Technology Transfer Policy in Israel - From bottom-up to Top down?

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Vice Chair
The Council for Higher Education
Universities as “Intellectual and Economic Engines”
–
Calls for Technology/knowledge Transfer from Academia to Industry
OUTLINES

- PART 1: On Higher Education in Israel
- PART 2: Gov. involvement in TT in IL
- PART 3: Trends & changes in TT policy in IL
Israel: Some Basic Data - 2012

- Area: 22,072 sq. km. (NJ - 22,608)
- Population: ~ 7.8 million (NJ ~ 8.4 million)
- GDP: 860.5 billion NIS ($30K per capita)
- State Budget: 348.2 billion NIS
- Education Budget: 34.9 billion NIS (10% from states budget)
- HE Budget: 7.4 billion NIS (2.1% from state budget)

* Not including Higher Education Budget
R&D statistics (1)

The expenditure on civilian research and development (R&D) in Israel over almost 20 years, 1992-2011:

1. National Expenditure on Civilian R&D, at 2005 Prices
   1995-2011

*Provisional Data
R&D statistics (2)
The expenditure on civilian research and development (R&D) as a percentage of the gross domestic product (GDP) - 2009:

Source: ISRAEL CBS
R&D statistics (3)

The expenditure on civilian research and development (R&D) per capita - 2009:
Israel: Recent Nobel Laureates

- **Arieh Warshel**, Chemistry, 2013, Weizmann Inst
- **Dan Shechtman**, Chemistry, 2011, Technion
- **Robert Aumann**, Economics, 2005, HUJI
- **Aaron Ciechanover**, Avram Hershko Chemistry, 2004 - Technion
- **Daniel Kahneman**, Economics, 2002 - HUJI
No. 5 in scientific publications/capita (in ’84–’88 this was No. 1)
Average citations/paper: Israel, OECD, World, 1981-2008

Avg. of 5.57 Citations/paper
Lessons from IL experience – How to maintain top level Science together with successful High-Tech Industry?
<table>
<thead>
<tr>
<th>Category</th>
<th>Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Students</td>
<td>298,600</td>
</tr>
<tr>
<td>Bachelor</td>
<td>230,000</td>
</tr>
<tr>
<td>Master</td>
<td>57,000</td>
</tr>
<tr>
<td>Ph.D.</td>
<td>11,600</td>
</tr>
<tr>
<td>Faculty</td>
<td>~ 7,000</td>
</tr>
<tr>
<td>Tech &amp; Admin.</td>
<td>~ 10,000</td>
</tr>
<tr>
<td>BUDGET (est. all sources)</td>
<td>~$3.0 billion</td>
</tr>
</tbody>
</table>
## HEI in Israel 2012/13

### INSTITUTIONS

<table>
<thead>
<tr>
<th>Type</th>
<th>Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>Research Universities</td>
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<td>Open University</td>
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<tr>
<td>Art Academies</td>
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<tr>
<td>Comprehensive Colleges</td>
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<tr>
<td>Engineering Colleges</td>
<td>7</td>
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<td>Teachers’ Colleges</td>
<td>23</td>
</tr>
<tr>
<td>Non-Budgeted Colleges</td>
<td>15</td>
</tr>
</tbody>
</table>
Research University vs. Colleague

**PRO**

Research:
- Grants,
- TT,
- Facilities,
- Inst.

**TEACHING & RESEARCH**
- Faculty,
- Graduate students

**HEI**

Teaching:
- Undergrad

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The 7 research universities (2012/13):

• The Technion
• The Hebrew University in Jerusalem
• Tel Aviv University
• Bar Ilan University
• Ben Gurion University in the Negev
• Haifa University
• The Weizmann Institute
All Israeli research universities are in the top 500 of the Shanghai list.

