutional level, academic ties between Israel and the US, a look at the future of Israel's universities and their research status, and more.

In the field of environmental protection, the researchers dealt with the issue of recording GHG emissions in Israel, global assessments of emissions from offshore drilling facilities, and the preparation of a basic calculation for collecting business waste fees.

The Center for Industrial Excellence dealt with the issues of formulating a metropolitan plan for the north, a master plan for the establishment of an industrial park in Shfar'am, innovative research on the possibility of exploiting insects for human benefit, formulating national policy for advanced production, investigating the success and failure factors of leading companies in Israel, and the integration of the Arab population in industry and the economy.

In the field of energy, the Institute held several expert forums on topics such as: "Energy Efficiency in Israel", "Energy Security in Israel", and "Steps for Implementation after the Approval of the Gas Layout in Israel".

This year, the Project of "Ramzor North" continued to provide a computerized infrastructure for high-level mathematics teachers, an evaluation of the Technion's excellence program was conducted, and a report was compiled on models for a budget for international graduate students at the Technion.

The real estate policy in Israel and housing prices have also been addressed and the Institute's involvement on this subject is gaining momentum.

These issues and many other important issues are described in this report.

This annual report presents, at the level of the headlines only, the various activities at the Samuel Neaman Institute, and I hope that it will serve only as a reference, while the studies are accessible in full

on the Institute's Website. Also, I hope that the Institute will continue to attract senior researchers who will continue to find in it the infrastructure and support they need to conduct policy studies.

At the end of June I will be completing my term as Director General of the Samuel Neaman Institute, in which capacity I have served for the last five years. I would like to thank all the staff of the Samuel Neaman Institute for their full cooperation and the excellent work relations that characterized my entire term of office. There is no doubt in my mind that the atmosphere of work and the sense of creation have helped us to navigate in this period, with all the dramatic changes that occurred in our work environment. I would also like to express my hope for the continued success of this Institute and wish success to my successor, Prof. Moshe Sidi.

Research Activities at the Samuel Neaman Institute

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A. Wheels of Life

A.1 Israeli Innovation - Bright Side & Dark Side

Prof. Shlomo Maital & Tsipy Buchnik

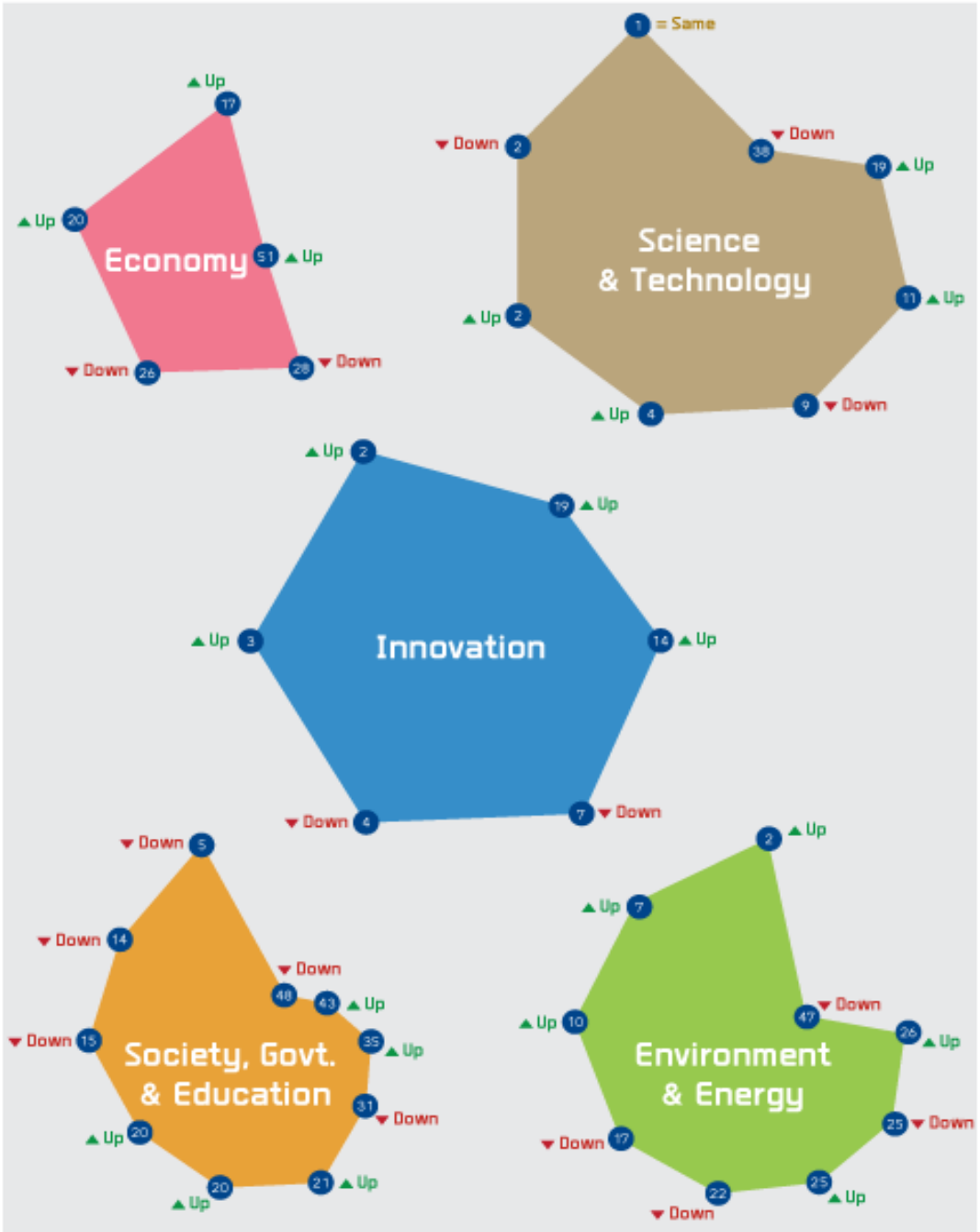
The "Wheels of Life" project was launched in 2013, in order to compare Israel's performance with the performance of other countries in five main dimensions of Israel's society: economics, innovation, science and technology, society-governance- education, environment, and energy. The data source used for comparative analysis is the World Competitiveness Yearbook of the IMD School of Management, a leading business school in Lausanne, Switzerland, which presents data on a wide range of global competitiveness variables in 60 countries.

Each such dimension was defined in a "Wheel", which analyzes Israel in relation to the other countries, where 5-10 indicators are presented. In each indicator, Israel is ranked among 60 countries that compete in global markets. The indicators were selected by the research teams. A high rating (No. 1) places the indicator close to the circumference of the wheel. A low rating (No. 60) places the indicator at the center of the wheel. The painted area within the wheel shows the general performance of Israel in the same dimension. A large area within the wheel presents Israel's general performance on that dimension. A large area attests to Israel's excellence; a small area indicates Israel's backwardness. Some of the indicators are objective, for example, per capita GDP, and some are subjective by nature, for example, "science education in schools is sufficiently emphasized" on a scale from 1 to 5, where 5 means "absolutely agree". **The main conclusion of these analyses was that Israel's huge achievements in the field of innovation, science, and technology are not expressed at all in the field of economy, where Israel is lagging behind.**

The continuation of the Wheels of Life for 2016, presents relevant publications that the Samuel Neaman Institute published during the course of 2016 on the five topics in recent years. All Neaman Institute studies can be found at the Samuel Neaman Institute website: www.neaman.org.il

SNI Israel's "Wheels of Life" 2016

Samuel Neaman Institute for National Policy Research



Source: International Institute for Management Development. (June, 2016) IMD World Competitiveness Yearbook 2016. Lausanne, Switzerland

Science and Technology

As in innovation, Israel is also among the world's leaders in many scientific and technological indices. An important aspect of science and technology in Israel is cooperation with the US. Studies conducted by the Samuel Neaman Institute in 2016 relating to science and technology include:

"Academic Relations between Israel and the US" focuses on academic relations between Israel and the US. Among the topics examined are quantitative trends in joint research outputs, leading areas in joint research outputs, leading institutions in joint research outputs, and more.

"Holistic Assessment of Science Communication according to Different Stakeholders' Views: Scientists, Teachers, Students, Pupils and the Public". This study analyzes holistically the attitudes and rankings of the importance of scientific communication to scientific platforms and the sharing of scientific knowledge among different audiences.

"Towards Evidence-Based Policy in the Field of Science Communication in Israel". The study quantified the coverage of science subjects and described the ways in which science is presented to the public, the common fields of research, and the differences in science coverage between different sources.

"Sustainable Development of Marine Agriculture in the Mediterranean Sea of Israel" details the general principles of government policy in the field of agriculture existing in the Mediterranean Sea in Israel.

"Dual Use of Space and Satellite Technologies" reviews the dual purpose use status in Israel and around the world, in the areas of interest of the State of Israel, and includes recommendations for improving the manner of work in order to improve the use of existing budgetary resources.

"Israel's Research Status: What Do the Indicators Really Describe?" examines the quantitative assessment of the quality of research in Israel.

SNI Israel's "Wheels of Life" 2016

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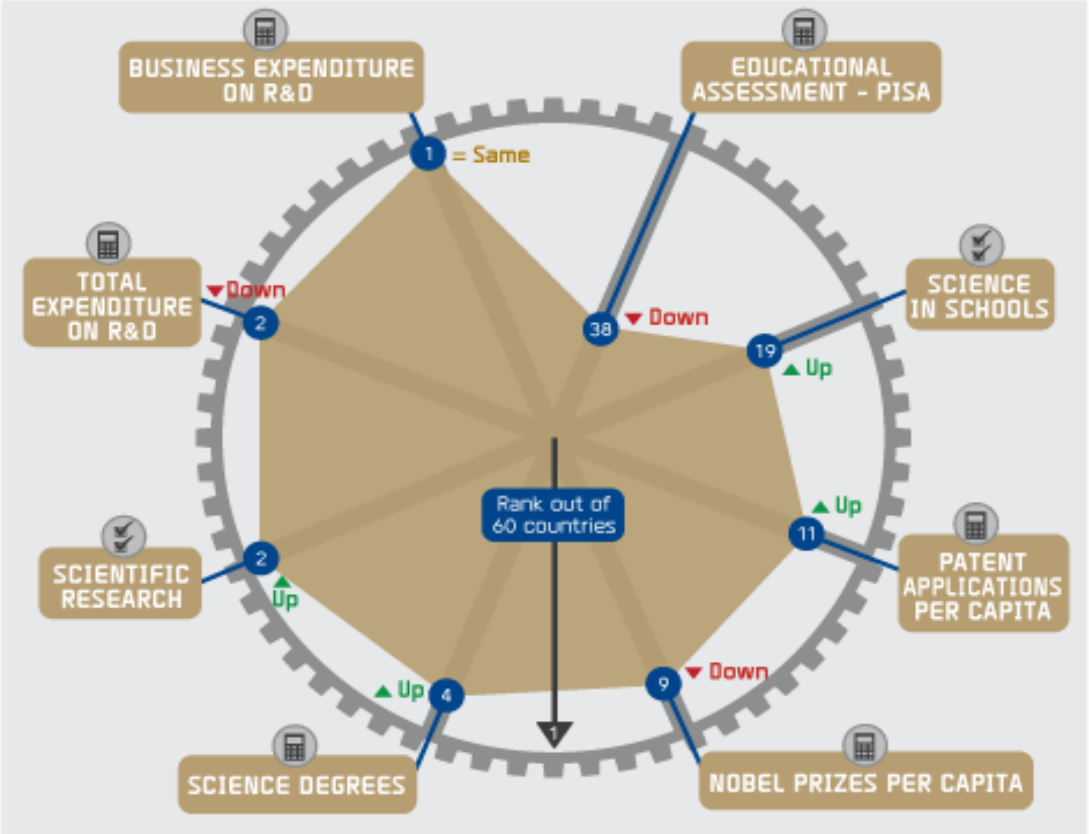


Science & Technology

BUSINESS EXPENDITURE ON R&D: Percentage of GDP
Ranked 1st - Unchanged compared to 2009

TOTAL EXPENDITURE ON R&D: Percentage of GDP
Ranked 2nd place - Drop of 2 places compared to 2009

SCIENTIFIC RESEARCH: Scientific research (public and private)
Ranked 2nd place - Improvement of 26 places compared to 2009

SCIENCE DEGREES: Percentage of total first university degrees in science and engineering
Ranked 4th place - Improvement of 5 places compared to 2009

NOBEL PRIZES PER CAPITA: Awarded in physics, chemistry, physiology or medicine and economics since 1950 per million people
Ranked 9th place - Drop of 2 places compared to 2009

PATENT APPLICATIONS PER CAPITA: Number of applications filed by applicant's origin, per 100,000 inhabitants
Ranked 11th place - Improvement of 8 places compared to 2009

SCIENCE IN SCHOOLS: Science in schools
Ranked 19th place - Improvement of 23 places compared to 2009

EDUCATIONAL ASSESSMENT - PISA: PISA survey of 15-year olds
Ranked 38th place - Drop of 3 places compared to 2009

Explanations:

1 Specifies the best position

For example: 1 - Israel ranks 1 out of 60 countries

Change from 2009:
▲ Up = Same ▼ Down

- Survey data

- Hard data

Source: International Institute for Management Development. (June, 2016) IMD World Competitiveness Yearbook 2016. Lausanne, Switzerland

Design: AdvA studio

Economics

The Wheels of Life of Samuel Neaman Institute show that for years Israel has not exploited the full potential of its excellence and leadership in science, technology, and innovation in terms of economic advantages. The Samuel Neaman Institute's studies of 2016, which shed light on the problem, are as follows.

"The carob tree: A systemic, revolutionary and radical solution to the pension crisis" is a report that addresses the global pension crisis, characterizes the root of the problem and its causes it in Israel and abroad, and offers a long-term radical solution, feasible in Israel and other Western countries, which could lead to accelerated economic growth.

"Surplus agricultural produce in the field (fruits and vegetables) and their optimal use" focuses on the production of surplus fruit and vegetables, and proposes policy measures to reduce these surpluses and make their use more efficient.

