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SCIENCE & TECHNOLOGY PARKS LINKING UNIVERSITY WITH INDUSTRY, WITH CASE STUDIES FROM IRAN AND TAIWAN

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STPs filling the gaps

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THEME 2: Models of cooperation between universities and companies and the role that STPs can or should play

B. The position of STPs in the flow of knowledge and technology (their role as bridge between business and academia)

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"Science & Technology Parks linking university with industry, with case studies from Iran and Taiwan"

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Introduction:

Science and technology parks as the links between academia and industry are considered as one of the key components of the national innovation system in each country which in turn play an important role in technology development. Establishing science parks is a measure taken by countries to enhance economic development. A science park can help the development of a nation if it works well and if it is successful in its performance. Science and technology parks normally adopt different policies and incentives to create attractions for knowledge-based companies as well as for government officials and owners of industries to link with each other. They also adopt different measures and strategies to enhance knowledge-based development among them we can refer to the strengthening and increasing the capabilities of high tech companies, creating employment opportunities or job creation and preventing the brain drain. Science parks do these measures in different ways including establishing cooperation and actually a link between university and industry. These are common almost among all science parks including those in Iran and Taiwan.

How establishing a link between university and industry through Science Park has worked in Iran and Taiwan:

One mechanism which brings together the basic resources into a working system for the generation of wealth and welfare is science and technology park and/or incubator, depending on the size and some other considerations. The idea of science parks in Iran and Taiwan started as a remedy to promote university-industry relation and to help improve the economic and technological development of the region. The aim of science and technology parks is to link industry and academia. They also establish a good link between government and the private sector. Science parks are tools for economic development. With regard to the

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important role they play in technology transfer, networking, collaboration, national innovation systems and promoting innovation and technological development they are considered as one of the best and the most appropriate tools for knowledge-based development and filling the gap between university and industry. On the other hand, the science parks have linked industry with university to increase revenue through promoting industry. This is because in the knowledge economy, the university has been granted a third mission of regional economic development and many research universities have developed closer links to industry through the science parks, university affiliated enterprises and joint research centers to seek to increase external revenue sources. This initiative has successfully been performed in many countries and new horizons have been opened for the industries. The SMEs have adopted a knowledge-based approach and the activities of SMEs and industries have been directed toward knowledge. This leads to their development and success and it reduces their risks of establishment and activities. Both Iran and Taiwan have considered this convergence by science parks as an effective factor in promoting their economy and regional development. They both have defined different roles for their science parks in technology transfer, networking, collaboration, innovation and entrepreneurship, etc and all aim at filling the gap between the two. ISTT mostly focuses on strengthening its companies and making them successful in the market. While at the same time it enjoys collaboration and technical assistance by university. In Taiwan the function of start-up incubation is mainly performed by universities and research institutes. Science parks not only are the home of the graduated incubatees and other high-tech firms, but also collaborate with universities in joint innovative research, technology transfer, and high-tech education.

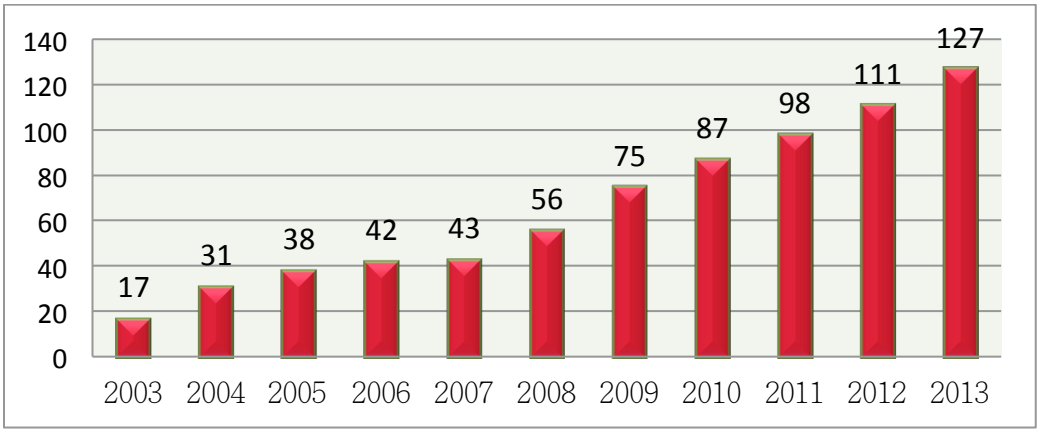
Pere Condom Vila said “a science park has two main objectives. The first is to act as a catalyst for regional economic development, while the second relates to facilitating the creation and development of new technology-based companies and knowledge transfer from universities to companies.” 1 In earlier years, the main mission of a science park put emphasis on helping the commercialization of the research results from academia, and helping entrepreneurs to establish their own startup companies. It is still true for many science and research parks today, especially for those university related research parks in the United States. While for some science parks the major focus is to promote regional or national economic development. Apparently Hsinchu Science Park (HSP) in Taiwan and Isfahan Science & Technology Town (ISTT) in Iran belong to this group.

