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## Міжнародна співпраця: шляхи і перспективи

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### СПІВРОБІТНИЦТВО УКРАЇНИ ТА ІЗРАЇЛЮ В ГАЛУЗІ НАУКИ І ТЕХНОЛОГІЙ (1991–2013 рр.)

*Упродовж 1991–2013 рр. українсько-ізраїльські відносини, в тому числі у науково-технічній галузі, розвивалися нерівномірно, – інколи швидко набираючи обертів, інколи уповільнюючись. Цьому існує низка причин як об'єктивного, так і суб'єктивного характеру. Водночас численна (понад 360 тис. осіб) громада колишніх громадян СРСР або вже незалежної України, суттєвий науково-технічний потенціал обох країн та багато спільних інтересів і проблем створюють гарне підґрунтя для активізації взаємодії наших держав за такими напрямками, як відновлювальна енергетика, сільське господарство, захист довкілля, медицина.*

*Досвід ефективного проведення спільних досліджень з іноземними фахівцями, тісні стосунки ізраїльських учених із зарубіжними науково-дослідними установами, інвестиційними фондами та бізнес-яголами є додатковими причинами для зміцнення українсько-ізраїльського співробітництва в науково-дослідній галузі. Таке співробітництво може бути дуже корисним для нашої держави як з точки зору отримання додаткових фінансових надходжень, так і через вдосконалення рівня конкурентоспроможності української науки та сприяння розвитку міжнародних зв'язків.*

*Досліджується історія розвитку зв'язків у галузі науки і технологій, розбудови договірно-правової бази двосторонніх відносин, а також пропонуються можливі кроки щодо їхньої активізації. Зроблено огляд фінансування ізраїльською владою науково-дослідної діяльності в країні, проаналізовано роботу кількох двосторонніх фондів у контексті комерціалізації продуктів, створених у результаті спільної роботи фахівців із кількох країн.*

*К л ю ч о в і с л о в а : Ізраїль, співробітництво.*

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### UKRAINIAN-ISRAELI COOPERATION IN THE SPHERE OF SCIENCE AND TECHNOLOGY (1991–2013)

When speaking about Israel, most people usually remember the close ties with the ex-USSR countries in the context of the 1990-s immigration, the so-called “great aliya” (aliya – Heb. wave), when over 1 million Soviet citizens moved into the country, among them couple thousand former candidates and doctors of sciences in miscellaneous spheres. However, the immigration of the scientists from the USSR started in 1970-s, when profes-



sors of math and physical sciences came to live in Israel. After having gone through many difficulties, Russian scientists managed to take a worthy place in the Israeli, as well as international, scientific community. They are presidents, rectors, deans and professors at major Israeli universities, thus having the access to the research base of all those colleges, funding and grants of the Israeli Government.

Apart from that, the expats from the ex-USSR managed to start in 1994 under the auspices of the Ministry of Industry, Trade and Labour BASHAN – the state program for support and development of new technical ideas and technological projects with market potential, the authors of which were the new immigrants who lived in Israel less than 10 years. After 2004 the program was transferred to the system of the Ministry of Science and Technology and after 2006 it has lost a bit of its impulse due to shrinking of the scientific immigration. However, its members are still scientifically active and ready to take on any form of cooperation with Ukraine and other post-Soviet countries.

Those highly skilled experts are a powerful lever for the development of cooperation with our state on a wide spectrum of issues – the lever, unfortunately not used enough by the Ukrainian party.

Since Ukraine gained independence, the scientific-technical cooperation between our state and Israel has been developing irregularly. During the first years of our state's existence an impressive legal base for such interaction had been worked out: on January, 1993, the Agreement on Cooperation in Science and Technology between the Government of Ukraine and the Government of the State of Israel was signed; the same year a scientific cooperation agreement was signed between the Israeli Academy of Sciences and Humanities and the Academy of Sciences of Ukraine. In 1996 an action plan has been worked out between the Governments of Ukraine and the State of Israel in the sphere of science and technology. After two years the Agreement between the Government of Ukraine and the Government of the State of Israel on Cooperation in the Sphere of Health Protection and Medical Sciences came into power. On the basis of this Agreement in 2011 during the visit of the President of Ukraine V. Yanukovich to Israel the Plan of Cooperation in the Fields of Health and Medicine between the Ministry of Health of Ukraine and the Ministry of Health of the State of Israel for 2011–2015 was signed. The same year the Agreement on Cooperation in the Sphere of Agriculture, and in 1999 – the Agreement on Cooperation in the Sphere of Environmental Protection were signed.