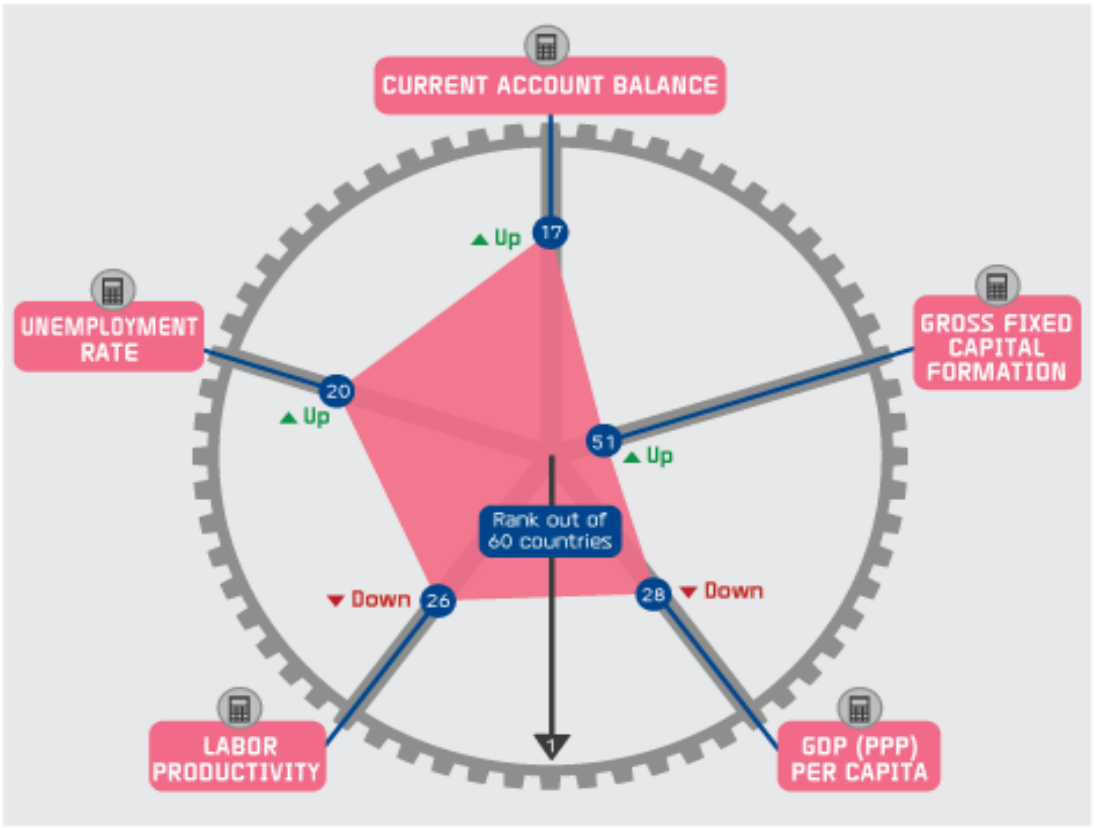
"The oil and gas sector in Israel: Economic and geopolitical aspects" reviews the oil and gas sector in Israel as of the beginning of 2016, and estimates the effect of the decline in oil prices on the Israeli economy. The study suggests ways to help exploit gas discoveries in Israel to maximize economic and geopolitical benefits.

"Assessing the economic damage of the fuel leak at the Beer Ora Junction 3/12/14: Economic Opinion" presents the full picture of the damage caused as a result of the event, by using a model developed by the US Environmental Protection Agency.

"The assessment of the benefits to the economy from transportation tunnels: The Carmel Tunnels case study" provides an economic assessment of the use of the transportation tunnels in the Carmel.

SNI Israel's "Wheels of Life" 2016

Samuel Neaman Institute for National Policy Research



Economy

CURRENT ACCOUNT BALANCE:
Ranked 17th place - Improvement of 5 places compared to 2009
Percentage of GDP

UNEMPLOYMENT RATE:
Ranked 20th place - Improvement of 5 places compared to 2009
Percentage of labor force

LABOR PRODUCTIVITY:
Ranked 26th place - Drop of 3 places compared to 2009
Estimates: GDP (PPP) per person employed per hour, US$

GDP (PPP) PER CAPITA:
Ranked 28th place - Drop of 1 place compared to 2009
Estimates; US$ per capita at purchasing power parity

GROSS FIXED CAPITAL FORMATION:
Ranked 51st place - Improvement of 3 places compared to 2009
Percentage of GDP

Explanations:

1 Specifies the best position

For example: 17 - Israel ranks 17 out of 60 countries

Change from 2009:
▲ Up = Same ▼ Down

- Survey data

- Hard data

*PPP - Purchasing Power Parity

Source: International Institute for Management Development. (June, 2016) IMD World Competitiveness Yearbook 2016. Lausanne, Switzerland

Design: Adva studio

Innovation

The Innovation Wheel shows that Israel is a leader and is one of the leaders on key innovation indices, and therefore the innovation area in the Wheel is quite large. Field-related studies conducted during 2016 include the following.

"R&D Activity, Infrastructure and Manpower in the Field of Civil Space in Industry, Academe, and the Education System in Israel" presenting detailed data on the space industry, in terms of manpower, R&D expenditure, mapping of knowledge centers, R&D output, and education in the field of space.

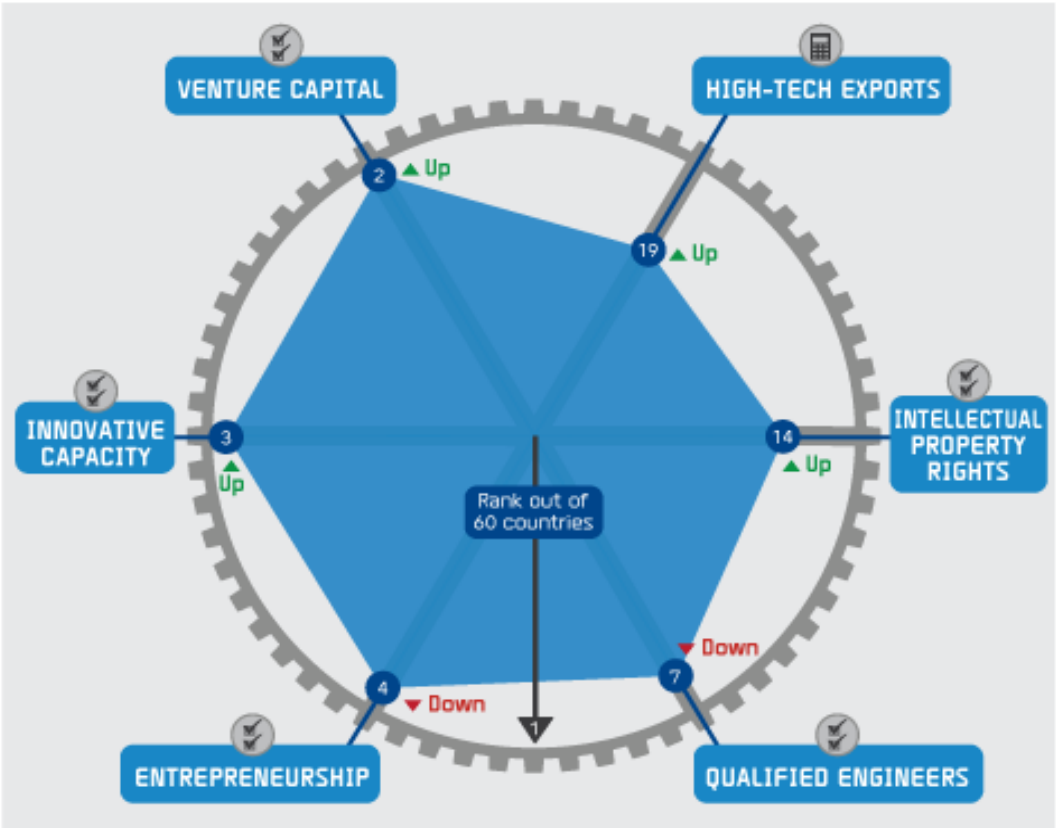
"A Survey to Examine the Difficulties in Nanotechnology Transfer from the Academe to Industry" was aimed to examine obstacles in the transfer of technology from the nanotechnology fields at the academe to the industry.

"Mapping Research and Innovation in the State of Israel" is the result of a unique collaboration between the Samuel Neaman Institute and the Science Policy Division of UNESCO, and was commissioned by the Israel Academy of Sciences and Humanities.

"Israelis in Berlin: A Community in Progress" examines the Israeli entrepreneur community in Berlin: the motives for Israeli emigration to Berlin in light of the limitations of the language and the political history of Israel and Germany, the establishment of community life of Israeli immigrants in Berlin, and how Israeli immigrants perceive their life in Berlin.

SNI Israel's "Wheels of Life" 2016

Samuel Neaman Institute for National Policy Research



Innovation

VENTURE CAPITAL: Venture capital
Ranked 2nd place - Improvement of 1 places compared to 2009

INNOVATIVE CAPACITY: Innovative capacity of firms (to generate new products, processes and/or services)
Ranked 3rd place - Improvement of 4 places compared to 2009

ENTREPRENEURSHIP: Entrepreneurship of managers
Ranked 4th place - Drop of 3 places compared to 2009

QUALIFIED ENGINEERS: Qualified engineers
Ranked 7th place - Drop of 5 places compared to 2009

INTELLECTUAL PROPERTY RIGHTS: Intellectual property rights
Ranked 14th place - Improvement of 16 places compared to 2009

HIGH-TECH EXPORTS: Percentage of manufactured exports
Ranked 19th place - Improvement of 18 places compared to 2009

Explanations:

1 Specifies the best position

For example: 2 - Israel ranks 2 out of 60 countries

Change from 2009:
▲ Up = Same ▼ Down

- Survey data

- Hard data

Source: International Institute for Management Development. (June, 2016) IMD World Competitiveness Yearbook 2016. Lausanne, Switzerland

Design: AdvA studio

Society, Government and Education

The Samuel Neaman Institute's research focuses not only on technological issues, but also on their social impact. Studies conducted in 2016 in this area include the following.

"How to draw Haredim to science and technology professions?" suggests ways to integrate the Ultra-Orthodox into science and technology fields in Israel.

"Traffic Light to the North" is a three-year program designed to improve the extreme shortage of math teachers at the 5-point level. The findings were presented to the Trump Foundation and to the Northern District of the Ministry of Education.

"Mass Teaching Online: Disruptive Innovation at Universities?" The purpose of the study is to examine and clarify various aspects of the Massive Open Online Courses (MOOCs) that have developed in recent years.

"Looking at the Future of Universities: Is the Revolution Beginning?" deals with the future of universities, and examines the impact of current processes on the future of research universities. A revolution may be followed by the universities' need to reinvent themselves.

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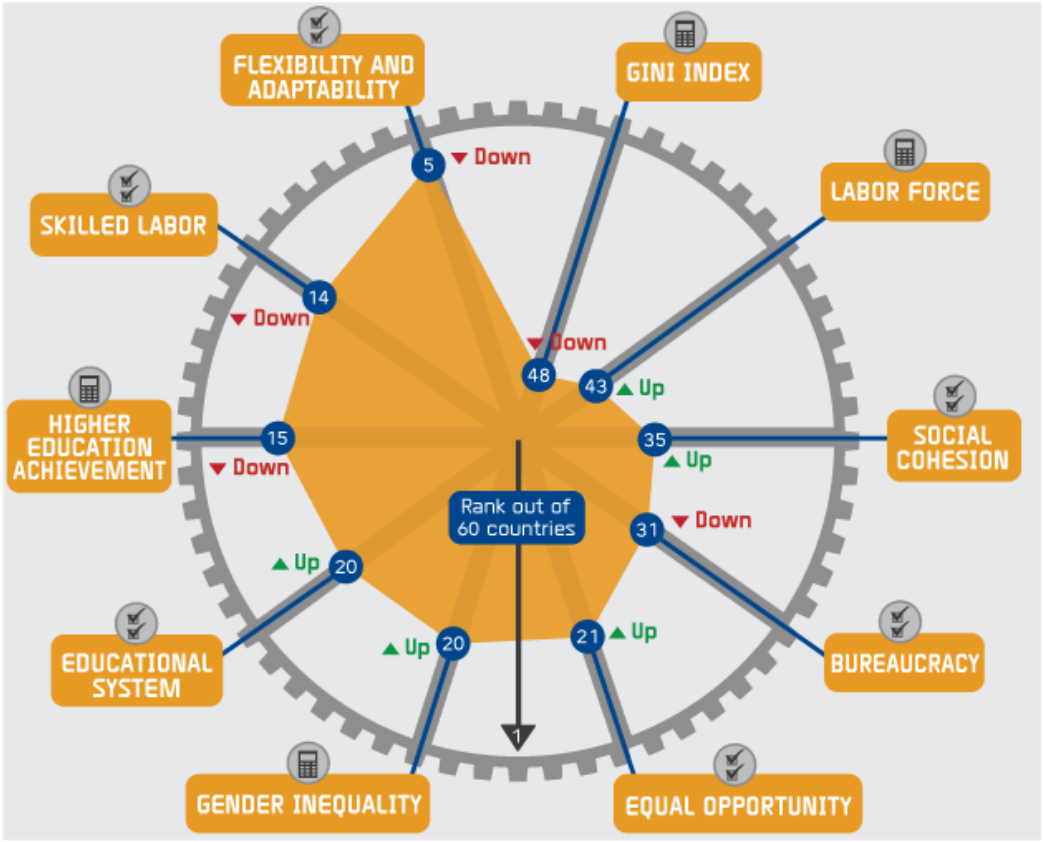

Society, Govt. & Education

FLEXIBILITY AND ADAPTABILITY: Flexibility and adaptability of people
Ranked 5th place - Drop of 3 places compared to 2009

SKILLED LABOR: Skilled labor
Ranked 14th place - Drop of 6 places compared to 2009

HIGHER EDUCATION ACHIEVEMENT: Percentage of population that has attained at least tertiary education for persons 25-34
Ranked 15th place - Drop of 9 places compared to 2009

EDUCATIONAL SYSTEM: The educational system
Ranked 20th place - Improvement of 13 places compared to 2009

GENDER INEQUALITY: Gender Inequality Index (UNDP)
Ranked 20th place - Improvement of 4 places compared to 2013

EQUAL OPPORTUNITY: Equal opportunity legislation in your economy
Ranked 21st place - Improvement of 8 places compared to 2009

BUREAUCRACY: Bureaucracy
Ranked 31th place - Drop of 2 places compared to 2009

SOCIAL COHESION: Social cohesion
Ranked 35nd place - Improvement of 6 places compared to 2009

LABOR FORCE: Employed and registered unemployed (millions)
Ranked 43nd place - Improvement of 11 places compared to 2009

GINI INDEX: Equal distribution of income scale
Ranked 48th place - Drop of 9 places compared to 2013

Explanations:

1 Specifies the best position

For example: 5 - Israel ranks 5 out of 60 countries

Change from 2009:
▲ Up = Same ▼ Down

- Survey data

- Hard data

Source: International Institute for Management Development. (June, 2016) IMD World Competitiveness Yearbook 2016. Lausanne, Switzerland

Design: AdvA studio

Quality of the Environment and Energy

In the field of Energy and the Environment, the Samuel Neaman Institute has extensive activities both in research and in the field of conferences and forums. For example, the Samuel Neaman Institute leads the Energy Forum, which brings together leading experts in the fields of government, the academe, and the public, with the goal of discussing crucial issues in the field of energy. Each forum session includes reporting by the experts on a specific topic, suggesting counseling and opinions on the subject in Israel.

