

Yissum:

The research development company creating multi-billion dollar companies

Jerusalem, Israel





General Information

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| Title | Yissum – The research development company of the Hebrew University of Jerusalem (HUJI) | | | | | | | | | | |
| Pitch | How an independent corporation responsible for the protection and commercialisation of university research created multi-billion dollar companies | | | | | | | | | | |
| Organisations | The Hebrew University of Jerusalem and Yissum | | | | | | | | | | |
| Country | Israel | | | | | | | | | | |
| Authors | Arno Meerman & Hacer Tercanli (University Industry Innovation Network) | | | | | | | | | | |
| Nature of interaction | <table><tr><td><input type="checkbox"/> Collaboration in R&D</td><td><input type="checkbox"/> Lifelong learning</td></tr><tr><td><input checked="" type="checkbox"/> Commercialisation of R&D results</td><td><input type="checkbox"/> Joint curriculum design and delivery</td></tr><tr><td><input type="checkbox"/> Mobility of staff</td><td><input type="checkbox"/> Mobility of students</td></tr><tr><td><input checked="" type="checkbox"/> Academic entrepreneurship</td><td><input type="checkbox"/> Student entrepreneurship</td></tr><tr><td><input type="checkbox"/> Governance</td><td><input type="checkbox"/> Shared resources</td></tr></table> | <input type="checkbox"/> Collaboration in R&D | <input type="checkbox"/> Lifelong learning | <input checked="" type="checkbox"/> Commercialisation of R&D results | <input type="checkbox"/> Joint curriculum design and delivery | <input type="checkbox"/> Mobility of staff | <input type="checkbox"/> Mobility of students | <input checked="" type="checkbox"/> Academic entrepreneurship | <input type="checkbox"/> Student entrepreneurship | <input type="checkbox"/> Governance | <input type="checkbox"/> Shared resources |
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| Supporting mechanism | <table><tr><td><input type="checkbox"/> Strategic</td></tr><tr><td><input checked="" type="checkbox"/> Structural</td></tr><tr><td><input type="checkbox"/> Operational</td></tr><tr><td><input type="checkbox"/> Policy</td></tr></table> | <input type="checkbox"/> Strategic | <input checked="" type="checkbox"/> Structural | <input type="checkbox"/> Operational | <input type="checkbox"/> Policy | | | | | | |
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| Summary | Yissum, the research development company of the Hebrew University of Jerusalem (HUJI), is one of the top 15 technology transfer companies in the world in terms of revenues. Yissum has partnerships with numerous industry leaders such as Johnson & Johnson, Roche, Merck, Teva, Adobe, Google as well as Lockheed Martin and its technologies are sold annually for over \$2b. Yissum's mission is to promote technology transfer of the research of the university, while maximising returns to support research, education, and scientific excellence. Its success is based on its autonomy and legal status as a private entity, its hiring policies, specifically industry experience of the staff as well as the strict HUJI policies that require equity profit sharing. | | | | | | | | | | |



Introduction & Overview

1. BACKGROUND

Founded in 1964, Yissum Research Development Company Ltd. (Yissum) is a wholly-owned company of the HUJI and is responsible for protecting and commercialising the intellectual property of HUJI. For over fifty years, this Israeli company has been successfully marketing academic research, which has led to it being among the **top 15 technology transfer companies in the world** in terms of revenues.

For many, this rigorous R&D commercialisation scene represented by Yissum doesn't come as a surprise. Israel is recognised as a research-driven tech giant, ignited by up to 30% of the military budget in the 1960s being spent on military research¹. Since its launch, **Yissum has forged numerous partnerships with industry leaders** such as Novartis, Johnson & Johnson, Roche, Merck, Teva, Adobe, Google, Lockheed Martin, Syngenta, Vilmorin, Monsanto and more, through its reputation and commitment to technology transfer. Products that are based on **Yissum's technologies are sold annually for over \$2b (€1.9b)**.

Yissum is built on experience, with its management currently consisting of 25 staff members and 13 directors who all have a history in business or as HUJI leaders. The company's mandates include acting as the university's proxy in dealing with inventions, representing the university in research commercialisation matters, reinforcing communication among the academic and industrial community, and attracting entrepreneurs for economic cooperation. The range of intellectual property produced by the HUJI researchers includes inventions in a number of areas, including nanotechnology, healthcare, pharmaceuticals, agriculture, environmental technologies, computer science and material sciences.