After that there was a certain standstill period: despite the extensive legal base no real money had been allocated by Ukraine for the projects, and with time some of those projects, that were the focus of discussion during first visits, lost their importance. In 2001 there were attempts to liven up the scientific-technical bilateral cooperation: a delegation of the National Space Agency of Ukraine visited Israel, and Agreement between the Government of Ukraine and the Government of the State of Israel on Cooperation in Peaceful Space Exploration and Exploitation, a scientific conference was organized by the Ashdod science and technology center and the Union of Israeli expat scientists "Industry of the Future".

Three years later a visit to Ukraine of the Minister of Science and Technology of Israel took place, the first Working Program of Cooperation in the Sphere of Science and Technology for 2005–2006 was signed. The emphasis was laid on research in biotechnology, chemistry, construction, electric welding and materials, ecology and influence of environmental change on humans. In 2005 two Ukrainian-Israeli business forums were organized dedicated to the scientific-technical cooperation between the two states. Two meetings of the Ukrainian-Israeli committee on scientific and technical cooperation were held. Within their framework the parties discussed the perspectives of the bilateral relations for the nearest future.

During 2007–2008 the governments of both countries allocated the necessary financial resources for 10 joint projects in the sphere of nanotechnologies and innovative materials. In 2009, in correspondence with the agreements reached during the Second session of the Joint Israeli – Ukrainian Commission on Scientific and Technological Cooperation, the parties began to carry out the next stage of the program for the realization of joint scientific projects in the sphere of biotechnologies for 2009–2010. Eight joint scientific projects in



the sphere of biotechnologies have been selected, which received the corresponding financing from both parties in the amount of 500 000 USD (300 000 – from the Israeli party, 200 000 – from the Ukrainian party).

In order to consolidate the agreements reached between the Ministry of Education and Science of Ukraine and the Ministry of Science, Culture and Sports of Israel a corresponding Protocol on Financing the Joint Ukrainian-Israeli Scientific Projects for 2009–2010 was signed. Unfortunately, due to the administrative reform of 2010, the Ukrainian party could not ensure a stable financing of the projects and the program was terminated.

In 2007 in Beer-Sheva a Ukrainian-Israeli scientific conference was held on ultra-hard materials' research. The Ukrainian party was represented by a delegation of the National Academy of Sciences of Ukraine. According to its results an agreement has been reached to hold in Kiev a scientific conference of young scholars from Ukraine and Israel and to study the possibility of holding, on the reciprocity basis, workshops for MSc students from the leading technical colleges of both countries. The delegation of the NASU also visited Haifa University and held a number of meetings with the representatives of Israeli companies and one of the technoparks, manufacturing products with ultra-hard materials.

Mutually fruitful relations in the scientific-technical cooperation were established between the State Scientific Technical Organization of Israel "BASHAN" and Cherkassy State Technological University regarding marketing the developments of Ukrainian scientists with the Israeli companies in third countries; cooperation between Odessa Plant of Bacterial Products and Weizmann Institute was started as well as between the Manufacturer's Association of Israel and several institutes of NASU in the sphere of construction, water desalination and purification. A permanent seminar was launched for expat scientists from Ukraine who facilitated the penetration of Ukrainian scientific institutions to the Israeli market.

The next effort to give a new impetus to the scientific-technical cooperation was made during the visit of the President of Israel S. Peres to Ukraine in November 2010, when the heads of two states agreed to develop and sign a bilateral program of cooperation in the sphere of science. For two years the initiative remained only an idea because of a number of objective and subjective reasons: lack of firm understanding by the Ukrainian party of the perspectives, direction and desired results of such document, periodical changes in the structure of Ukrainian and Israeli state apparatus as well as in the leadership of the corresponding state bodies. Taking into consideration that the budget of the Israeli Ministry of Science and Technology is usually rather small and that the Ukrainian party failed to keep its financial obligations under the Joint Research Program for 2008–2010, in 2011 the Israeli party excluded Ukraine from the list of priority cooperation countries. At the end of 2012 the parties resumed discussion of the perspectives of the Program, although, the new parliamentary elections took place in Israel, which again resulted in the change in the Government and redistribution of the responsibilities between the ministries and agencies. Besides, the 2013–2014 Israeli budget was adopted only in May due to long coalition negotiations and changes in the legislation introduced by the parliamentarians giving the Knesset the right to take 135 days for adopting the country's main financial law. In view of this, as well as inactivity of the Ukrainian party, it is hardly possible that the document will be drafted in 2013. However, there's enough positive signal in the fact itself that Ukraine is back in the priority countries for Israel.