In 2016, the following forums were held:

Energy Forum No. 36: Energy Efficiency in Israel: Upgrading Energy Systems in Factories and Organizations.

Energy Forum No. 37: Energy Security in Israel.

Energy Forum No. 38: Implementation Measures after Approval of the Gas Layout in Israel.

Other environmental and energy activities during 2016 included:

"Greenhouse Gas Reporting and Registration System in Israel: Summary of 2015 Reports". The staff of the Samuel Neaman Institute has developed a special tool that is used to quantify greenhouse gas emissions and document the emission inventories of the reporting entity.

"Renewable Energy Industry and Energy Efficiency in Israel: Updated Status and Policy Recommendations for Leveraging R&D and the Israeli Industry", a report that provides a rating of Israel's status and position in the field.

"National Priorities in the Field of Environmental Quality: Tenth Position Paper - Israel's Innovative Agricultural Technology Industry, 2016". This document, the tenth in a series of national priority documents in the field of environmental protection, concentrates up-to-date material and brings the subject of aggrotech technologies to the public agenda.

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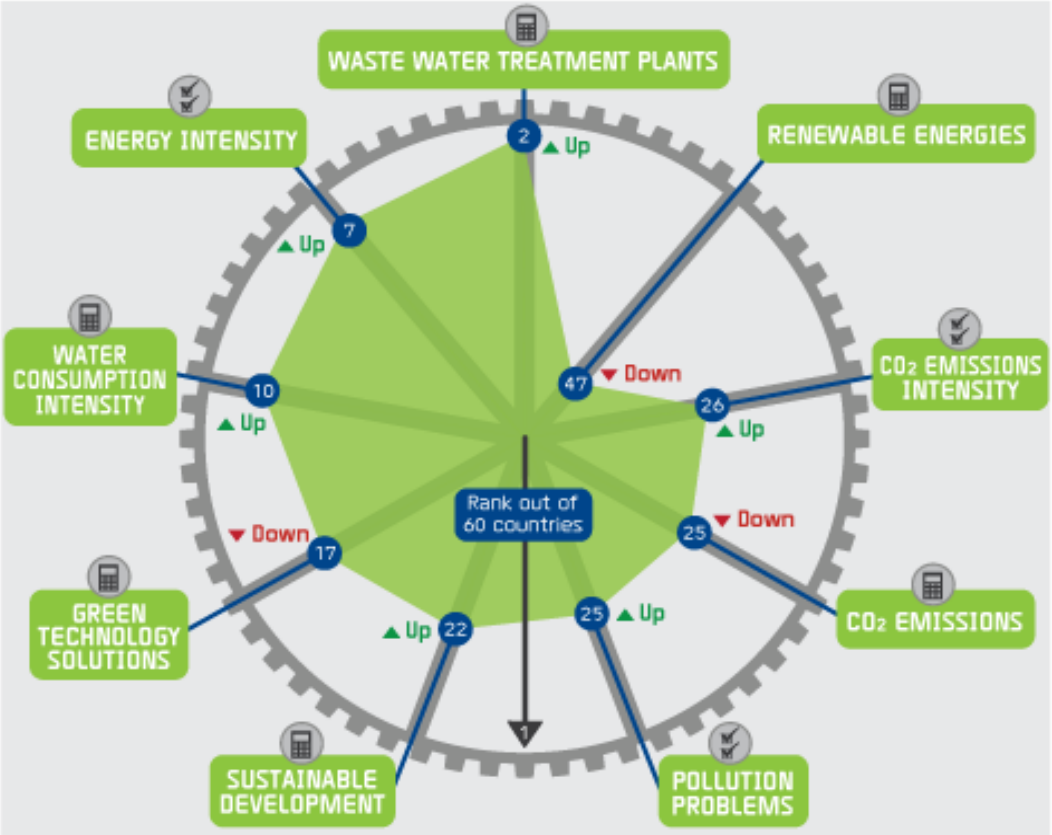

Environment & Energy

WASTE WATER TREATMENT PLANTS: Percentage of population served
Ranked 2nd place - Improvement of 2 places compared to 2013

ENERGY INTENSITY: Commercial energy consumed
Ranked 7th place - Improvement of 6 places compared to 2009

WATER CONSUMPTION INTENSITY: Water withdrawal for each 1000 US$ of GDP in cubic meters
Ranked 10th place - Improvement of 6 places compared to 2009

GREEN TECHNOLOGY SOLUTIONS: Renewable technologies (solar energy, wind turbines, etc.)
Ranked 17th place - Drop of 2 places compared to 2013

SUSTAINABLE DEVELOPMENT: Sustainable developmentfor each dollar of GDP in kilojoules
Ranked 22nd place - Improvement of 2 places compared to 2009

POLLUTION PROBLEMS: Pollution problems
Ranked 25th place - Improvement of 1 place compared to 2009

CO_2 EMISSIONS: Metric tons of carbon dioxide
Ranked 25th place - Drop of 3 places compared to 2009

CO_2 EMISSIONS INTENSITY: CO_2 industrial emissions in metric tons per one million US$ of GDP
Ranked 26th place - Improvement of 2 places compared to 2009

RENEWABLE ENERGIES: Share of renewables in total energy requirements, %
Ranked 47th place - Drop of 1 place compared to 2009

Explanations:

1 Specifies the best position

For example: 2 - Israel ranks 2 out of 60 countries

Change from 2009:
▲Up =Same ▼Down

- Survey data

- Hard data

Source: International Institute for Management Development, (June, 2016) IMD World Competitiveness Yearbook 2016. Lausanne, Switzerland

Design: AdvA studio

B. Science, Technology, Industry, Economics and Human Capital

B.1 Indices for Science, Technology, and Innovation in Israel: an International Comparison

Dr. Daphne Getz, Prof. Dan Peled, Tsipy Buchnik, Ilia Zatcovetsky

At the beginning of 2000, the Samuel Neaman Institute identified the need to establish an infrastructure for advancing a systematic and ongoing process of forming a national policy on research, technology, and innovativeness. Therefore, the Neaman Institute initiated and established a long-term plan aimed at improving the understanding of the R&D system and innovation through an infrastructure of data and metrics, the analysis of trends over time, and international comparison. The infrastructure allows us to answer the question of how the processes related to the development of science, technology, and innovation contribute to increasing knowledge, increased productivity, improved economic performance, professional employment, sustainable development, and social welfare. The fifth report in this series was published in 2016, presenting a host of indicators of science, technology, and innovation in Israel. The report is designed to provide diverse and useful information, through different perspectives on these issues. The report is divided into six main themes: national expenditure on civilian R&D, the business sector, the government sector, higher education sector, R&D indicators by gender distribution and spatial distribution, and a chapter on integrated international indexes. This program constitutes a source of knowledge and provides policymakers with a broad and up-to-date picture of the state of science, technology, and innovation in Israel. Publications are written in a format similar to the brochures published by agencies of other countries and are of great interest and are being used in various studies carried out at the Neaman Institute and by other organizations in Israel. In 2016, the Neaman Institute won the tender of the Ministry of Science on Science and Technology Indices, and the next report will be published within this framework.

B.2 R&D Outputs in Israel: Quality Characteristics of Distinct Inventions

Dr. Eran Leck, Dr. Daphne Getz, Bella Zalmanovich, Tsipy Buchnik, Golan Tamir

In the past decade, substantial methodological progress has been made in the field of patent statistics. This progress can be attributed mainly to the extensive research activity conducted in universities and international research organizations. The outcome of this innovative research activity has resulted in the development of new tools that vastly improve data retrieval, data segmentation, and data analysis capabilities. These provide a better understanding of the characteristics of inventive activity.

The main goal of this study is to provide decision makers with an in-depth picture of the scope and characteristics of Israeli inventive activity during the last two decades and to examine Israel's position in the inventive arena in relation to OECD countries. In addition to the quantitative description and analysis of Israel's inventive activity through the "Distinct inventions" index developed in the previous study, the present research focuses on the analysis of quality indices, aimed at providing an evaluation of the economic and technological value of Israeli patents in an international comparative perspective.

B.3 R&D Outputs in Israel: International Comparison of Scientific Publications, 2000-2014

Dr. Daphne Getz, Dr. Noa Lavid, Ella Barzani

This is the third in a series of studies. The first study was conducted in 2014, The second part was conducted in 2015-2016 and was based on data from Elsevier's SciVal and Scopus databases.

The study's findings are: International comparison indicates that Israel's ranking continues a downward trend in various quantitative indices: number of publications, the number of publications per capita, its share in global and OECD publishing, and its growth rate. This decrease stems from both Israel's internal factors, such as low growth rate that actually leads to stagnation in the number of publications and in particular in the number of publications per capita and global factors, such as the global steep growth, in particular in developing countries.

Israel shows an increase in all the indices of scientific impact (citation indices); however, this increase is not in pace with the rate of increase in other countries, and therefore, Israel's ranking among the countries is descending.

In comparison to the world, Israel gives higher priority to the areas of Mathematics, Psychology, and Neuroscience and lower priority to those of Energy, Environment studies, Engineering, Chemical Engineering, and Materials. Regarding the overall average of citations, in most areas of science Israel's ranking is not high, although the analysis of individual impact components shows that Israel displays excellence in a considerable portion of the subjects. Computer science was found to be the most excellent area in Israel.

A review of publications in the Middle East countries shows a clear trend of narrowing gaps between Israel and its neighbors in both the number of publications and indices of scientific impact, although today most of these gaps remain wide. This trend is steeply increasing and encompasses many different areas.

Also, an analysis of the Academy-Industry Relations in computer science in Israel was conducted.

B.4 RISIS Project – WP-9: Geocoding and Geoclustering of STI Datasets

Dr. Daphne Getz, Dr. Emil Israel, Dr. Eran Leck

RISIS (Research Infrastructure for Science and Innovation Policy Studies) is a European Consortium that brings together several research institutions. The aim of the project is to build an accessible data infrastructure for research on scientific activities, technology, and innovation. In this project, the Samuel Neaman Institute leads Work Package No. 9 (WP9). The aim of this package is to develop geographical clustering methods that detect concentrations of spatial activity in the fields of science, technology, and innovation.

WP9 has three main objectives: to compare different approaches to spatial clustering; to propose a strategy of implementation that will integrate one or several clustering methods within RISIS datasets; and finally to develop and implement the selected method (or methods) in several RISIS primary datasets.

In 2016, SNI's activities within WP9 included writing technical reports, participation in the annual RISIS conference in Amsterdam, and organizing a summer school on geocoding and geo-clustering methods in Paris.

B.5 Innovation in the ICT Sector: A Case Study of Israel

Dr. Daphne Getz, Eliezer Shein

On Tuesday, 17 May, 2016, personnel from the World Bank led by Anat Lewin (WB strategic plan for the ICT sector and current projects in the developing world) gave a short presentation at Tel Aviv University, describing the ICT sector in Israel. Anat also described the lessons learnt from it. The presentation elaborated on a case study and its main points, based on a report prepared by the Samuel Neaman Institute as a background paper for the World Bank development report 2016 (WDR 2016) Digital Dividends.

Ms. Indira Santos (Ph.D.), Senior Economist in the Social Protection and Labor Group, gave the WDR presentation. Ms. Santos presented the various issues involved in the acquisition of Digital Dividends by developing countries.

Dr. Daphne Getz and Eliezer Shein presented the Israeli case study. They showed that developing countries could build their own ICT ecosystem, given that the required resources are invested in the education system.

The purpose of the report is to describe the environment for Internet entrepreneurship in Israel and analyze how government policies have contributed to the development of a vibrant ecosystem that spurred a high rate of technological innovation and entrepreneurship. The objective is to draw conclusions from Israel's growth experience that can be relevant for developing countries.

B.6 EduNano: Learning Infrastructures in the Field of Nanotechnology –Tempus

Dr. Daphne Getz, Vered Gilad

The industry in the nanotechnology area needs to be involved in defining the knowledge and skills required of nanotechnology graduates so that they can integrate better into the industry and meet both current and future requirements that are critical to the success of Israel in this field.

The EduNano project is part of TEMPUS, an EU program that supports the modernization of higher education. SNI participates in the project together with the Nano centers of Tel Aviv University, the Hebrew University, Ben-Gurion University, Bar-Ilan University, Weizmann Institute of Science, and Elbit Systems. In addition, the Technical University of Sofia in Bulgaria, the Polytechnic Institute of Turin in Italy, and the Grenoble Institute of Technology in France participate in the project.

As part of the project, infrastructures for online learning and courses were developed in the field of nanotechnology for students toward master's degree and training courses for the industry.

In 2016, SNI conducted a second survey among industrial companies and academic researchers in the field of nanotechnology, the goal of which was to assess their needs regarding the courses that were developed in the project. An analysis of the data collected in the survey was presented in a project team meeting that was held in Torino on September 2016.

B.7 Training of Personnel and Development of Human Capital in the Field of the Cyber Defense of Israel

Dr. Daphne Getz, Oshrat Katz Shacham, Eliezer Shein, Ella Barzani, Dr. Noa Lavid, Dr. Eran Leck

The study was commissioned by the National Cyber Headquarters at the Prime Minister's Office and funded jointly by the Cyber Headquarters and SNI. The purpose of the research is to describe the current state of academic research and human capital in the field of cyber defense, analyze major issues necessary for setting policies, and lay the foundation of data and indicators that will allow measurement over time, as well as to evaluate the outputs of the headquarters' activity and its effect on the growth of academic research as well as the needs in the area of human capital.