Impact Factor of Scientific Work
Israeli Universities

```
Number of Citations per Papers

<table>
<thead>
<tr>
<th>University</th>
<th>Citations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ben Gural</td>
<td>6.38</td>
</tr>
<tr>
<td>Technion</td>
<td>8.48</td>
</tr>
<tr>
<td>Bar Ilan</td>
<td>8.56</td>
</tr>
<tr>
<td>Tel Aviv</td>
<td>9.11</td>
</tr>
<tr>
<td>Jerusalem Weizmann</td>
<td>11.98</td>
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<tr>
<td>Many more</td>
<td>19.73</td>
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</tbody>
</table>
```

“Best Place in Academia” ranked No. 1 in 2011 among top International academic Institutions”

TheScientist.com
Higher Education in Israel - history

Two institutions served as the basis for the Israeli HE System:

- 1924 - The Technion – Israel Inst. of Technology
- 1925 - Hebrew University of Jerusalem

1948 – the establishment of the State of Israel

- 1958 – the Council for Higher Education (CHE) Law
- 1977 – the Government Decision 666 established The Planning and Budgeting Committee (PBC), as a sub-committee of the Council for Higher Education.

- 1948-1990 – HE as an “ivory tower”
- 1990’s – Transition to mass higher education
The Council for Higher Education (CHE)

Serves as the State of Israel's guiding institution for all matters related to Higher Education

- Approve and maintain the establishment of institutions of higher education
- Accreditation: New Degrees & Programs
- Licensing branches of HEI’s outside of Israel
- Quality Assurance
The Council for Higher Education (CHE) – Establishment & Structure

- The CHE was established in 1958 according to “The Council for Higher Education Law”.

Structure:

- 25 members.
- Formally chaired by the Minister of Education.
- Majority - faculties from HEIs.
- 2 Student Union representatives.
- 4-5 Public representatives.
The Planning and Budgeting Committee (PBC)

• Established by the Government in 1977

• **Exclusive** in all matters relating to the budget allocations and approvals for Israel's accredited public HEI’s.

• National Planning of HE System
Breakdown of the Income of the HEIs

Gov (PBC Allocations) – 65%

Other – 14%  Tuition Fees – 21%
HE-GOV interface in IL

The State
Parl. GOV
others MOF MOE

PBC
PLANNING & BUDGETING
(partially)

CHE
ACCREDITATION, QA

Higher Education institutions
OUTLINES

● PART 1: On Higher Education in Israel
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Industry, university, government

Researchers (people!), Faculties, Administration, etc.

Entrepreneurs, VCs, Productions, Marketing, Management, Stocks holders etc.

Knowledge

Technology/knowledge Transfer

Money

Government

Knowledge

Industry

Universe
The Role of Governments

1. Financial support for academic, basic research. (Public support is essential for academic freedom.)

2. Intervention programs for “bridging the gap”.

3. Legal infrastructure: intellectual property rights (IPR) laws, Taxations, innovation law, etc.
Traditional TT Regulation in IL:

- Generic IP legislation (Patents, Copy rights)
- Government’s involvement mainly by intervention programs (1)
- Each university decides on its own policy and regulations independently. However, they share common principles (3)
- Each university has its own TTC (2)
- TTCs are for-profit companies, own by the universities.
- TTCs are handling universities IP and are responsible for commercialization, following the university’s policy.
(1) Government’s involvement by intervention programs

- Under the responsibility of the office of the Chief Scientist at the ministry of economy (OCS).

- Different intervention programs for university-LOCAL industry collaboration.

- Restrictions on internationalization of knowledge created under these programs.
Main Gov. Intervention Programs

OCS Instruments Along The Value Chain

- **Pre-Seed**
  - Tnufa (100%)
  - Technological Incubators (90%)

- **Generic R&D**
  - Magnet (60%)
  - Infrastructure for R&D

- **Competitive R&D**
  - Industrial R&D
  - Seed Fund
  - Support of Traditional Industry

- **Cooperative R&D**
  - Bi-national Funds
  - Bi-national Agreements
  - EUREKA!
  - Galileo
  - Global Enterprises R&D Cooperation

- **Support of Research Institutes**
  - ISERD (Europe FP)