A scitech cooperation in the sphere of agriculture is developing quite steadily. For instance, a few hundreds of experts participated in the seminars organized by the Center for International Agricultural Cooperation (CINADCO) of the Ministry of Agriculture and Rural Development of Israel with the assistance of the Center for International Cooperation Development of the Ministry of Foreign Affairs of Ukraine (MASHAV). CINADCO's activity is aimed at providing methodical and consulting assistance to other countries in the sphere of agriculture, hence Israel has an extensive experience of farming in extra hard conditions – not only climate-wise, but sometimes also financially and from the security point of view. For several years already a joint program of CINADCO, MASHAV, CIDA (Canadian International Development Agency) and civil organization MEDA is being real-



ized in the farmers' gardens of the Crimean Autonomous Republic dedicated to improving the growing and post-harvesting technologies. Seminars on the irrigation problems, storage and processing of vegetables and fruit, veterinary issues are held regularly. The Israeli Experts pay frequent visits to the Crimea to provide consulting assistance and control the implementation of the recommendations in the fields.

The most impressive experience has been gathered by Israel in the sphere of drop irrigation (efficiency level 70–80% compared to 40% with the regular soil watering), symbiotic technologies – for instance, using warm geothermal mineral water from fish ponds for growing vegetables, in dairy cattle breeding (annual quantity of milk from one cow is up to 14 thousand liter). All these achievements can be successfully utilized in Ukraine, for instance in the conditions of Kherson region steppe and in the mountainous parts of the Crimea. The research on the efficiency of drop irrigation in saving water resources and optimization of mineral fertilizer application on Ukrainian black soil can provide huge practical scientific material. Taking into consideration the importance of agriculture for the structure of the national economy, export in particular, further development of cooperation with Israel can give an impetus for the increase of Ukraine's foreign trade balance and improvement of competitiveness of the national economy.

Another field which has a considerable, however not yet fully explored, potential is peaceful exploitation of space. It is worth noting that despite a short history – beginning with the launch of the first satellite "OFEK-1" and Israel's own rocket "Shavit" in 1988 – and insufficient funding of the space project by the state compared to other countries, Israel managed to achieve a lot in this sphere. The main driving force here is the Israel Institute of Technology and its Aerospace Engineering Department under the auspices of Asher Space Research Institute. Israel's biggest success is in launching objects (including, due to geopolitical reasons, in the trajectory opposite to usual), creation of small and extra small commercial satellites (e.g. for mobile communications), electrical and optical devices etc.

The first step on the way of cooperation between Ukraine and Israel in this sphere was taken at the beginning of the Independence, by scientific institutions. In 1992 a memorandum of intentions between the Center of Air and Space Probing at the Kharkiv Radio-Physical Institute and the Center of Distance Earth Probing at the Bar-Ilan University regarding joint learning programs on distant Earth surface probing. There were negotiations, also engaging European countries, regarding cooperation within the framework of the project of low-orbit mobile communications system, but the project never came into existence. In 1996 a visit of Israeli experts to Ukraine had also been negotiated for discussing concrete joint projects. However, the visit did not take place and the suggested projects were never carried out.

Taking into consideration the interests of the Israeli party, one can name the following topics as perspective ways of cooperation in the space sphere: development and creation of the distance Earth probing satellites, upgrade of the Israeli rocket carrier "Shavit", development of airplane-born space rocket launching complexes. Since 2009 the NSAU has been working with the Israeli company "ImageSat International" in receiving in Ukraine the images from the space apparatus of Earth distant probing EROS-B. The last meeting of the leaders of the Ukrainian and Israeli space agencies took place within the framework of the Eights International Ilan Ramon Space Conference in January 2013. During the meeting concrete projects were discussed, that both countries could participate in.

Since 1997, when an inter-governmental Agreement on Cooperation in the Sphere of Standardization, Metrology and Certification has been signed, Ukraine and Israel have been continuously working on standards, trials, certification and legal metrology on the basis of the principles of the Agreement on Technical Trade Barriers within the framework of WTO. This direction is very important for Ukraine while it helps improve of the competitiveness of our industry, synchronize Ukrainian and international standards.

The field of medicine and life sciences is another perspective direction of cooperation. The level of medical services and the medical system of Israel have received the highest marks around the world, but there also are enough technologies and innovations in Ukraine that could be of interest to Israeli colleagues. There's a wide network of technoparks in



Israel, some of them working in the sphere of biotechnologies and life sciences. One of the largest such parks is located in Jerusalem on the grounds of Hadassah medical center, which is also the clinical base for the Hebrew University Faculty of Medicine. The technopark is a headquarters of start-ups developing new medicines and technologies which use the clinical trials center of the hospital for introducing new products. The most known of the recent innovations of the Israeli scientists in the sphere of medicine during last couple of years are drugs from multiple sclerosis and Parkinson disease, pill camera used for examining the intestines. In their turn, the Israeli experts got interested in Ukrainian technologies of tissue welding, use of Teflon in reconstructive surgery and cosmetology, porcelain – in traumatic surgery etc.