During last year, the Samuel Neaman Institute submitted a final report to the National Cyber Headquarters which included two main chapters. The first chapter deals with a snapshot of the human capital in the cyber defense industry in Israel. The chapter contains interviews with representatives of industries in the field of cyber defense in Israel, and questionnaires were administered to workers engaged in the development of technological solutions in the field of cyber protection. The results of these questionnaires and interviews shed light on the needs of the industry in the area of human capital, the characteristics of the existing human capital, and the gaps between them.

The second chapter deals with the state of research and training in the field of cyber defense in the Israeli academe in recent years and prepares an infrastructure for evaluating the development of academic research in light of Cyber Headquarters' activity in the coming years.

The data about academic research, the needs of the industry, and the characteristics of the human capital in the field of cyber protection did not exist until now. The data gathered in the study would help the National Cyber Headquarters to formulate the desired directions of action for strengthening Israel's leadership position in cyber protection, by positioning the Israeli academe as a leader and promoting programs of human capital empowerment.

B.8 Promoting R&D and Innovation in Israel's Periphery

Dr. Daphne Getz, Dr. Emil Israel, Dr. Eyal Salinger, Dr. Tzameret Rubin, Oshrat Katz Shacham, Tamar Dayan, Tsipy Buchnik, Ella Barzani

The study, commissioned by the Israel National Council for Research and Development (MOLMOP) at the Ministry of Science, Technology and Space, was aimed at providing decision makers with an updated account of the innovation and R&D activities in Israel's peripheral areas. The study, completed in 2016, identified the potential of Israel's peripheral areas in terms of stimulating innovative activities, while providing an understanding of the challenges and barriers.

The theory of the geography of innovation indicates that peripheral regions suffer from structural disadvantage, as the emergence of innovation tends to diminish with the distance from metropolitan areas. A series of indicators, variables, and models presented in the study confirm the existence of this tendency in Israel. Despite the gap, there is an increase in innovative activity in the periphery, in particular in the fields of high technology. This could be attributed to government policy, which in recent years has increased its support of innovative activity in the periphery. However, it is not clear whether sufficient support is given, in light of the needs and limitations of the periphery, as shown by the study.

The study recommends possible policy directions, aimed mainly at establishing a regional innovation authority that will be responsible for forming and updating an innovation database focusing on the periphery. This database is necessary for policy-making outlined by such a regional authority and its update.

B.9 Survey of Israel's R&D Foreign Relations at the National and Institutional Levels

Dr. Daphne Getz, Oshrat Katz Shacham, Eliezer Shein, Bahina Eidelman, Ella Barzani, Golan Tamir

In 2014, the Neaman Institute completed the first phase of the survey of Israel's foreign relations in R&D at the national and institutional level. As part of this stage, a comprehensive survey was conducted, and a computerized database was established. The database is comprised of considerable amount of information about the scientific national and institutional foreign relations of the State of Israel. In 2016, the second phase of the project was conducted, which included supplements and extensions of the activity performed in the first phase. The third phase is expected to take place during 2017, in which all data in the database will be updated. Upon completion of the third phase, the complete and updated computerized database will serve as a tool to help design policies regarding Israel's scientific foreign relations of the National Commission to Coordinate Foreign Relations at the NCRD and other relevant bodies.

Israel international relations in R&D are many and varied. Most of the information on Israel's scientific foreign relations is scattered among various agencies. This decentralization creates a situation where there is no coordination and planning regarding the needs and possibilities in the various fields, or between the existing programs with different countries and agencies. Israeli representation in international institutions has been often double or missing.

B.10 Is there a Shortage of Academic Degree Holders in Science and Technology?

Prof. Benjamin Bental, Prof. Dan Peled

This research extends a previous study by the authors on "The Role of Research Universities in the Israeli R&D System" by examining the possibility of a growing shortage in recipients of academic degrees in science and technology (S&T). Contrary to the common view, we conclude that there currently is no overall shortage in the number of S&T degree recipients. This conclusion is based on two main arguments. Some 10,000 receive a first degree in S&T each year, in addition to some 4,000 who receive graduate degrees. Such annual numbers constitute about 10% of the academic S&T occupations in the Israeli workforce, more than the natural attrition and retirement rates from such occupations, including scientists and engineers who immigrated to Israel from the former Soviet Union in the 90's. The second argument hinges on the development of real salaries of S&T academic degree holders, using income and employer costs surveys of the Israeli CBS. While significantly higher than salaries in non-S&T occupations, S&T real salaries have not grown faster than average salaries in the business sector over the last 15 years. An acute shortage in S&T academic workers would have exerted pressure to increase their salaries, a pressure that cannot be discerned in the data.

There are indications that shortages do exist in some subfields, such as computer hardware and software development, while surpluses exist in other scientific occupations. Such imbalances are inevitable in a world with rapidly changing technologies.

B.11 The Future of Universities: Is the Revolution in Front of Us?

Prof. Uri Kirsch

The object of this study is to evaluate the effects of current processes on the future of research universities. A wide global view, including economic, academic, social, and other aspects, is described, with special emphasis on Israeli issues. Due to significant changes in technology, society and business, combined forces are threating the future of universities. There is a common belief that these forces could result in significant changes and disruption on a historical scale. As a result, the universities will have to reinvent themselves once again.

B.12 Israel Research Status: What do the Indices Really Describe?

Prof. Uri Kirsch

Research evaluations using qualitative indices have various advantages, but also many limitations and deficiencies. Despite their importance, these evaluations are controversial, and often misunderstood. The main object of this study is to contribute to the understanding of the evaluations and particularly to consider the question “Do they describe the reality correctly?” Approaches and issues related to research evaluations are described, and results and processes describing the research status of Israel and its universities are discussed. The main conclusion is that, despite their present respected status, in recent years there has been a clear decline in their ranking.

B.13 Entrepreneurship at the Technion

Prof. Arnon Bentur, Prof. Uzi De-Han, Ella Barzani,

Dr. Daphne Getz, Oshrat Katz Shacham, Prof. Shlomo Maital

This report was prepared at the initiative and at the request of the Technion Board and was intended to serve as background material for the purpose of formulating the Technion's policy in the field of entrepreneurship. The report analyzes the objectives of a 21st-century technological research university and points to entrepreneurship as one important component in the realization of the university's third mission, beyond research and teaching.

The report is based on a number of levels, including an analysis of the need and purpose of entrepreneurial activity on the campus in the context of the development of an entrepreneurial ecosystem based on the experience of leading universities around the world, an analysis of management structures and policies for managing entrepreneurial activities on the campus, and an analysis and mapping of entrepreneurial activities in universities around the world, as compared with what is happening at the Technion.

The main insights and recommendations relate to a number of key aspects, including entrepreneurship as a component in the education of engineers and scientists, insights from the experience of leading universities, university policies to promote the subject of entrepreneurship, and patterns for the structure of the Technion's activities, which relate to three facets: the faculties, the management, and the entrepreneurial discipline itself, as it relates to research in the field of entrepreneurship. In addition, the report also refers to the transfer and commercialization of technology, relations with industry, integration of entrepreneurship education into regular curricula, physical structure and presence at the Technion.

B.14 Israel-US Academic Relations

Dr. Daphne Getz, Oshrat Katz Shacham, Bahina Eidelman, Ella Barzani

Israel on Campus Coalition (ICC) is a national network of students, faculty members, and professionals in the US, whose goal is to strengthen the pro-Israel movement on campuses across the US. The research department of the ICC addressed SNI and requested a review of the development of academic relations between Israel and the United States over the past decade.

During 2015, the Samuel Neaman Institute submitted a report to the ICC describing trends in the development of academic relations between Israel and the US over the past decade, as reflected in the changes that occurred in the output of the joint studies by American and Israeli researchers. Among the topics examined are quantitative trends in joint research outputs, leading areas of joint research, leading institutions in joint research outputs, and more. Special emphasis is placed on the fields of social sciences and humanities.

During 2016, the Samuel Neaman Institute has completed, at the request of the ICC, an examination of the development of academic relations between Israel and the US at the level of students' study programs abroad, i.e., student exchange programs (Study Abroad), and the mutual recognition of credits. In this part of the research, quantitative data were collected on the number of students who participated in these programs and qualitative research was conducted, in order to describe the trends and changes that occurred on those programs during the last decade.

Toward the end of 2016, the ICC launched a campaign based on the findings of the Neaman Institute regarding the joint research outputs of American and Israeli researchers. The data were presented on US Websites engaged in higher education, particularly the Inside Higher Ed, as well as on sites dealing with US-Israel relations, and in the *Jerusalem Post*.

C. Environment

The environment and energy team at the Samuel Neaman Institute conducts studies and produces white papers, reviews, and policy recommendations on a wide variety of environmental and energy subjects, which constitute the core issues of these sectors in Israel.

The Samuel Neaman Institute research team, headed by Prof. Ofira Ayalon, works with SNI researchers: the Lev-On Group, Shiri Freund-Koren, Idan Liebes, Maayan Zerbib Tsion, and Dr. Tzipi Eshet. We also work in collaboration with external partners, such as The Natural Resources and Environmental Research Center (NRERC) at the University of Haifa, Adv. Lior Shmueli of Ecofinance Ltd., Efrat Elimelech, an environmental consultant at NRERC and PhD students at the Faculty of Management of the University of Haifa, and others.

The studies conducted over the years include topics such as waste management (municipal, business, hazardous, packaging in general and the issue of shopping bags in particular, waste treatment facilities), reducing greenhouse gas emissions, registration of emissions, adaptation to climate change, environmental aspects of agriculture, and various topics related to energy and to the planning of the energy economy in Israel. Documents on environmental national priorities, designed to provide a current picture of the situation in Israel and abroad and for formulating the policy recommendations needed to reach the desired targets, are also produced.

The documents prepared by the staff are discussed and presented at Knesset committees, used by the managements of the relevant Ministries, including the Ministry of Finance, the Environmental Protection Ministry, The Ministry of National Infrastructure energy and water, the Ministry of Economy, and the Information Center of the Knesset. These papers are leading in environmental policy in Israel and form the basis for articles and editorials on environmental issues published in print and in the electronic media.

C.1 Climate Change: Israel's Greenhouse Gases Reporting and Registration System

Prof. Ofira Ayalon, the Lev-On group, Maayan

Zerbib Tsion, Idan Liebes

Climate change is receiving worldwide attention in light of its environmental, economic, and social implications for the developing and developed world. The Israeli government recognizes the importance of taking steps to reduce greenhouse gas emissions, and acts accordingly. Consequently, a voluntary system to register Greenhouse Gas (GHG) emissions in Israel was launched in 2010. The project is conducted in collaboration with the Ministry of Environmental Protection and targets industrial, commercial, financial, and other organizations.

FY 2015 (reported in 2016), 51 organizations of a wide variety of sectors reported their emissions. Their cumulative emissions constitute about 58% of the total emissions in the Israel economy. The process of designing the procedures and methods for the Israeli system, as well as the support and monitoring of the reports, were carried out by the environment and energy team at the Samuel Neaman Institute and the team of the Ministry of Environmental Protection, with the collaboration of a wide range of stakeholders.

Updates of the reporting system (protocol) and Excel files for FY 2015 include the following: Updated global warming coefficients were adopted in accordance with the UN orders; a specific Excel file was developed for GHG emissions of heavy vehicles fleets that are obliged to repast according to the Clean Air Act; Independent Power Producers (IPP) are increasingly gaining a market share and affecting the indirect emissions (in Scope 2).

In 2015, 17 organizations used electricity generated by IPP, as compared to 10 organizations in 2014.The IPP use mostly gas turbines or co-generation. During this project, we conducted three workshops: GHG emissions from heavy vehicles fleets, annual organizations meeting - conclusions of 2015, and trends in GHG emissions reporting.The voluntary GHG registry is a control tool that helps organizations focus their efforts on the measures required for the reduction of GHG emissions. This, ultimately, leads to energy efficiency and saves financial resources.

C.2 Global Estimates of Methane Emissions from Offshore Drilling Plants and Their Importance

Prof. Ofira Ayalon, Dr. Miriam Lev On, Dr. Perry Lev On, Maayan Zerbib Tsion

The study reviews, for the Ministry of Environmental Protection, the world's regulations and methodologies for estimating methane emissions in the natural gas sector. In addition, the study presents an opinion concerning the relevance of these methodologies and their application for estimating methane emissions from natural gas facilities in Israel. Methane (CH_4) is emitted into the atmosphere from a variety of natural and anthropogenic sources. According to climate models, in terms of Global Warming Potential (GWP), methane affects global warming 25 times more than carbon dioxide (CO_2), according to a 100-year forecast. Since the time methane remains in the atmosphere is shorter than that of CO_2, a reduction in methane emissions from anthropogenic sources would be effective in reducing global warming in the near future. Offshore oil and gas extraction has been a growing industry in recent years. In marine gas production, it is necessary to extract and transport gas to shore, and as a result, gas may be released during the process or it may be necessary to burn it. The document presents three alternatives for characterizing methane emissions from the natural gas sector in Israel:

1. Using a generic emission coefficient based on the entire quantity of gas.

2. Using generic emission coefficients for the various sections in accordance with the IPCC guidelines.

3. Collecting periodic activity data from the natural gas sector for quantification.

The recommendation of the Samuel Neaman Institute researchers is to adopt, at the first stage, Alternative No. 2 because it will be acceptable for the two-year national emissions inventory that Israel will have to transmit to the Secretariat of the Climate Convention.

It is also recommended to examine, in parallel, Alternative 3 in order to implement a periodic review (once every 3-5 years) in the longer term.

C.3 Waste Management: Preparing a Principle Calculation for Collecting Business Waste Fee

Prof. Ofira Ayalon, Efrat Elimelech, Maayan Zerbib Tsion

Municipal and commercial waste management is an environmental and economic burden, both for the municipality and businesses. This study was conducted for the municipality of Tirat Hacarmel.

The amount of commercial and municipal waste is 4.8 million ton per year, of which 20% is recycled and the rest is landfilled. The cost of waste treatment is between 4% and 8% of the total budget of local authorities in Israel. During 2004-2014, the total expenditure of municipalities on waste management doubled (more than 4 billion shekels per year) due to the gradual increase in the landfill fee, the increase in the prices of fuel, and a gradual increase in transportation distances (to landfills sites).