2. OBJECTIVES AND MOTIVATIONS

Yissum is driven by the motivation to make an improvement in the lives of society, both within and beyond the borders of Israel, through technology transfer. Capturing this globally oriented organisational goal, the mission of Yissum is to **promote the transfer of the research** of HUJI for the benefit of society, while **maximising returns to support research, education, and scientific excellence**.

Along the same lines, the goals and objectives of Yissum are specified as:

- ▶ to **protect, promote, and market** commercially promising inventions and knowledge developed at HUJI;
- ▶ to **find the 'right fit'** for each intellectual property asset in the university's portfolio; and
- ▶ to **deliver, manage, and optimise** knowledge transfer to the global market through a variety of business development activities and services.

From a more national perspective, the motivations of Yissum also involve contributing to the social and economic development of Israel, as an organisation paying taxes to Israel, and providing job opportunities to as many as 600 employees.

3. STAKEHOLDERS

The major stakeholders involved include:

- ▶ Yissum- Although an independent corporation, the main responsibility of Yissum is protecting and commercialising the IP of HUJI. Yissum caters to the needs of a wide variety of parties, ranging from the university's researchers, industry partners, private investors, government and of course its sole shareholder, HUJI.

The main activities, outputs and funding of Yissum relate to the below-mentioned stakeholders.

- ▶ Hebrew University Jerusalem – As a 100% shareholder of Yissum, HUJI researchers provide the research for Yissum to commercialise. In addition, HUJI provides grants to researchers in collaboration other local institutions;
- ▶ Government - The government institutions of the Israeli Ministry of Trade and Industry, and the Office of the Chief Scientist (OCS) provide grants for industrial research through the programmes *Nofar* and *Kamin*, and for technology transfer, the programme *Magneton*;
- ▶ Industry – this group includes long-term business partners such as Roche as well private investors and venture capital firms, which contribute to dedicated investment funds established by Yissum. These funds include *Integra Holding*, and *Agrinnovation*;
- ▶ Researchers - In addition to the main investors and shareholders, Yissum researchers are also regarded as an important group of stakeholders, as they benefit through the financial returns of patenting and commercialisation, as well as through professional recognition and advancement of their expertise; and
- ▶ Students of the HUJI - students of HUJI also take advantage of the funding opportunities for their start-up and other entrepreneurial initiatives, through Yissum's partnership with the Student's accelerator: HUStart.





Implementation

4. INPUTS

Two of the important inputs contributing to the success of Yissum and its shareholder HUJI are the human resource approach of HUJI and the strategic approach of Yissum towards financial resources.

The leading and expert human capital possessed by HUJI underpins Yissum's activities, however this does not occur by chance. **A strategic hiring policy is the foundation behind this unique selection of individuals** and it is this policy that safeguards the future of HUJI's scientific aims and Yissum's commercialisation activities. New staff are selected based on the trilateral competencies of having an excellent research profile, focus on applied research as well as previous industry experience. Particularly interesting for both HUJI and Yissum are researchers with experience in larger corporates and that of business developers, innovators and business leaders because it provides them with **deep industry knowledge and pre-existing contacts to industry**. These attributes contribute to producing excellent scientific research, (which contributes to HUJI's aims) that is already market-aligned and possessing commercial potential (which contributes to Yissum's objectives).

As outlined in the stakeholders section of the case, the **funding is brought in through a mixture of private and state investors**:

- ▶ *External investment* - OCS, the Ministry of Trade and Industry and private investors. In addition to the external resources;
- ▶ *Internal organic growth* – Yissum also puts great emphasis on internal capacity-building, through giving back 60% of its revenues to the HUJI employees, divided into 40% that goes to their pockets and 20% to their research lab. The remaining 40% is allocated to the overall HUJI budget. This gives the research a financial incentive to invest, patent and commercialize and allows them to reinvest these funds into their future research as well.
- ▶ *Internal Seed fund* - Yissum generated its own internal seed funds, *Jumpstart funds*, through a yearly investment of \$1m (€943,000) of its total revenues in 25-30 interesting projects. After *Integra Holding* and *Agrinovation*, Yissum is now establishing the *Materials and Computer Science Fund* with four promising projects and a projected investment of \$20m (€18.9m).

5. ACTIVITIES

A large share of Yissum's success comes from that of its shareholder, HUJI. HUJI is one of the largest research hubs in Israel and is responsible for 43% of Israel's biotechnology research, 30% of all Israeli academic research, has over 100 research centres spread over 6 campuses and currently employees over 1,000 researchers. This, in combination with their previously described approach towards hiring new staff, ensure a continuous output of excellent research for Yissum to market.