The Ministry of Health of Ukraine is considering a possibility of organizing seminars and workshops for Ukrainian medical workers in Israel, within the framework of the Plan of Cooperation between the Ministry of Health of Ukraine and the Ministry of Health of the State of Israel for 2011–2015. Among the specific fields for such exchanges – surgery, emergency medicine, oncology etc. In 2012 a modern diagnostic center was opened in Vinnytsia with the overall surface of 1200 sq.m. which became a kind of example for other similar institutions. From the Israeli side the work was coordinated by MASHAV agency of the MFA of Israel. The center's staff is about 30 Ukrainian medics who will be trained by the Israeli experts.

A visit by the Minister of Ecology and Natural Resources of Ukraine E.Stavytski to Israel in 2012 was dedicated to the problems of environmental protection and renewable energy as one more possible way of cooperation in the scientific and technical sphere. For instance, due to land shortage the issues of waste management and reprocessing gained importance, and absence (until recently) of own fuels laid a fertile ground for numerous technologies of using solar and water power. Shortage of water and dangers of terrorist acts forced the Israeli scientists to develop one of the most efficient systems of water resources management (in Israel 75% of wastewater is processed and used again) and prevention of emergencies on water management facilities. Despite a large number of rivers and streams in Ukraine, lately the problem of rational use of the water resources and ensuring the adequate quality of drinking water has become very urgent. So far the plans of cooperation in this sphere are at the very initial stage – developing the general concept, but it's highly probable that this sphere can become number one in the scitech bilateral cooperation.

Taking into consideration all of the above, the suggestions for further developing the cooperation between Ukraine and Israel in the sphere of science and technology could include the following:

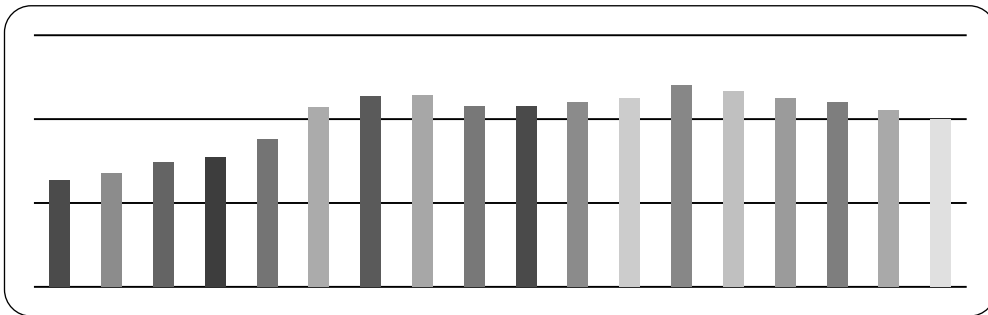
- development of trilateral cooperation, e.g. Ukrainian-Israeli-American, for instance at the non-governmental level: joining Ukrainian scientific fundamental and practical research with the Israeli innovational mechanisms and high technologies and American marketing instruments for introducing modern technologies and scientific elaborations. Perhaps, an efficient form of interaction would be to create a venture capital or investment fund, the proceeds of which would be partially allocated to finance other research;

- promotion of direct contacts between higher educational institutions. For instance, in March 2013 “Days of Israel” were held at the National Technical University of Ukraine “KPI” dedicated to cooperation of the Ukrainian University with its Israeli counterparts, i.a. Israeli Institute of Technology “Technion” (Haifa). It's worth mentioning, that this year at the “Technion” a new program for Russian-speaking students was launched aimed at young people from the CIS countries. In 2012 a delegation from the National Yaroslav Mudry Academy of Law paid a visit to Israel, during which its representatives discussed a possibility of exchange of post-graduate students with Hebrew University (Jerusalem) and Tel-Aviv University. We should mention here that Ukrainian universities have to be more active. As a variant for joint scientific activity one could consider establishing a kind of forum of Ukrainian and Israeli universities;

- wider involvement of representatives of Ukrainian universities, private companies during the preparation of the visits of high officials;