Most of the municipalities in Israel manage their waste and provide waste treatment services for businesses in their area.

In comparison with household waste, commercial waste is usually relatively clean, and businesses can be coerced to separate it at source. Separation of waste at source in the business sector carries additional benefits, such as reducing the financial investment required of both the government and the local authority for implementing the separation, and granting certainty to end facilities and increasing their profitability. Authorities that did not implement separation in households can introduce the process of separation in the commercial sector in a way that is simpler and easier to implement. Authorities that already separate waste will be able to expand and improve the separation that presently relies on the existing systems. In this study, a calculation was conducted regarding commercial waste collection in order to create a mechanism that applies the principles of both the "polluter pays" and "simplified tax," and avoid discrimination. The mechanism is built so that it will cater for the average production rate of waste, as well as for waste production on peak days.

C.4 Waste Treatment: Establishment of Waste Treatment Facilities by a Public-Private Partnership in Israel

Prof. Ofira Ayalon, Maayan Zerbib Tsion in collaboration with Efrat Elimelech

This study was conducted as part of research funded by Mifal Hapais (the Israeli Lottery) and the Center for Local Authorities.
The lack of compatibility between the waste management policy in Israel and the reality in the field raises the following question: What are the factors that hinder the establishment of end-treatment plants in Israel? In particular, is the establishment of end-treatment facilities for waste treatment in Public-Private partnership (PPP) capable of contributing to remove the barriers and realizing the policy?

To answer these questions, an extensive review of case studies from around the world was conducted, emphasizing vital indices for the success of PPP projects. In the second stage, an experts workshop was held with the participation of about 30 specialists in waste treatment from the public sector (government and local authorities), private sector consultants, operators of transfer stations and waste treatment facilities, and entrepreneurs in the area of waste treatment facilities. The workshop was conducted in the form of a Delphi Survey, where the experts were asked to address leading questions posed by the researchers, while working and discussing in groups. Group discussions focused on the identification and mapping of the main barriers to the establishment of waste treatment facilities in Israel and the development of possible solutions.

The experts' workshop found 4 main barriers to the advancement and establishment of waste treatment facilities in Israel: regulatory uncertainty, economic uncertainty, the structure of the tender, and the NIMBY (Not in My Back Yard) phenomenon. One of the main conclusions of the study is that in the field of waste treatment, the public body is the local authority or the town association, not the government. The government's role in the market is to create a supportive regulatory environment, while defining the 'drainage areas' for the waste.

D. 1 The Center for Industrial Excellence

Dr. Gilead Fortuna, Giora Shalgi, Dr. Avigdor Zonnenshain, Dr. Eitan Adres, Shiri Freund Koren, Idan Liebes, Tamar Dayan

The Center for Industrial Excellence was established in 2011, and its objective is to promote a national industrial policy. The Center helps formulate and promote a proactive policy of industrial excellence, intended to sustain a balanced and high-quality national industry that maintains a healthy life cycle, focusing on Israel's global competitive advantage and the quality employment of all sectors of society. The Center for Industrial Excellence is part of the Israel 2028 Vision previously led by Samuel Neaman Institute. The work method applied to the study subjects is usually characterized by the following stages:

- Surveying and mapping areas and industrial directions that are innovative or already existing and have a large national potential.
- Identifying and targeting potential that justifies a national effort.
- Identifying bottlenecks that prevent businesses' breakthrough in the industry.
- Proposing processes to remove bottlenecks and the promotion of recommended solutions.
- Guidance and support for the implementation of solutions.

New topics studied in 2016 include the following: Israeli industry since its establishment - past, present, and future; identification of high-tech companies that have technical potential to develop advanced solutions for manufacturing; promotion of The National Center for the Development of Insects in Human Service; promotion of an integrated industrial park in Shfar'am; strengthening R&D in the Arab sector in the north; and examining the feasibility of the commercial production of standard fuel from natural gas in Israel (GTL). The research topics that were continued in 2016 from 2015 are as follows: Promotion of the upgrade of the northern region, according to a program drawn up by the Samuel Neaman Institute; strengthening the renewable energy and water industries; development and implementation of advanced production in Israel, and leveraging the life sciences industry by improving the processes of knowledge transfer from the academia to the industry.

D.2 Issues for Formulating a Metropolitan Plan in the North

Prof. Arnon Bentur, Prof. Amnon Frenkel, Prof. Daniel Czamanski, Dr. Emil Israel, Dr. Eran Leck, Marina Toger, Maria Marinov; database manager: Tamar Dayan; Steering Committee: Dr. Avigdor Zonnenshain, Prof. Yehuda Hayuth, Dr. Gilead Fortuna, the late Prof. Baruch Kipnis, Prof. Omri Rand

The promotion and positioning of the northern region as an attractive metropolis for industry and the Israeli public is constantly on the public agenda. This work was intended to provide tools for formulating an attractive plan for the north, so that it will become an economically and professionally developed metropolis, based on new regional development models and data relevant to the north. The data in this project are based in part on work conducted at the Samuel Neaman Institute for the economic upgrading of the northern region and an analysis of the data. At the end of the process, the outcome was a set of tools for economic-employment policy measures, as well as for formulating priorities and concentrating efforts on a plan that extends over a period of several decades for the north, as follows.

• Definition of the northern region, the Galilee + Haifa Sub-District, as a multi-focal, single metropolis. Only then will it be possible to reach a critical mass that can withstand the Tel Aviv magnet.

• Taking a systemic approach based on a series of steps in various and different fields, which will be integrated and synchronized, while viewing the metropolis as a geographic area that constitutes a single labor market.

• Prioritizing one of the metropolitan areas and formulating a wide range of measures in this area, based on the assessment that such steps will have significant results for initiating processes in the other metropolitan areas as well.

• Selection of the region's priority will be based on a variety of considerations, including on the one hand the chances of success, and on the other the possibility of realizing the process with as little investment as possible, based on the unique infrastructures and advantages in that region. In this analysis, the southern part of the metropolis, extending from Haifa to Afula (including Nazareth) was identified.

D.3 Upgrading the Economic System of the North

Dr. Gilead Fortuna, Dr. Avigdor Zonnenshain, Giora Shalgi, Dr. Eitan Adres, Tamar Dayan

In mid-2014, SNI joined a venture with the Ministry of Economic and Industrie, aimed at drafting a plan for substantial improvement of the economic status of the North. During 2015, the project was completed and a summary report, which includes an analysis of the socioeconomic situation in the north, and recommendations to realize change-generating infrastructure anchors and non-linear growth generators, was submitted to the Government. The program's outline was approved by the government in 2015, and in 2016 the government discussed in detailsthe recommended subjects, with the support of the Samuel Neaman Institute.

At the end of 2016, supporting decisions were made and a budget was submitted for some of the recommended growth engines, including part of a cluster of life sciences in the North, promoting innovation and productivity in the classical industry in the north, strengthening the Arab sector as a growth engine, and business promotion. Most of the recommended infrastructure anchors (change generators) have already been implemented; for example, the expansion of Haifa port, leveraging and expanding the transportation infrastructure, and its completion. Also, the establishment of the International Airport has been approved but has been delayed because of the residents' opposition, and the transfer of armour production and maintenance centers to the North is currently under detailed study by all relevant government bodies.

Some of the overall system recommendations have not yet been realized by government decisions, including the integration of the Arab sector in the northern economy as a joint economy, the development of the ultra-Orthodox population in the north as a productive community, and the expansion of life sciences development to the entire northern region.

During 2016, a team of the Neaman Institute supported the process leading Haifa University, led by its new president, to formulate a challenging strategy that is expected to strengthen the north of the country and the city of Haifa.

D.4 Master Plan for the Establishment of an Industrial Park in Shfar'am

Dr. Gilead Fortuna, Dr. Avigdor Zonnenshain, Dr. Eitan Adres

A master plan for the construction of a new industrial park at the closed quarry of Shfar'am, consolidates a recommended strategy for the new industrial zone in Shfar'am, to be built in the quarry adjacent to the eastern side of the town of Shefar'am. For the first time in Israel, an Arab municipality is leading a significant process of promoting the combined Jewish-Arab economy. The focus is on the characterization of the new industrial park and its construction methods and the desired management method, to bring about the creation of a significant leverage for economic and social growth for the town of Shfar'am and its residents, as well as for all the residents of the area. As part of the program, a strategic planning process was conducted, referring to the vision of the park, an examination of its industrial uniqueness, management uniqueness, and the uniqueness of town-industry relationships. Three options for the park's positioning were examined:

- The possibility of relying on industries in which Shfar'am and the region specialize.
- Relying on high-tech industries, with an emphasis on life sciences, computing, and communications.
- Absorbing traditional industries that combine advanced manufacturing processes, together with high-tech industries and industries with export potential - without highlighting any specific industry. The third option is the recommended one, and that according to which the strategy for action is proposed. This means that the Shfar'am Park has to be differentiated from other parks by its focus on its customers and their success and will not be a purely real estate project.

D.5 Insects for the Benefit of Humanity

Dr. Gilead Fortuna, Idan Liebes, Shiri Freund-Koren

Insects are of fundamental importance to the ecosystem, and their existence is critical for human survival. Insects play a variety of roles in the service of man, while the research of the full potential inherent in them is still in various stages. The market of insect applications in the service of humankind is an increasing trend worldwide and has the potential for significant growth in the coming years. As part of this study, the different aspects of insects in the service of humanity were classified into three main areas:

- Insects in agriculture and for the health of the public.
- Insects for food and feed.
- Insect-based systems and materials.

It is apparent that areas of agriculture and food are of the greatest potential in the immediate to medium terms. As part of the construction of an action plan, a number of possible options for the establishment of a center to promote insect activity in the service of man were examined. Afula, as a municipal center surrounded by agriculture, is suited to be a center of activity on the subject of insects in the service of man and even expressed willingness and desire to promote this issue as part of the continued development activity of the recently established Entrepreneurship Centre. The town of Afula has been developing rapidly in recent years and has a number of local and regional assets that the Center can leverage for the benefit of its activities. **Our recommendations for a national policy for Israel:**

- To extend systemic weight and attention in Israel to promote activity on the subject of insects in the service of humanity.
- To take action to establish a national-global center in Israel to promote research and entrepreneurship on the subject of insects in the service of humanity.

Further to the policy recommendations, the proposed action plan, and the willingness and interest of the town of Afula to promote the subject, the recommended strategy for Afula is to establish a knowledge center that could later develop into an entrepreneurship center, under the vision of an entrepreneurship and industrial center that combines the scientific and business knowledge in Israel in the field of insects in the service of humanity.

D.6 Empowering Classical Industry

Giora Shalgi, Dr. Gilead Fortuna, Dr. Avigdor Zonnenshain

2016 was characterized by the promotion of the outline proposed by the Committee to Empower Classical Industry, expanding it into other areas, such as education, promoting technological-vocational education*. The effort to rebuild the legendary school of Bosmat as a standard bearer of high-quality technological-vocational education is beginning to materialize. The school entered its second year of operation, supported by a high-quality executive committee, and with the determined support of Haifa Municipality and the Ministry of Education. The school is expected to move, for an interim period, until the construction of a dedicated building is completed, to the new technology center in Neve David, that will include modern laboratories. The establishment of an applied R&D center. As a result of the recommendations of the Grand Strategy Committee, assistance was given to the ORT Braude College to add to its definition of mission innovation-oriented applied R&D and productivity emphasizing traditional industries. The realization will be carried out by the application company "Ofek Eshkolot" in cooperation with the Israeli branch of the German FRAUNHOFER Institute.

Organizational excellence. Continued promotion of excellence in the industry in the north, as part of the Manufacturers' Association. Presenting the topic to the Haifa Municipality board as a step that supports the city's desire to turn the city into a metropolis of excellence. Haifa University strategy. Contributions to the process leading the university, under the leadership of its new president, to formulate a challenging and inspiring strategy, which is expected to strengthen the north of the country and the city of Haifa.

BUY BACK (retry) failed. The attempt to introduce a change in the policy rules of the ICA, which is responsible for reciprocal procurement agreements at the Ministry of Economy, failed.

Combining nanotechnology. A continued effort, as part of the INNI Committee (which ceased operating in 2016 after two five-year plans) to accompany the implementation of nanotechnology in traditional industries, the core business of which is in the field of materials, such as Ginegar (plastic sheeting for greenhouses), Caesar stone (synthetic marble), Nilit (fibers).

* This subject was led by Giora Shalgi.

D.7 Advanced Manufacturing: Consolidating a National Policy

Dr. Gilead Fortuna, Dr. Avigdor Zonnenshain, Giora Shalgi, Idan Liebes, Shiri Freund-Koren

This study is intended to formulate a national policy proposal for promoting and implementing advanced manufacturing in Israel and help in its implementation. A wide variety of advanced technologies and innovative processes are included under the title of Advanced Manufacturing: Digitization, three-dimensional printing, nanotechnologies in manufacturing and products, advanced automation, and more. During 2015, global and domestic trends in this area were summarized based on reports and documents published on the subject. In addition, preliminary recommendations were formulated for a national policy for advanced manufacturing in Israeli industry. In 2016, efforts continued at the Industrial Excellence Center to develop and promote a national policy for advanced manufacturing in Israel, which included, among other things, the following activities:

The formulation and distribution of a document that summarizes the status of advanced manufacturing in the world and Israel, proposing a national policy on the subject.

A roundtable discussion with more than 30 experts and stakeholders to develop awareness in this area, and the creation of an advocacy group for the proposed policy.

Participation in a roundtable held at the Ministry of Economy on the subject and presenting the policy.

Mapping of the companies in Israel engaged in advanced manufacturing technologies (commissioned by the Foreign Trade Department of the Ministry of Economy – a report was issued to the commissioning party).

Participation in a tour of advanced manufacturing in Germany organized by the Manufacturers' Association.

Initiating and participating in various meetings and seminars to present and discuss various aspects of advanced manufacturing.

Participation in standardization committees in the fields of three-dimensional prints.

Continued dialogue with Aviv Co. to promote the productivity in traditional industries.