- **Matimop**
  - Israeli Industry Center for R&D
(2) Each university has its own TTC

Weizmann Institute    Yeda    1959
Hebrew University     Yissum   1964
Tel Aviv University   Ramot    1973
(3) main common principles:

- Researchers must disclose to the university any research of commercial potential.
- Universities own the IP of “institute inventions” (service invention).
- Institute inventions are discoveries of employees and others, related to the university.
- Institute inventions are commercialized solely by the TTC.
- Commercialization revenues are shared by the inventors (40-50%; 50-60%) and the university.
- If the TTC chooses not to file for patent, the inventors can do it at their own expense.
The technology transfer process at TAU

“Bridging the Gap”
Sponsored Research

Discovery & Innovation
Evaluation
Patenting & Marketing Strategy
Business Development
Follow Up on Contract

IDF
Revenues 40-20-40

To inventors

Publications

Academic Basic and Applied Research
Commercialization of Knowhow—Survey of technology transfer and IP companies 2008-2009

- Approximately **400 new patent applications** were filed **each year** in Israel and abroad by the TTCs (approximately 94% of total applications filed abroad).
- Commercialization of TTCs focus almost exclusively on inventions.
- Most of the revenues from sales of intellectual property (IP) and gross royalties received in 2009 came from Life Sciences and Medicine (approximately 92%).
- All the TTCs have affirmed that the main means of protecting IP is applying for a patent.
Since their establishment, TTCs have been involved in the establishment of **151 startup companies**, of which 44 startup companies are non-operational.

In 2008-2009, approximately **1,000** IP invention disclosure reports were submitted by the researchers of various universities for examination by the TTCs; of those, the companies decided to protect approximately **700**.

Most commercialization done by the TTCs is to Israeli companies.

Patent distribution by field:

![Diagram 1. New Patent Applications by Fields](image-url)
International Comparison

<table>
<thead>
<tr>
<th>Country</th>
<th>Israel</th>
<th>Canada</th>
<th>Australia</th>
<th>USA</th>
<th>UK</th>
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<tr>
<td><strong>Years</strong></td>
<td>2008</td>
<td>2009</td>
<td>2008</td>
<td>2008 2009</td>
<td>2008 2009</td>
</tr>
<tr>
<td># of ID received</td>
<td>- 992</td>
<td>1,613 -</td>
<td>1,300 1,409</td>
<td>17,694 18,163</td>
<td>3,800 3,900</td>
</tr>
<tr>
<td># of invention disclosures for 1000 university researchers</td>
<td>- 110</td>
<td>25.9 -</td>
<td>21.2 -</td>
<td>- -</td>
<td>23.2 23.1</td>
</tr>
<tr>
<td># of new patent app.</td>
<td>395</td>
<td>384</td>
<td>755 -</td>
<td>1,274 1,253</td>
<td>11,197 11,260</td>
</tr>
<tr>
<td># of new patent applications for 1000 university researchers</td>
<td>43.2</td>
<td>42.7</td>
<td>12.1 -</td>
<td>20.8 -</td>
<td>- -</td>
</tr>
<tr>
<td># of patents granted</td>
<td>- -</td>
<td>346 -</td>
<td>595 600</td>
<td>2,933 3,088</td>
<td>653 827</td>
</tr>
<tr>
<td>Revenues from commercialization million euro</td>
<td>314</td>
<td>367</td>
<td>38 -</td>
<td>50 43</td>
<td>1,712 1,279</td>
</tr>
</tbody>
</table>

- Israel is internationally leading in ID, patents and revenues per researcher (about 200K euro commercialization income per a university researcher)
OUTLINES

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Higher Education in Israel - Expanding system

- 1989/90: 21 HEI (8 universities + 13 colleagues), 88,800 students.
- 2011/12: 67 HEI, (8 universities + 36 academic colleagues, 23 pedagogical colleagues) 297,800 students.
# of Institutions of HE in Israel