Primary activities

Yissum activities are primarily concentrated on the **administration of the entire transfer cycle of HUJI** and more specifically on the **commercialisation of R&D**, which occurs in one of four different ways: collaborative research, joint ventures, licensing and spin-offs.

The transfer cycle starts in one of two ways, either in a collaborative research partnership whereby the research is undertaken collaboratively with a third party, or when a HUJI researcher makes a new discovery or invention and submits a 'research disclosure' to Yissum.

Yissum facilitates **collaborative research partnerships** between businesses and the researchers. In such agreements, it is ensured that each partnership is tailored to the requirements of all elements of the collaboration including the inventor, the invention/technology, the partner, and the HUJI.

When the process starts **with a 'research disclosure'**, the disclosure is then evaluated for its commercial potential. For projects deemed to possess potential, Yissum then registers the intellectual property. From there, the new technology or research project takes one of two paths: **the patent is licensed to interested companies**, or **it is encased and commercialised in a new company** (spin-out or joint venture) that will develop the invention themselves.

In regards to the form of **licensing**, Yissum mainly grants patent licenses to exploit the inventions rather than selling intellectual property to third parties. These licenses usually include three elements: Royalties, equity and research.

The decisions on establishing a **new company** are made only after careful calculations of the potential future benefits, and the factors such as maturity of the technology, ability of the researcher to lead the efforts of the emerging company, the applications of the technology, and the ability to raise money.

Starting **joint ventures** with industrial and commercial enterprises takes the form of a start-up company, in which Yissum transfers patents and know-how under license to the joint venture. In addition to their role in the examination of profits and risks in the establishment, Yissum contributes to the professional expertise and technical support of the ventures after their launch.

Emerging activities

While the R&D commercialisation activities are at the core of their activities, in recent years Yissum has been **cooperating with institutional and governmental stakeholders on several start-up and business incubation projects**, along with the **development of innovation oriented study programmes** to contribute to the development of entrepreneurial skills and mind-sets among students, academics, and professionals.

There have also been a few entrepreneurial initiatives Yissum has been directly and indirectly involved in over the past years. One of the most prominent examples is Yissum's participation in a project to operate a tech incubator under Israel's National Incubator Programme, with Jerusalem Venture Partners (JVP), Motorola Solutions (NYSE: MSI) and Reliance Industries (NSE: Reliance). Yissum also joined forces with the Asper Center for Entrepreneurship and Innovation to support the new HUJI initiative 'HUStart' by the Hebrew University Entrepreneurship Centre that provides **practical education, support, and mentorship needed for the students and Jerusalem community members to become successful entrepreneurs**. A new Executive MBA programme with a focus on Innovation and China, The Trans-Disciplinary Innovation Programme (TIP), and InnovNation (in collaboration with the Israeli Ministry of Economy, the Israeli Ministry of Foreign Affairs, and the Singularity University-Israel) are a few other examples of training programmes through which Yissum offers insights and know-how.

6. OUTPUTS

Yissum has an exceptional track record in the valorisation of research outputs since its establishment. In its 50 years of existence, the institution has:

- ▶ started more than 120 spin-off companies including internationally renowned Mobileye, Collplant, Qlight, Briefcam, and Avraham Pharma, some of which are valued over \$10b (€9.4b) on the stock exchange;
- ▶ registered 9,800 patents that cover more than 2,750 inventions; and
- ▶ licensed 880 innovations.

Today, commercialised products by the HUJI researchers generate over \$2b (€1.9b) in worldwide sales every year. In 2015 alone, 165 new inventions were generated by the researchers, with 92 patents granted.

Yissum's activities have led to long-term research collaborations with major corporations, including e.g. Intel, Google, Philips, Coca Cola, Roche, GM, and P&G, as well as the establishment of new cutting-edge research facilities for 3D printing, cybersecurity, stem cell, and bioengineering research.

7. IMPACTS

Technology transfer facilitated by Yissum enables the inter-relations with industry – technological incubators, large enterprises as well as start-up companies – in high-tech and bio-tech fields, and this interaction **bolsters the national economy as well as its scientific reputation**.

Beyond the financial returns, the technologies generated by the scientists and commercialised by Yissum are now available worldwide, **benefiting the society** in a wide range of areas, including healthcare, road safety and nutrition.