D.8 Success and Failure Factors of Leading Companies in Israel

Dr. Gilead Fortuna, Yuval Niv, Tamar Dayan

The aim of the study, which started in 2016, is to review the Israeli industry since the establishment of the state until today, in order to draw lessons from the accumulated experience and try to reach understandings and recommendations for the future. Twenty-five companies from nine industries were selected for the study, whose activities over time represent the behavior of the domestic industry. The focus is on identifying factors of success and failure in retrospect, and in doing so, drawing conclusions and finding ideas and recommendations for the future. For the sake of the study, the survival of companies that occupied a central position in the domestic industry was examined. Gathering information from a variety of written sources about the companies allows an initial objective assessment of the companies' performance and the diagnosis of their conduct over time. In order to deepen the study, the research team met with various managers and key personnel from various periods over the life of the selected companies and traced their conduct. Of course, time has elapsed, and the subjective perspective of the interviewees affects the nature of the information obtained in this way. However, the questioning of a variety of key personnel plus the ancillary benefits of observation from the distance of time did compensate for this shortcoming. The study examined five periods:

1. 1950-1967 Emergence and consolidation of the country's economy.

2.1968-1973 The euphoria following the Six Day War.

3. 1974-1985 Coping with the effects of the Yom Kippur War and political upheaval.

4. 1986-1996 Exit from the crisis of the '80s and entering the hi-tech era.

5. 1997-2016 Integration of the local industry in the global economy.

Each of the periods chosen represents unique economic conditions, which naturally had an impact on the business environment in which the companies operated and hence on the way they were managed and the resulting implications for their "business positioning". The study is scheduled for completion in 2017.

D.9 Strengthening the Integration of the Arab Population into the Industry and the Economy: Formulating a Strategy for the Galilee Society R&D

Dr. Gilead Fortuna, Dr. Avigdor Zonnenshain

SNI in collaboration with the Galilee Society, which is a regional R&D center supported by the Ministry of Science, working together to strengthen a stable regional center that promotes knowledge industries and unified Jewish-Arab economics in the north. The program began in late 2015 and is aimed to leverage the capabilities and experience of the Galilee Society as an excelling regional R&D center and a catalyst to promote high-tech industries in the North and ensure the economic stability of the Center. The strengthening of the Center will be achieved by increasing the support of the Ministry of Science and the Ministry of Economy. The long-term stabilization of the R&D center and its contribution to the economy of the Galilee will be achieved by the reorganization of the Center. During 2016, the study focused on:

Analysis of professional past achievements and the economic leverage obtained, to gain insights and conclusions for the future.

Analysis of the current positioning of the Center - the assets, personnel, budgets, potential, and leverage plans.

Preparation of a position paper for the Ministry of Science and the Ministry of Finance proposing a long-term plan to turn the Center into a dominant regional R&D center, including a list of budgets, increasing the number of researchers employed, and the outputs resulting from this effort.

Preparation of a reorganization plan for the Center vis-à-vis the required budgets, to successfully lever the existing assets and those to be built in the future as part of the enhancement program.

Search and analysis of regional interfaces with the Academy, including colleges, other R&D centers, industrial zones, greenhouses, factories, and target companies to realize the products to be developed.

D.10 Analysis of Israel's Renewable Energy Industry

Dr. Gilead Fortuna, Shiri Freund-Koren, Idan Liebes

This project began as part of a joint venture with the Newtech unit at the Ministry of Economics, and since 2015 it has continued with the funding of the Samuel Neaman Institute, as part of the Industrial Excellence Center. The goal of the project is to leverage Israel's position as a leader in the field of renewable energy, including energy production and its integration into the energy system, efficiency improvements, and the development of fuel substitutes.

In 2016, the research findings were presented by the SNI staff to the Science and Technology Committee of the Knesset, with the participation and support of industry representatives and the Ministry of the Economy. The main recommendation is to establish a fund in cooperation with the government and including private capital to promote the commercialization of innovative technologies for renewable energy and increased energy efficiency.

During 2016, the Ministry of the Economy adopted the recommendations of the Neaman Institute team to support and encourage the commercialization of innovative solutions in the field of renewable energy. Since mid-2016, the Ministry of the Economy, led by the Newtech Unit, has promoted the program toward making a government decision. As part of this activity, the study findings were presented again to the Science and Technology Committee of the Knesset by Newtech and then submitted for review and promotion by the Ministry of Finance. Hopefully, the establishment of the fund will be realized in the coming year, and the research team will accompany the process in order to help with the successful implementation during 2017.

D.11 Feasibility of Commercial Production of Standard Fuel from Israeli Natural Gas (GTL)

Dr. Gilead Fortuna, Jonathan Goldsher, Idan Liebes

The production of natural gas-based fuels using GTL technology is one of the existing alternatives that are on the agenda of the government for testing and evaluation, as well as other technologies for the production of substitute natural gas-based fuels. The decisive advantage of the GTL process over the alternatives is that the substitute fuels generated using this technology have a chemical identity close to that of oil-based fuels and therefore do not require any changes in the conventional vehicles with internal combustion engines available today. This fact, as stated, constitutes a huge advantage, which translates into a higher economic benefit and proven and significant savings in scales of magnitude as compared to the alternatives examined. Considerable investment is still required, estimated in the magnitude of billions of dollars to establish the GTL plant.

This current analysis focuses on an in-depth examination of the GTL alternative while reviewing the existing production processes, the review of major GTL plants in the world, the drivers for their success, the unique characteristics necessary in Israel, understanding the factors that support the establishment of a GTL plant in Israel, as well as on the analysis of the obstacles facing it, based on a variety of factors, including the geopolitical situation, reserves of natural gas in Israel, economic viability, environmental contribution, economic contribution, and other benefits. The study includes a model of the advisability of investing in Israel based on historical margin rates of oil versus natural gas and refers to the analysis of the economic viability as a function of gas prices and the options for future improvements due to the research and development that is currently conducted in the world. After the publication of the research results, an international tender by the Ministry of Energy was published, partially based on this study, awaiting investors.

E. Energy
E.1 Energy Forum

Prof. Gershon Grossman, Yigal Evron

The purpose of the energy forum is to maintain a professional infrastructure in the field of energy in Israel and to allow meetings and discussions that encourage the promotion of projects in the field of renewable energy, energy saving, and conservation. Through the forum, the Samuel Neaman Institute formulates professional and applicable positions, on which experts and stakeholders in the field and decision-makers in various government offices that participate in the forum agree.

In 2016, three Energy Forum meetings were held:

"Energy efficiency in Israel: Systems Upgrade", on 7.3.2016, which discussed the potential for energy savings by upgrading and replacing outdated equipment with new and modern equipment.

"Security of energy supply in Israel", on 15.6.2016, which discussed issues relating to security and reliability of energy supply for the Israeli economy.

"Measures to implement following the approval of the gas outline in Israel", on 26.9.2016, which discussed the steps to be taken for implementing the gas outline approved by the government.

E.2 Innovation Policy in the Field of Clean Energy in Israel

Prof. Gershon Grossman

The aim of the project is to analyze the policy lessons arising from Israel's successful efforts to initiate, guide, and accelerate the processes of technological innovation in the field of clean energy. The intention is to identify the basic principles for designing a policy that can be applied to any group of technologies, even in different countries, and in different political, economic, and technological contexts. Based on a detailed analysis of these principles, the project is preparing a series of general recommendations of best practices for an innovation policy in the field of clean energy.

In 2016, the consultations with the Israeli Association for Intelligent Energy concerned means of advancing the subject of the Smart Grid in Israel, further to the research in recent years on the matter, and in collaboration with the London School of Economics.

F.1 Project "Traffic – Light to the North"

Prof. Nitsa Movshovits-Hadar (PI), Naomi Buchnik, Orna Imber, Dr. Eyal Levy, Dr. Ofir Ris, Noga Rivlin, Dr. Ruti Segal, Prof. Atara Shriki, Varda Zigerson, Dr. Ohad Zohar, Tal Zohar

Launched in August 2014, the project "Traffic-Light to the North" started its third year in 2016. It examines the possibility of empowering secondary school math teachers in Israel's northern region for teaching toward the highest level of school leaving examination (5 units), using three means: 1. "Traffic-Light" software, developed especially for the collaborative design and documentation of the professional work performed by mathematics teachers; 2. Mentoring of mathematics teachers, the "Mentees," who have not yet experienced teaching Mathematics at the 5-units level, but have the formal qualifications to do so, by teachers experienced in teaching 5-units mathematics in the same schools, the "Mentors." Mentees gain their first experience teaching at the 5-units level, starting from the 10th grade (in 2014/15 schoolyear), through the 11th grade (2015/16), until the matriculation examinations at the end of the 12th grade (2016/17); 3. Workshops for Mentors and Mentees, which take place online and through face-to-face meetings, intended to promote the professional development of each group.

Benefitting from the software, the personal mentoring, and the workshops, participants prepare collaboratively detailed lesson plans, thematic or periodic teaching programs, and items for achievement assessment. Products are at the users' disposal to change and adapt to their specific classes. To date, the database contains over 800 lesson plans.

The project is followed by a monthly formative evaluation. The results and conclusions will be submitted to the Ministry of Education and to the Trump Foundation, the funder.

F.2 Education Forum

Prof. Orit Hazzan

The Forum for Science and Technology Education was established in 2013. The purpose of the forum is to foster cooperation between different sectors in the Israeli society to promote science and technology education in K-12 education.

As a background for the forum's discussions, a report was prepared titled "Science and Technology Education in Israel: Selected Indicators towards Building a Risk Management Strategy for the Expected Shortage of High School Teachers in Science and Technology". The purpose of the report was to create a basis for developing a risk management strategy in view of the anticipated shortage of science and technology (S&T) teachers.

On the basis of this report, two major challenges facing S&T education in Israel were defined: the expected shortage of S&T teachers and the relatively small number of students in technological education.

In 2014, the forum focused on the teaching of Physics in the high schools on the highest level. Based on data analysis related to students who choose to study physics at this level, one of the report's recommendations was to expand the thinking about suitable ways to increase the number of physics students at the level of 5 study units.

F.3 Where is Chemistry Education Heading?

Project team: Prof. Yehudit Judy Dori, Dr. Zehavit Kohen, Dr. Orit Herscovitz, Gabby Shwartz, Or Shav-Artza

More than a decade ago, working groups at the Neaman Institute explored the future of the chemical industry in Israel. One of the four working groups focused on the question of education in chemistry. Under the leadership of Prof. Judy Dori, this group investigated the state of chemistry teaching in Israel and the future of chemistry education in Israel by interviewing and administering questionnaires to chemists, chemical engineers, academics, and teachers. In view of the decline in popularity of chemistry in high schools and decrease in the number of teachers and schools in which chemistry is taught, the current research revisits that study and expands it. The objective is to examine trends in motivation and reasons for choosing a career in chemistry, biochemistry, chemical engineering, or chemical education and recommend ways to foster these career choices. The study group includes about 110 participants, 30 of whom are faculty members engaged in research in chemistry, bio-chemistry, chemical engineering and other chemistry-related fields in universities in Israel, about 40 chemists and chemical engineers, and about 40 first- and second-career chemistry teachers. Most of the participating pre-service teachers studied in the track of chemistry teaching of the two-year Views ("Mabatim") program at the Faculty of Education in Science and Technology at the Technion. The study is a mixed-method research, based on in-depth interviews and questionnaires. Preliminary findings indicate that the process of choosing chemistry as a major study field and as a career is related to various external and internal motivational factors. These include influential role models, such as a Ph.D. advisor or a high school teacher, personal qualities, such as striving for excellence, exposure to science during middle and high school, and socio-cultural messages, such as the prestige of the profession or family guidance. The research has practical implications of potentially increasing the number of students choosing to study chemistry in high schools and universities and to pursue chemistry as a future profession. The study recommendations may also help increase the number of chemistry teachers, countering the dramatic drop over the past decade in the number of chemistry teachers, high school and undergraduate students who study chemistry as a major.

F.4 Evaluation of the Technion Excellence Programs

Dr. Eran Leck, Vered Gilad, Orly Nathan, Dr. Daphne Getz

The Technion Program for Excellence was launched in 1992 and is intended for undergraduate students in the Faculties of Science and Engineering who have been identified as having exceptional abilities. The Program offers its participants a personalized academic study program designed to exploit their curiosity and creativity and enables them to focus intensively on particular scientific domains. The Program offers students professional tools and broad opportunities to advance and develop their personal potential, by encouraging creativity, originality, and curiosity through independent study and teamwork.

The goal of this study is to provide stakeholders and decision makers at the Technion with an in-depth analysis of the program, to map out its goals, to describe the contributions and achievements over the years, and evaluate its success. The study employs a wide range of research methods, both quantitative and qualitative. It includes an analysis of various data sources to create a deep understanding of the program. This analysis was performed by comparing the Technion Excellence Program to similar programs in Israel and abroad. A quantitative knowledge base was formulated based on responses to questionnaires and interviews held with students and graduates of the program. This allowed the program's outputs and achievements to be analyzed and assessed.

F.5 Models for Budgeting International Postgraduate Students at the Technion

Vered Gilad, Tsipy Buchnik, Orly Nathan, Ayelet Raveh, Dr. Tzameret Rubin, Dr. Daphne Getz

SNI was asked by the Director General of the Technion, Prof. Matanyahu Englman, to conduct a study of the options for increasing the number of international postgraduate students studying at the Technion.

Universities around the world are competing for the resource of the best students, based on the perception that the accumulation of knowledge and talent is a national asset, and the growing understanding of the importance of research outputs in determining the funding of universities and their position in international rankings. In recent decades, many universities have formulated policies to increase the number of international students, leading to a global significant growth in the volume of international students in general, and advanced degrees in particular. This trend is expected to continue over the next decade. The rate of international postgraduate students studying at the Technion for advanced degrees is 2.8% (123 international students out of 4439 graduate students in 2015). This rate is low as compared to that of the world's leading universities. As part of the study, SNI was requested to review the models used by leading universities around the world for international postgraduate students and to examine how these models can be sustainable for the Technion in order to expand its research potential and achieve other benefits, such as promoting the Technion's standing in international rankings, increasing the Technion's international orientation, and using students' mobility to improve the processes of transferring international knowledge in research collaborations. As part of the work, information was gathered on the models for supporting international graduate students at the world's leading universities in the fields of science and technology, and a comparison was made with the existing model at the Technion. In particular, the existing model at the Cornell College of Engineering was studied. The research findings were submitted to the Technion Board and were presented to the Academic Development Committee at the Technion and before the Board of Governors.