<table>
<thead>
<tr>
<th>Year</th>
<th>Universities</th>
<th>Budgeted Academic Colleges</th>
<th>Non-Budgeted Academic Colleges</th>
<th>Teacher Training Colleges</th>
</tr>
</thead>
<tbody>
<tr>
<td>1989/90</td>
<td>7</td>
<td>5</td>
<td>8</td>
<td>7</td>
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<tr>
<td>1994/95</td>
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<td>1999/00</td>
<td>19</td>
<td>7</td>
<td>16</td>
<td>2</td>
</tr>
<tr>
<td>2004/05</td>
<td>26</td>
<td>7</td>
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<td>2</td>
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<td>2009/10</td>
<td>24</td>
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<tr>
<td>2012/13</td>
<td>22</td>
<td>16</td>
<td>20</td>
<td>2</td>
</tr>
</tbody>
</table>

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Weizmann's Patent Royalties

For the first time in its distinguished 45-year history, the Weizmann Institute of Science has revealed its income from its patents.

Royalty revenues from commercialized products by the institute and its staffers has amounted to a billion shekels from 2007 to 2012, the institute revealed.

The Weizmann Institute is Israel's smallest higher education institution, it receives the least financial support from the government and it is among the world's five highest earners in terms of commercialization of patents.

Royalties amounted to $93 million in 2003, the institute revealed, building on $72 million in 2002. In that year Weizmann placed third in the world, among academic institutes, from the perspective of royalties income. Its income is double that of the Hebrew University of Jerusalem, which has twice as many staffers, and outstrips academic institutes in the U.S. and Europe that have far greater R&D budgets.
The success of universities’ TT in IL has derived the Government (*MOF*) to study TT in universities, and to look for un-exploited potential for TT.

They have decided to adopt successful TT tools from the research universities and to provide them to others.

In particular, they have initiated *top-down* tools to explore TT in other-than-research universities.
1. National TTC

- To explore the potential TT in colleges (and others), the government initiated “a national TTC”.
- Its structure of the operation is similar to universities’ TTCs, but it is financially supported by the PBC.
- This TTC must provide subsidized TT services to budgeted HEI, and can provide TT services to others.
The technology transfer process at TAU

“Bridging the Gap”

IDF

Revenues 40-20-40

To inventors

Academic Basic and Applied Research

publications

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Evaluation

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Business Development

Follow Up on Contract

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2. National “Bridging the Gap” fund: KAMIN

- Most research universities had an internal “bridging the gap” funds, to accelerate commercialization of potential technologies by demonstrating feasibility.
- These funds were based on philanthropy or semi-philanthropy resources.
- Much of the funds vanished at the 2008 crises.
- Based on the existing internal model, the MOF initiated a national “bridging the gap” fund – KAMIN, operated by the OCS and open to ALL.
3. TT in governmental hospitals and research institutions.

- After being un-regulated at one hand, but not free to operate (as HEIs) on the other hand, TT in hospitals and other gov.-owned RIs has been dealt with in the last decade.

- The resulting solution is a similar arrangement to the one built (bottom-up) by the research universities.
The Israel Tech Transfer Organization (ITTN) serves as the umbrella organization for Israel’s technology transfer companies. These companies are affiliated with the country’s world-renowned universities and research institutions.

Currently, the 12 partnering organizations comprise the shareholders. ITTN intends to add more members from Israel’s government-owned medical centers and research institutions.

ITTN is a private non-profit organization.

The Partnering Organizations

ITTN’s partners are affiliated with some of the world’s leading educational and research institutions.
Summary

- TT in IL has started by the research universities as a bottom-up operation, under their built-in autonomous and self definition of their mission.

- Its success, and the 21-century trend to convert HEIs into “Economic Engines” have caught the attention of the government.

- After few unsuccessful attempts to regulate the universities TT operations, the top-down involvement has turned into adaptation of their best practice tools and applying it to other potential knowledge/technology sources.
Results? Not yet…
Meanwhile -

Thank You

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