Some of the ground breaking products marketed by Yissum are:

- ▶ *Exelon* - a cholinesterase inhibitor which treats the symptoms of Alzheimer's disease and other dementias. The drug was sold worldwide by pharma giant Novartis, with global sales of over \$1b (€943m) in 2012;
- ▶ *Doxil* - an oncology product for ovarian and breast cancer patients developed by the HUJI researchers;
- ▶ *Long shelf life cherry tomatoes* - cocktail hybrids produced by the researchers from HUJI Faculty of Agriculture;
- ▶ *Mobileye* - a collision avoidance technology that alert the drivers when they are getting too close to the car in front of them.

These high-impact products and other services introduced to the world by Yissum is clearly in line with the institutional vision of the university: the pursuit of universal values of science.



Support & Influencing factors

8. SUPPORTING MECHANISMS

The **triple-helix** of HUJI, public and private industries and the Israeli government, supported by Yisum, drives the success of Yisum's activities. The synergies among those partners generate generous incentives for pre-seed and competitive R&D projects to boost the outputs of innovative research. Among those, the *Technological Incubators programme*, the *Tnufa programme*, the *Noffar Fund*, and the *R&D fund* are some of the state initiatives that seek to match the public and private interest to foster early-stage research projects.

A further mechanism supporting this process is the **expertise of Yisum staff and the well-established tech-transfer process** as well as the administrative support system that surrounds it. As further discussed in the following section, a transparent and straightforward patenting procedure together with the support provided throughout the process, encourages researchers to be involved in applied sciences.

The **transparency of Yisum's activities**, and how researchers, business and government interact with Yisum, contributes substantially to the success of Yisum and occurs through a number of mechanisms:

- ▶ Government supported R&D takes place within a legal framework called 'The Encouragement of Industrial Research and Development Law' that regulates royalties of the commercialised products;
- ▶ Yisum implements strict equity profit sharing policies and relevant property ownership structures. According to the arrangement, the regulations assign 40% of the research commercialisation revenues to the individual researcher; and
- ▶ At the national level, swift yet high-quality patent examination process facilitates a faster patenting process.

9. BARRIERS AND DRIVERS

Yisum has identified a few administrative and financial challenges that the institution has experienced during its development. Earlier in its development especially, the **limited funding opportunities** available for University-Business Collaboration (UBC) activities was a major inhibitor, which stemmed from the lack of venture partnerships.

Secondly, **commercialisation can be a long and complex process**, which involves many legal procedures and documents but also takes a great deal of time. Therefore, it was emphasised that it is of the utmost importance to ensure an early protection of the technology and use the business and legal terms accurately from the very start. An early-stage technology will potentially change hands many times, involving researchers, investors and attorneys, which makes it difficult to foresee all scenarios and increase the risk of early-disclosures.

The UBC ecosystem within the HUJI promotes an accommodating environment for Yisum's activities to be facilitated. **Shared participation of Yisum staff and researchers and their external coop-**

eration partners is seen as fundamental for the success of technology transfer, particularly to overcome the complex administrative procedures and legal issues involved in the technology transfer process.

Yissum, in that regard, maintains an environment in which the faculty can focus on their research activities, where office staff take on the bureaucratic work, and assist them in their dealings with the administrative processes related to patent applications.

10. CONTEXT

The UBC context in Yissum is characterised by two crucial elements that facilitate innovation:

- ▶ **The organisational context** – this is composed of well-accomplished researchers of the Hebrew University, with the knowledge and expertise in the areas such as pharmacology, medicine, agriculture, brain research, engineering and computer science, nanoscience and advanced materials, clean-tech, veterinary, education. This is combined with a stimulating organisational environment that facilitates innovation, which contributes to the rate of academic engagement with 40% of academics involved in commercial links with industry;
- ▶ An enabling national context - Israel has the reputation of 'Start-Up Nation' in reference to the economic miracle of the country, and reported to have more high-tech start-ups and venture capital industries per capita than any other country in the world². Behind this rapid rise of the country as a tech-power lies the fact that the country has limited resources, which necessitates concrete efforts to maximise human intellectual capacity. The investments are already paying off, in the form of foreign investments as well; according to Forbes, more than 250 global companies have their R&D labs in Israel, with 80% of them being Fortune 500 companies³.

11. KEY SUCCESS FACTORS

There are **three key elements** that have prepared Yissum to emerge as one of the most prominent technology transfer offices of its kind.