F.6 Universities' Influence on Student Decisions to Become Entrepreneurs: Theory and Evidence

Prof. Shlomo Maital, Vered Gilad, Tsipy Buchnik

This project presents and tests a theory of the process that students, in particular Technion students, undergo as they learn about startup entrepreneurship and, in some cases, decide to launch a startup after graduating. The theory is based on the "stage gate" model for product development. According to this theory, the process that students of science and technology undergo in their journey to becoming high-tech entrepreneurs involves a series of "gates," or decision points, or "doors." It a) begins with the decision to study science and/or engineering and technology, b) continues with their increased awareness of the possibility of creating a startup after graduating, c) continues with the intention and desire to become an entrepreneur, and d) proceeds with acquiring the tools and the knowledge, while at Technion, in order to succeed, ending, for some with e) launching a successful startup some years after graduating. These five stages, then, are preparation, awareness, intention, action and, hopefully, success.

Our research is based on a survey of Technion alumni/ae, who responded to a Web-based questionnaire. The research found that the greatest impact on entrepreneurship was related to activities that, during their studies, were defined as "experiential" (for example, Biztech, Hackathon, Startup Day). In these activities, students experience entrepreneurship during a short intense time period, during which they practice transforming ideas into businesses. In addition, there are activities in which students hear the stories of entrepreneurs, and about how what they did had an influence, mainly in terms of building their awareness (according to the stage gate model). The research validates the transitions of students from the initial stage of curiosity (about entrepreneurship), to awareness, intention, and action. In addition, it was found that the wide variety of entrepreneurial activities available to students is highly appropriate for students' wide variety of learning styles. This research was funded by a grant from Yehuda and Dita Bronicki, founders of Ormat Technologies, one of the earliest Israeli startups, launched in 1965.

G. Land Policy
G.1 Israel's Land Policy and Housing Prices

Prof. Rachelle Alterman, Dr. Eyal Salinger; Advisors: Prof. Ezra Sadan, Prof. Ron Kenett

SNI has taken on the challenge to examine the reasons for the increase in housing prices in Israel. Among other things, it was found that investing efforts to curb the high housing prices ignores the implications of the fact that only in Israel, unlike all other OECD countries, most of the land reserves are nationally owned. The accepted public perception is that national ownership should allow better control over prices than the private market. The hypothesis of this research is that the effect is in fact contrary. This study is the first to attempt to test whether national ownership is an asset or liability. At this stage, the study is in its exploratory stage.

The methodological challenge is that the Israeli context does not provide a natural "control group" where national land ownership is insignificant. International comparison is not valid due to the numerous contextual differences. Using analytical models and simulations, the research attempts to examine the expected effect on land price levels if the Israel Lands Authority (RMI) had operated similarly to the private market. Currently, RMI controls the contents, timing and minimal price levels for land tenders. We developed a database that includes all the plots issued out for tenders for housing projects nationwide since 1998 (2,785 sales).

As prices rise over time, the tender procedures were found to add an average of 6.2 years to the time between approval of a zoning plan and the issuing of building permits. To quantify the impact on housing prices, we examined 407 plans representing 2,155 tenders. The findings are that under certain circumstances, the delays related to land tendering may encounter an annual price increase of up to 8.5%. In addition, statistical correlation was found between the percent of national land ownership within municipalities and the prices of plots tendered out. For example, in areas where RMI holds 100% of the land, prices are about 10% higher (despite the fact that towns tend to be located in the county's periphery). The hypothesis is that this counterintuitive finding may be due, to some extent, to the national land monopoly. However, as this is exploratory research, we have not yet controlled for various additional factors, nor have we analyzed other costs and benefits of national land ownership.

H. Immigration, Society, and Social Resilience

H.1 It Takes Two to Tango: Spatial and Social Implications of Joint Civil-Military Development

SNI: Dr. Reuven Gal, Dr. Emil Israel, Dr. Eran Leck, Orly Nathan and Tsipy Buchnik; BGU: Prof. Miki Malul, Dr. Ophir Rubin, Shaul Hartal

In December 2016, we submitted a preliminary report to the Ministry of Science and Technology on the study which had started in early 2015. The study examined the impact of the IDF bases' relocation to the Negev on strengthening the urban regions in the Be'er Sheva metropolitan area. It was hypothesized that the relocation of military installations would become a major mechanism for strengthening the towns located in the Be'er Sheva metropolitan area, strengthening the Negev's urban sector and thus increasing social integration. The study examined this hypothesis, both qualitatively and quantitatively, based on a broad spectrum of collected data.

The study focused on both the planned housing supply and the demand for it. On the supply side, planning was examined through a multitude of interviews evaluating how institutional key players perceive the urban and regional development policy, that is, whether the development is perceived as being targeted at strengthening the urban sector in the region or weakening it. On the demand side, several samples were surveyed, including military personnel whose units are designated to be relocated to the Negev. Other samples included civilian groups with similar relevant characteristics.

The results of this study will provide decision makers with relevant information regarding their future planning and actions in this matter.

H.2 Israelis in Berlin: Community in the Making

Shuki Stauber, Dr. Gilead Fortuna, Prof. Sybil Heilbronn

In recent years, there has been a large migration movement to Europe, especially to two cities, London and Berlin.

This study looked at the motives, lifestyle, and perceptions of Israelis who emigrated to Berlin in 2015, in light of the special relationship between Israel and Germany.

Three main questions were examined:

What are the motives for the immigration of Israelis to Berlin, despite the language barrier and fears generated by the past?

How is the community life of Israelis consolidated in Berlin?

How do the Israelis in Berlin perceive their life in the capital of Germany?

The data were collected as part of a qualitative research founded on participant observation and semi-structured interviews. The principal Investigator lived in Berlin for 16 months, conducted 85 semi-structured interviews with Israelis in Berlin, with experts and key personnel, participated in 90 events, and visited relevant institutions and organizations. In addition, materials were collected from reports, magazines, and Websites.

The study identified six main reasons for emigration from Israel and found three super-frames for the formation of Israeli communities in Berlin. The findings and conclusions of the report were that this community is in the process of formation and most of the migrants are still at the stage of finding their way and that Berlin is just a springboard to permanent emigration. The conclusions were distributed in early 2016 and sent to the relevant government offices, with recommendations to formulate a National Policy regarding the attitude toward Israelis who immigrate to Berlin and toward immigrants at the beginning of the migration process. At this stage, the government has still not responded to the recommendation to formulate a new national policy relating to this community.

H.3 Ultra-orthodox Integration Project

Dr. Reuven Gal, Yehuda Morgenstern, Yael Elimelech

The Ultra-orthodox Integration (UOI) Project was inaugurated at the Samuel Neaman Institute in 2010, following the recommendations of the "Israel 2028" Project. The goals of the UOI Project were to monitor the changes within the Ultra-orthodox (U-O) community and to provide recommendations on how to enhance the participation of the U-O population in the labor market in Israel.

During the last six years, the project team has produced a multitude of analyses of various aspects of the subject matter and has published numerous reports, which in turn had a significant impact on the national policy in this area. In 2016, the project's activities focused on the following areas: mentoring a forum of social activists from the U-O community, consultation, providing data, and delivering policy papers to various governmental bodies. In addition, during 2016, we completed a study on The potential for Excellence in Mathematics and Physics Studies within the Ultra-orthodox Educational System, solicited and funded by the Trump Foundation. An interim report was submitted to the Foundation toward the end of the year.

Further, following several research efforts conducted within our project on the integration of U-O students in academic institutions, we initiated various interventions (meetings, correspondences, consultations) related to the MACHAR Project (Haredi Settings) led by the PBC/CHE. In the near future, we will conduct a brain-storming meeting aimed at exploring feasible alternatives to the existing program in this field.

I. Agriculture
I.1 The Industry of Innovative Agricultural Technologies in Light of the Global Food Crisis

Prof. Ofira Ayalon, Shiri Freund-Koren, Idan Liebes, Maayan Zerbib Tsion

This is the 10th document of SNI's National Environmental Priorities position papers. As the world's population grows, the demand for food is growing as well. The FAO expects that the global agricultural output will have to rise by 60% by 2050 to meet the needs of the growing population and changes in dietary habits, together with the outcomes of climate change, water and our pollution; soil degradation and biodiversity reduction.

The agricultural industry will have to change by means of innovative agricultural technologies (AgroTech) in order to increase the efficiency of agricultural production, while reducing costs – environmental, social, and economic – of agricultural production. The aim is, therefore, to develop sustainable agriculture.

Given this trend, the Samuel Neaman Institute initiated a study on the subject of leveraging the Israeli Agrotech industry in Light of the global food crisis.

The study presents the major trends affecting the technologies of the agricultural industry around the world and sheds light on the obstacles faced by entrepreneurs, investors, and industrialists in Israel. In addition, the uniqueness and the relative advantage of the Israeli industry are mapped.

I.2 Agriculture: Reduction of fruits and vegetables loss along the marketing chain in Israel

Prof. Ofira Ayalon, Dr. Tzipi Eshet

Wastage of food causes economic, resources, environmental and social concerns. In reference to the global food crisis, the common assumption is that it is possible to reduce the rate of food loss by half, and by means of this action alone feed 1-2 billion more people. In Israel, the financial damage from food loss was recently estimated at approximately 18 billion Nis a year, where about 44% of the total foods lost are fruits and vegetables.

This study, the first of a three years study in collaboration with the Volcani Institute and the University of Haifa for the Ministry of Agriculture, focuses on studying and preventing loss throughout the stages of the production and marketing chain of agricultural products: during harvest, storage, classification and packing, food processing, and marketing, and in the consumers' homes. Each of the partners is responsible for a particular stage in the supply chain.

In the first year of the study, we reviewed successful international campaigns to reduce food waste in general and particularly at the retail chain store level. These campaigns attempt to promote appropriate reference to expiration dates, encouraging the consumption of "ugly" fruits and vegetables, encourage the donation of surplus food to the needy, and educate for reasonable and sustainable consumption.

We identified key principles, which offered a basis for further ways and solutions for reducing losses of fruits and vegetables and reducing the food waste problem through education, campaigns to raise awareness and change consumer behavior patterns, and more. In addition, we recommend a review of the suggested protocols and practices in retail chains stores that unfortunately, encourage waste.

J. National Infrastructure
J.1 Future Trends in Israel Seamanship: Marine Manpower

Prof. Yehuda Hayuth; Professional Advisor: Captain Akiva Hofman

About 99% of Israeli trade is transported by sea. Despite the peace agreements with Jordan and Egypt, in times of war it is impossible to rely on these bordering countries for overland trade routes, and therefore, Israel has to maintain and develop its maritime routes in peacetime and all the more so in wartime. Thus, this study focused on analyzing the needs of the Israeli economy, taking into account the expected developments of Israeli shipping and the infrastructure development of ports in Israel.

The study indicates that in recent years there has been a dramatic decrease in the number of maritime officers. In 2010, there were 311 officers, whereas in 2015 this number dropped to 200, and at the end of 2016 contracted to only 129 registered officers. If that was not enough, in 2010 there were 50 captains, in 2015 there were 33 captains, and in 2016 there were only seven captains.

The potential target population for recruiting to the merchant fleet is the graduates of the Marine officers' school and the Navy, members of sailing organizations, and immigrants from the former Soviet Union, in anticipation of attractive world travel, adventure, and a high-income level; however, the reality is different. The training course is long, and the gap between expectations and the reality at sea is large. Working on the sea is characterized by long absences from home and isolation and slow progress through the ranks, and the salary does not meet expectations. These are the main reasons why officers leave the sea. In general, merchant marine officers, especially senior ones, are offered work in on-shore professions in demand by government agencies and companies, and it is more lucrative for them to exchange their sailing for professional offshore work. The report provides recommendations and can be viewed on the SNI Website.

J.2 Shipping and Ports: Trends in vehicle imports at Israeli ports

Prof. Yehuda Hayuth. Professional Advisor: Captain Akiva Hofman

This study was designed to provide an assessment of, as well as to examine, the current and future trends in the Israeli vehicle market and their impact on the shipping and ports industry in Israel, in order to recommend better preparedness of the vehicle import industry. Israel has three ports for unloading vehicles: Ashdod, Haifa, and Eilat. At the beginning of 2016, the directing order whereby vehicles imported from the Far East must be unloaded only at the port of Eilat was canceled. The cancellation of the order allowed importers to choose at which port to unload the vehicles, and today they are allowed to bring cars at will to the port of Ashdod or Haifa via the Suez Canal. The Israeli car import market has been characterized for many years by relative calm. From 2000 to 2009, the scope of car import ranged from 133,000 up to 155,000 per year. Between 2010 and 2014, a rapid increase occurred in the import of cars and the number reached about 260,000 per year. From 2015 to the end of 2016, this increase was accelerated and the number of imported cars will soon reach 350,000 per year. The three ports were completely filled with cars in the past two years and have become one big parking lot: about 35,000 cars in the port of Ashdod, 25,000 cars in the port of Eilat, and 15,000 in Haifa port, leading to a situation that disrupts the routine operation of the ports.

Under the project, the subjects requiring clarification include:

The impact of vehicle import on the performance of the ports, Eilat, Haifa, and Ashdod, in other areas of operation (except vehicles), in order to assess the effect of the cancelation of the restricting order.

Storage areas in the ports and new storage and unloading practices for storing vehicles, including a recommendation for maximum and minimal number of storage days.

The considerations of importers and shipping companies when choosing the unloading port.

Methods for storing vehicles at heights and estimated cost.

Changes in trends of vehicle transport, developments, and innovations at sea and on land (including rail).

K. The Future of Israel
K.1 Grand Strategy

Prof. Zehev Tadmor, Prof. Yadin Dudai

In the course of 2016, the work of the Grand Strategy Forum on a Grand Strategy for the State of Israel, founded by the Samuel Neaman Institute and the Israel Institute for Economic Planning has culminated and reached the stage of conclusion. This Forum has organized, in various activities, more than one hundred and twenty people with experience and stature in areas of national importance to Israel (on a unique platform), with the goal of reasoned thinking about analysis, discussion, planning and formulating a Grand Strategy for the State of Israel.

The Forum was inaugurated on Independence Day of 2013, at the initiative of Prof. Uzi Arad and Prof. Zehev Tadmor, and the summary work entitled "Grand Strategy for the State of Israel: Studies and Directions (2017)" is currently in print, both in Hebrew and English. The volume has four parts: Grand Strategy; an outline for a global and regional policy and arrangements; science, technology, and education; and economics, society, and governance. Prof. Zehev Tadmor, the chairman of the Samuel Neaman Institute, was one of the leaders of the steering committee, and Prof. Yadin Dudai, a senior research fellow at the Neaman Institute, was a member of the Steering Committee and the leader of the team formulating the strategy for science, technology, and scientific-technological education.