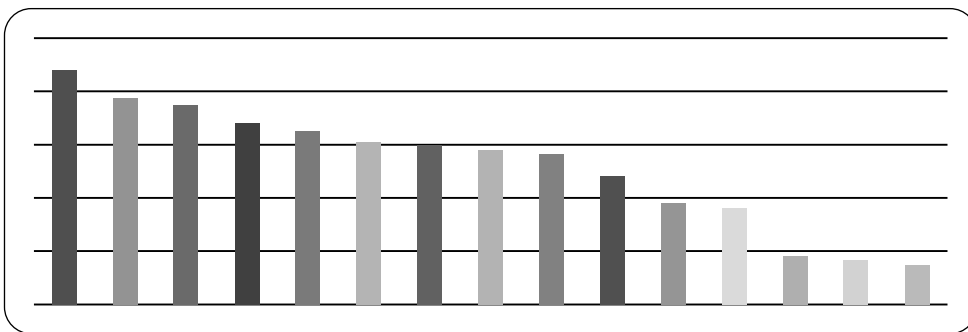
- organization of joint stands or presentations of Ukrainian innovations at exhibitions and conferences in Israel. Establishment of ties between Ukrainian colleges and business incubators at the universities (such as Tel Aviv University Entrepreneurship center Star TAU) in order to use the experience of promoting innovative activity among the students and marketing of their know-how's;
- promotion of multilateral cooperation, in particular within the framework of such projects as international European innovation research and development program EUREKA. From the date of receiving the member country status in 2006 Ukraine has participated in 27 projects of this program with the overall budget of 5.86 mln. Euros. In 2012 Ukraine took part in 10 projects with different member countries.

Unfortunately, due to the lack of information it's not possible to see the financial efficiency of the research conducted according to the joint R&D programs during 2005–2010, but taking into consideration the budgets of the programs and the funds allocated by Israel for scientific research (Pic. 1), the following assumptions can be made.



**Picture 1. Israel's R&D Expenditures, % of GDP<sup>1</sup>**

First of all, Israel has a reputation of one of the countries with highest number of scientific publications per capita (4th place overall, 2nd in life sciences) and one of the highest R&D to GDP expenditures (see Pic. 2).



**Picture 2. R&D Expenditures, % of GDP, 2011<sup>2</sup>**

This allows Israeli scientists to be highly skilled and gives them access to state of the art equipment. Secondly, the financial input from the Israeli party – 320 thousand USD in 2009 – would also be a considerable amount of money available for scientific work in Ukraine. Third, the developed Israeli system of marketing R&D results would enable Ukrainian researchers develop commercially attractive products which would in their turn create additional revenue for the Ukrainian scientific sphere. Also, the highly intensive scientific collaboration between Israeli and Chinese, Indian, European and American scientists would

<sup>1</sup> National expenditure on civilian R&D – 2012// Central Bureau of Statistics of Israel press-release, 23/07/2013.

<sup>2</sup> OECD Factbook 2013.



give the Ukrainian colleagues an indirect – or even direct – access to the latest theoretical and applied developments in different spheres.

Israel has an extensive experience of highly effective joint R&D activity. For instance, in 2004 a Nobel Prize in Chemistry was jointly earned by Israeli and American scientists for their discovery of a protein degradation system which resulted in development of drugs against melanoma bone marrow cancer and potentially Alzheimer's, Parkinson's, arthritis and some other diseases. There's no generalized research as for the revenue from all bilateral R&D funds and programs, but a few separate numbers below can give an understanding of the scope of bilateral and multilateral cooperation between Israel and other states in the sphere of science.

The U.S.-Israel Binational Science Foundation, founded in 1972 by an agreement between the United States and Israel, invests every year some 15 billion USD on joint scientific work. In 2007–2009, the government of Israel transferred about 270 million USD overseas for the purpose of carrying out joint civilian R&D projects with foreign partners. 798 Israeli scientists and companies received grants totaling 501.8 million Euros as part of the Seventh European Framework Program. In 2009 the Israeli R&D business sales abroad generated revenue of over 5 billion USD. In 2011 an Israeli-Chinese 20 million USD R&D fund was established which can fund up to 50% of the approved projects.

Below are some figures illustrating the Israeli governmental institutions' involvement into financing bilateral and multilateral R&D cooperation programs.

*Table 1*

**Funds transferred abroad by government ministries for the purposes of cooperation in civilian R&D projects, USD mln.<sup>3</sup>**

	2007	2008	2009
Amount	81,5	86,9	99,3

In view of the above, it's clear that the enforcement of Ukrainian-Israeli cooperation in the R&D sphere would be very beneficial to our country revenue-wise as well as by influencing the level of the competitiveness of Ukrainian science and assisting the development of international ties.

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<sup>3</sup> International Aspects of Israeli Civilian Research and Development, 2006–2009 // Central Bureau of Statistics of Israel press-release, 27/02/2012.