To start with, Yissum is a profit oriented company that is entirely owned by the HUJI, with a majority of board members drawn from industry. Here, Yissum's degree of **autonomy and legal status as a private entity**, despite having organic ties to the university, allows it to earn revenues and hold equity in spin-off companies. Second, **its hiring policies**, specifically **industry experience** amongst board members and key management staff which facilitate the UBC process and ensure the institutionalisation of UBC activities undertaken by Yissum. This experience, complemented by staff holding **PhD degrees in the core industries**, e.g. agriculture, chemistry, life sciences, humanities and computer science and the **patent portfolio of the HUJI staff** provide Yissum with a unique mix of human resources. The third element is the **strict HUJI policies that require equity profit sharing**. The university has an intellectual property ownership structure that incentivise commercialisation by assigning 40% of revenues to the individual researchers and their team, 20% to their laboratory, and 40% to the university. This arrangement in the allocation of profits motivates researchers to conduct more advanced applicable research and pursue commercial links with the industry. Given that more than 40% of the academics are involved in UBC activities, the impact of the policy has proven its effectiveness.



Further Information

12. SUSTAINABILITY MEASURES

The financial sustainability of Yissum is maintained through the income from out-licensing of patents, public-private investment funds, spin-off companies, and industry research collaborations. High-impact research is regarded as the core trigger of these income streams. Policies at the national level, and incentives for technology transfer activities across Israel are other elements that ensure the financial sustainability of Yissum.

13. TRANSFERABILITY

Yissum's successful example is closely observed by international counterparts, with the institution hosting delegations to examine its system for the possibilities of replication in similar institutional contexts, or Yissum staff being invited for seminars and workshops at various technology transfer and entrepreneurship centres around the world to share its success story. Within this context, the most recent interactions have taken place with teams from the USA, Australia, Finland, Japan, and Canada.

14. AWARDS AND RECOGNITION

Since its establishment, Yissum has been recognised by several institutions for its successful UBC activities:

- ▶ One of the blockbuster start-ups of Yissum, Qlight, has received the award 'Company of the Year 2014' in the Nanotechnology field; and
- ▶ In 2005, Yissum ranked second in commercial profit earnings among Israel's academic institutions, the first being the Weizmann Institute of Science's company, Yeda Research and Development.



15. PUBLICATIONS AND ARTICLES

EU-Japan Centre for Industrial Cooperation (2016) *Technology Transfer Webinar 8: Maximizing Efforts by Harnessing the Power of Social Networks*, available online at:

<http://www.eu-japan.eu/events/technology-transfer-webinar-8-maximizing-ip-marketing-efforts-harnessing-power-social>

Forbes (2016a) *Secrets to Israel's Innovative Edge*, available online at:

<http://www.forbes.com/sites/davidyin/2016/06/05/secrets-to-israels-innovative-edge/#3ad9e861170e>

Forbes (2016b) *Secrets To Israel's Innovative Edge*, available online at:

<http://www.forbes.com/sites/davidyin/2016/06/05/secrets-to-israels-innovative-edge/5/#6014a72945b3>

HIJU (2016) *Visit to Yissum – Technology Transfer Company of HIJU by Victorian Liberal Parliamentary Delegation*, available online at: <http://austfhu.org.au/events/28/visit-to-yissum-technology-transfer-company-of-the-hebrew-university-of-jerusalem-by-victorian-liberal-parliamentary-delegation/>

The Conference Board of Canada (2016) *Executive Study Tour: Innovation and Cyber Tech Cluster*, available online at:

http://www.conferenceboard.ca/Libraries/NETWORK_PUBLIC/Nov2016_agenda_Israel.sfb

The Economist (2010) *Beyond the start-up nation*, available online at: http://www.economist.com/node/17796932?story_id=17796932

Yissum (2016) *Director of one of the World's leading tech transfer firm's, Yissum, visits ACE*, available online at: <http://www.openpr.com/pdf/329824/Director-of-one-of-the-World-s-leading-tech-transfer-firm-s-Yissum-visits-ACE.pdf>

16. LINKS

Yissum: <http://www.yissum.co.il>



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18. REFERENCES

- ¹ The Tower: Forbes: Israel's Tech Success Fueled by Turning Limitations into Advantages <http://www.thetower.org/3477-forbes-israels-tech-success-fueled-by-turning-limitations-into-advantages/>
- ² The Economist (2010) Beyond the start-up nation, available online at: http://www.economist.com/node/17796932?story_id=17796932
- ³ Forbes (2016a) Secrets to Israel's Innovative Edge, available online at: <http://www.forbes.com/sites/davidyin/2016/06/05/secrets-to-israels-innovative-edge/#3ad9e861170e>