L. Information
L.1 Information Centers of MAGNET Consortia

Dr. Daphne Getz; Coordinator: Josef Linhart; Information Specialists: Orly Nathan, Ayelet Raveh, Ella Barzani, Dr. Noa Lavid, Tamar Dayan; Information Systems Manager: Golan Tamir

A computerized information center, one of the largest in Israel, operates at the Samuel Neaman Institute. The center was established to fulfill the needs of knowledge management and to supply information science services to consortia that operate within the MAGNET program and is part of the MAGNET program of the National Authority for Technological Innovation. The information centers are based on a computerized system that was designed according to the requirements of SNI and in collaboration with the consortia. Consortia during 2016 - The Israeli Smart Grid Consortium (ISG): Developing a technological infrastructure for integrating the communication network and elements of command and control in the electricity network through optimal utilization of the energy available in order to realize a greener world. Silicon Wafer Metrology (Metro450): Focusing on identifying the technological challenges involved in developing measurement equipment for large wafers and coping with the challenges common to all measurement machines. Brain Stimulation & Monitoring Toolbox Consortium (BSMT): Developing generic technologies for the integration of neurostimulation and monitoring for treating neurological and psychiatric diseases with closed-loop feedback and personalized treatment. Network Programing (NEPTUN): Research and Development of various technologies for communication network programming. Transportation Electric Power Solutions (TEPS): Developing innovative technologies for electrochemical energy and power sources for all-electric advanced vehicles. Printed Electronics (PRINTEL): Developing the printing of structures, components, and functional devices in two or three dimensions on flexible and other substrates. Extracting insights from Web big-data (INFOMEDIA): Development of generic infrastructure to extract insights and customizing content according to the user needs. Advanced Additive Titanium Development (AATiD): Developing advanced technologies and processes for design, production, characterization and proofing of aero-structures made of complex titanium alloys in three-dimensional printing.

M. Samuel Neaman Website
www.neaman.org.il

The website is managed by Golan Tamir, Chen Bar-Lev, Lior Ben-Ami

The Samuel Neaman Institute's Website serves as a platform for the work of the Institute and its researchers. In fact, the Website serves as the Institute's information center for the Samuel Neaman Institute's activities. Furthermore, all the Institute's publications since 1987 can be downloaded from the Website, and visitors can register for the conferences organized and led by the Samuel Neaman Institute and contact the various researchers working at the Institute. The Website's languages are Hebrew and English, and it is updated daily, thus exposing the Samuel Neaman Institute to both professionals and the general public. The home page of the Institute's Website shows research in progress, new publications, media, news, events, opinion pieces, media news, and other issues. On the Researcher Page, one can see all of the activities of each researcher at the Samuel Neaman Institute: projects, publications, opinion pieces, press, and events that he/she led. In 2016, the number of visitors was 32,169, most of whom (71%) were new; about 5,300 were visitors from abroad. The number of publications downloaded from the Website is 3,157. The five leading publications based on the number of downloads are: Looking at the future of universities: Is the revolution at the door?; Renewable Energy Industry and Energy Efficiency in Israel Updated Status and Policy Recommendations for Leveraging Israeli R&D and Industry; National Environmental Priorities - Tenth Position Paper; Israel's Innovative Agricultural Technology Industry, 2016; Sustainable Development of Marine Aquaculture in Israel; Energy Forum 35: Storage of energy in the production of electricity. The most watched projects were: The Energy Forum; The Higher Education Forum; Integrating the Ultra-Orthodox population into the Israeli Economy; From "Israel 2020" to "Israel 2050,"; and the Wheels of Life report of Israel.

The Samuel Neaman Institute distributes a quarterly newsletter to about 10,000 subscribers, to which one can register on the Website. In 2015, 7,797 visitors watched our **youtube** channel at https://www.youtube.com/user/SamNeamanInstitute

and our **Facebook** page: http://www.facebook.com/NeamanInstitute

* Visitors can be notified about future events, news from the press, and recent publications; visitors can respond to and share any article or news.

List of Publications

Articles can be downloaded from the Samuel Neaman Institute's website

www.neaman.org.il

Mapping Research and Innovation in the State of Israel Assessment of greenhouse gas emissions intensity from electricity generation in Israel
Prof. Ofira Ayalon, Dr. Miriam Lev-On, Dr. Perry Lev-On, Idan Liebes

Greenhouse Gas Emissions Reporting and Registration System in Israel: Summary of Reports for 2015
Prof. Ofira Ayalon, Dr. Miriam Lev-On, Dr. Perry Lev-On, Maayan Zerbib, Idan Liebes

Israel-US Academic Relations
Dr. Daphne Getz, Oshrat Katz Shacham, Bahina Eidelman, Ella Barzani

Insects in the Service of Man: Review and Recommendations for the City of Afula as a Hub to Promote this Field - English version
Dr. Gilead Fortuna, Idan Liebes, Shiri Freund-Koren

Israel Research Status: What Do the Indices Really Describe?
Prof. Uri Kirsch

First & Second Year Report of Ramzor to the North Project
Prof. Nitsa Movshovitz-Hadar, Prof. Atara Shriki, Varda Zigerson, Dr. Ruti Segal

Annual Report for 2015 Samuel Neaman Institute

Mapping Research and Innovation in the State of Israel
Dr. Eran Leck, Dr. Guillermo A. Lemarchand, April Tash

R&D Outputs in Israel: International Comparison of Scientific Publications, 2000-2014
Dr. Daphne Getz, Dr. Noa Lavid, Ella Barzani

National Environmental Priorities, Position Paper X: The Industry of Innovative Agricultural Technology in Israel, 2016
Prof. Ofira Ayalon, Shiri Freund-Koren, Idan Liebes, Maayan Zerbib

Israelis In Berlin – A Community in the Making

Shuki (Joshua) Stauber, Dr. Gilead Fortuna

Energy Forum 37: Energy Security in Israel
Prof. Gershon Grossman, Yigal Evron

Israeli Oil and Gas Sector: Economic and Geopolitical Aspects
Gina Cohen, Miki Korner

National Policy in the Area of Construction
Prof. Arnon Bentur

Energy Forum 36: Energy Efficiency in Israel: Systems Upgrade
Prof. Gershon Grossman, Yigal Evron

UNESCO 2015: Science and Innovation in Israel
Prof. Zehev Tadmor, Dr. Daphne Getz, Vered Gilad, Tsipy Buchnik, Dr. Eran Leck, Ella Barzani, Bella Zalmanovich, Idan Liebes, Oshrat Katz Shacham, Eliezer Shein, Dr. Noa Lavid

The Future of Universities – Is the Revolution in Front of Us?
Prof. Uri Kirsch

Seminars and Conventions

Samuel Neaman Annual Lecture: “Israel in face of the Middle Eastern Chaos Era”, **December 27, 2016. Lecturer:** Dr. Shmuel Bar.

Higher Education Forum Meetings: "**Independence of the Higher Education System in Israel**". Meeting No.3 8.1.16 at Tel Aviv University. Panel members: Prof. Hagit Messer-Yaron, Chairman of the Committee for the Governance Regulation of the Higher Education System, KM Prof. Manuel Trajtenberg, Former Chairman of the Council of Higher Education, Prof. Peretz Lavie, President of the Technion, Chairman of the Universities Board (VERA). Moderator: Prof. Hanoch Gutfreund, Chairman of "Basha'ar", Former President of the Hebrew University.

"The Transition of Academic Education Colleges to PBC Budgeting". Meeting No. 32 1.4.16 at Tel Aviv University. Panel members: Prof. Roni Lidor, the President of the Wingate Institute, Chairman of the National Institute for Testing and Evaluation; Prof. Tamar Ariav, President of Beit Berl College; Prof. Yaffa Zilbershatz, Chairperson of the Council of Higher Education; Michal Neuman, Vice President for Academic Affairs, the Council for Higher Education; Eyal Ram, Head of the Education Employees' Administration, Ministry of Education.

"**Where is the CHE Heading?**" Meeting No. 33 14.6.16 Tel Aviv University. Panel members: Prof. Peretz Lavie, Prof. Mordechai (Motta) Kremnitzer, Prof. Moshe Maor, Prof. Ami Volansky, Prof. Nehemia Friedland, and Prof. Eilon Vaadia. Moderators: Prof. Hanoch Gutfreund and Prof. Hanoch Gutfreund.

"**The Policy of Affirmative Action in Higher Education in Israel**". Meeting No. 34 took place on November 18, 2016 at Tel Aviv University. Prof. Sigal Alon, Department of Sociology and Anthropology, Tel Aviv University.

Energy Forum Meetings: "**Energy Efficiency in Israel: Upgrading Systems**". Energy Forum No. 36, March 7, 2016.

"**Security of Energy Supply in Israel**". Energy Forum No. 37, June 15, 2016.

"**Steps for Implementation Following the Approval of the Gas Layout in Israel**". Energy Forum No. 38, September 26, 2016.

Participation of researchers in conferences in Israel
The Activities of the Center for Industrial Excellence

Date	Conference	Researcher	Location	Subject
12.1	The Knesset Science and Technology Committee on Renewable Energy	Dr. Gilead Fortuna	Israeli Knesset	Presentation of the Samuel Neaman Institute report and its recommendations to promote the renewable energy industry
2.6	The annual conference for quality in practice and theory in the Galilee	Dr. Avigdor Zonnenshain and Dr. Gilead Fortuna	ORT Braude College	Presentation of the Samuel Neaman Institute program as a systemic approach
15.2	MAOF Conference in the South	Giora Shalgi	MAOF South	Excellence of Industry in the South, Presentation of the Neaman Institute Program
17.4	A roundtable meeting on the formulation and implementation of a national program for advanced manufacturing	Dr. Gilead Fortuna and Dr. Avigdor Zonnenshain	Round Room, Samuel Neaman Institute	Presentation of the Samuel Neaman Institute program and an open discussion with 30 leaders in the economy

3.7	Conference at the Ministry of Economy and Industry, led by the Director General of the Ministry of Economy	Dr. Avigdor Zonnenshain and Dr. Gilead Fortuna	The Ministry of Economy, Jerusalem	Presentation of the Samuel Neaman Institute study on advanced production in the world and in Israel and presentation of a program
5.9	Urban renewal	Giora Shalgi	Haifa Municipally	Growing out of crisis

Seminars and Conferences in the Field of Environmental Protection

Date	Conference	Researcher	Location	Subject
5.6	Hot, hotter, boiling: Climate change is already here, what to do?	Prof. Ofira Ayalon	Talkhouse Tel Aviv	Measures to reduce greenhouse gas emissions, and a climate change adaptation program
20-21.6	The Bat-Sheva de Rothschild seminar on climate change and its impact on agriculture, economics, and the environment	Prof. Ofira Ayalon	Ein Tzurim	Agritech and climate changes – new opportunities
20-21.6	Sustaining food systems - The Food Safety and Security Program of the Manna Center	Prof. Ofira Ayalon	Tel Aviv University	Discussion on food wWaste: barriers and regulation - What is missing to create effective regulation?

21-23.6	The 44th Annual Conference of Science and Environment of the Israeli Society for Ecology and Environmental Sciences	Prof. Ofira Ayalon	Tel Aviv University	Discussion: Whether and how science affects decision-makers
21-23.6	The 44th Annual Conference of Science and Environment of the Israeli Society for Ecology and Environmental Sciences	Prof. Ofira Ayalon Dr. Miriam Lev-On Dr. Perry Lev-On	Tel Aviv University	What is measured is also managed: A review of five years of reporting and recording greenhouse gas emissions in Israel
26.9	The Energy Forum: Steps to be implemented after approval of the gas outline in Israel	Idan Liebes	Samuel Neaman Institute	Economic Implications of Natural Gas Exports: A Case Study of Israel

Activities of the Ultra-Orthodox Integration Project

Date	Conference	Researcher	Location	Subject
5-8.1	Workshop on Army-Society Relations in Israel - National Security College	Dr. Reuven Gal	Neve Ilan Hotel	1. Integration of Haredim. 2. National resilience. 3. The IDF recruitment model
18.1	The INSS Annual International Conference	Dr. Reuven Gal	Eretz Israel Museum, Tel Aviv	The recruitment of Haredim to the IDF: A snapshot
27-28.1	The Third Kineret Conference of the Association of Military and Society Researchers in Israel	Dr. Reuven Gal	Kineret Academic College	The recruitment of Haredim to the IDF
8.2	A seminar on the subject of army- social relations	Dr. Reuven Gal (and others)	Afek Command and Staff, IDF	To what extent should the IDF be involved in civic-social-educational issues?
8.5	Yad Ben Zvi Institute -	Dr. Reuven Gal	Yad LaBanim	Changes in the Israeli society

	Studies in Israeli Society		House, Ra'anana	between 1967 and 1977.
19.6	Military Culture in Modern Japan	Dr. Reuven Gal	Kyoto University, Japan	Military culture and youth culture in the Middle East
20.7	Colloquium hosted by Center for Global Security at NDA	Dr. Reuven Gal	National Defence Academy, Yokohama, Japan	Social/National resilience, mental health, and cultural differences: How different communities respond to crises?
27.7	Experts' discourse on excellence in the Haredi community	Dr. Reuven Gal, Yehuda Morgenstern, Yael Elimelech	Trump Foundation Offices, Modi'in	The potential for mathematics studies at a 5-unit level in the Haredi educational system

Activities of the Science and Technology Education Project

Date	Conference	Researcher	Location	Subject
17.5	Launch of World Bank Report 2016	Dr. Daphne Getz, Eliezer Shein	Tel Aviv University	WBG development report 2016: Digital Dividends SNI presentation: Best Practices and Lessons Learned in ICT Sector Innovation - a Case Study of Israel
14-16.9	21st International Conference on Science and Technology Indicators: Peripheries, Frontiers & Beyond	Dr. Daphne Getz	Valencia, Spain	Performance indicators for areas of innovation: international perspective A case study of Be'er Sheva Advanced Technology Park (ATP) in Israel. Daphne Getz, Eliezer Shein

15.12	21St International Conference On Science And Technology Indicators	Tsipy Buchnik	Valencia, Spain	Best-Practice Benchmarking for Israel: The SNI Scorecard - A Multidimensional Perspective

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