Technology Business Incubators (TBIs) and Science and Technology Parks in Iran

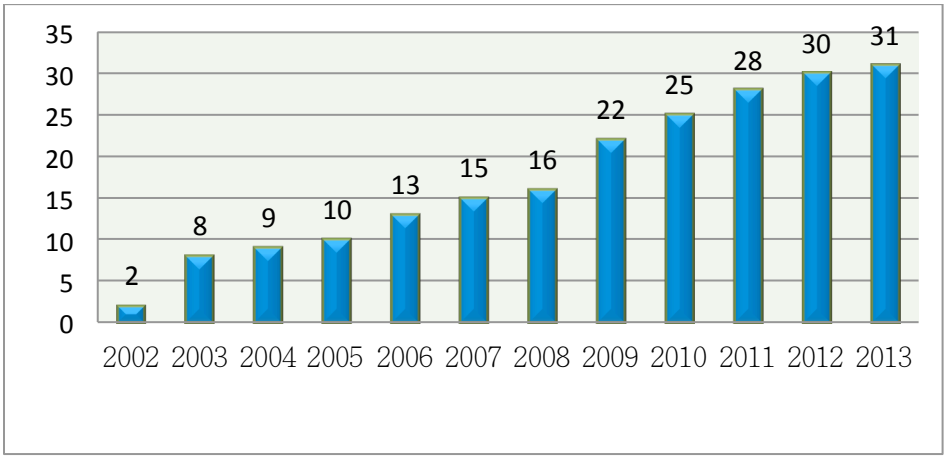
It is important to create an effective interaction between university and industry and establishing a link between these two together with the government itself is a need for having a knowledge-based economy. The Iranian government has put a special emphasis on developing the necessary infrastructures for the growth and promotion of knowledge based activities in the public and private sectors in its 4th and 5th Development Plans. Developing Innovative Culture and Support for SMEs are other issues that have been emphasized on in this plan. Technology Business Incubators (TBIs) and Science and Technology Parks (STPs) are of major concern in this plan that mostly support SMEs. TBIs and STPs have been established as the means of employment opportunities for university graduates, experts and innovators.
Today 31 STPs and 198 TBIs have received official establishment permits from the government.
In the Development Vision Document of I.R. of Iran special emphasis has been put on knowledge and technology. The two following articles have been mentioned concerning the specifications of the Iranian society based on this vision:

- Enjoying the advanced knowledge, capable in producing science and technology, reliant on human resources and social investment in the national production
- Achieving the first place in the field of economy, science and technology in West Asia Region

Knowledge based development and developing new technologies have been considered as one of the major objectives of the country in this development plan and science and technology parks are one of the most important sectors that can help fulfill this goal.
This is because STPs are considered as one of the major elements in promoting a knowledge-based economy and technological development. Iran is trying to shift its economy from an oil-based economy to a knowledge and innovation-based economy and the Iranian government has been successful in this regard during the recent years. It has put special emphasis on creating science and technology parks as the means of achieving this goal and this is obvious in the fast growing trend of these organizations in the country. The following diagram indicates the trend of growth in the number of TBIs and STPs in Iran.



The following diagram shows the growth trend of STPs in Iran.



Today Science & Technology Parks in Iran are part of the National Innovation System that also help strengthening the relations between university and industry and they do this through helping in commercialization of ideas and innovations. Most of the companies that have been located in science parks have been established by university graduates and in many of these companies we see that the faculty members of the universities play an important role. Most of the science parks in Iran have been located adjacent to a university and use the services and facilities of the university. In turn university students also use the facilities in science parks and there have been created a synergy between many of them with the knowledge-based companies in the parks. Therefore, there is a good relationship and a synergy between science parks and universities in Iran. Establishing relation with the industries have also been always of great concern to science parks so that we see today that the innovation comes from the university, it goes into the science park to reach the

stage of pilot production and creating income and then to be commercialized and then through the commercialization offices in science parks, the technology goes for mass production outside or will be assisted to find an investor. In the commercialization process, the technology incubators help and support the business plans and ideas of the start up companies and in the further stage the science parks help the knowledge-based companies to enter the global markets. Isfahan Science & Technology Town (ISTT) in Isfahan and Pardis Science Park in Tehran are the first science parks in Iran that embarked on this initiative.

Isfahan Science & Technology Town (ISTT)

As the first and pioneering science town in Iran, ISTT is an independent organization which aims to promote knowledge-based development in Isfahan region, Iran's second economic and industrial power through establishing science and technology parks and incubators. ISTT intends to attract national and international investments through providing the ground for developing the economic activities of large and medium size private companies and technopreneurs. Today ISTT is home to more than 350 knowledge-based companies with more than 5000 full time and part time staff.
ISTT established close relations with Isfahan University of Technology, one of the top universities in Iran since of its establishment. Today ISTT has links and relations with most of the universities in the region as well. In 1992 when ISTT was still an idea and was in the phase of feasibility studies, there were some technical and specialized committees whose members came from the major industries and the universities of the province. They formed specialized meetings to investigate the needs of the province and to investigate the establishment of a science park. It was the result of the studies by these committees that the master plan of ISTT came out and a science town establishment was defined in Isfahan. For example, there was a specialized committee on chemistry and chemical industries. The members of this committee were from Isfahan Petrochemical Company, Isfahan Refinery, Chemistry Research Organization, Chemical Industries Organization, Faculty members of Chemistry departments from Isfahan University of Technology and the University of Isfahan, members from ISTT and other related members. The same was with steel industry committee, textile industry committee, standardization committee, etc. Today also the novel ideas and best innovations come from the universities and ISTT has still strong links with IUT and many other universities through out the province. So that today almost in each university in the Province, ISTT has established an incubator and provides

services to those graduates who establish a company there. We call them satellite incubators and affiliated incubators. The admission and management processes of these incubators are under ISTT supervision and by ISTT experts. Meanwhile ISTT gets strong support from the faculty members of these universities.

On the other hand, ISTT is linked with the major industries in the Province today. It defines and attracts projects for the companies from the industries through its Research Plans Office. Meanwhile, ISTT has formed some informal afternoon tea meetings in which the managers of the knowledge based companies (that have a faculty member in their company as well), and the authorities and managers of the major industries in the Province are invited. During the meeting after an introduction by ISTT representative, each representative of the industry elaborates shortly on their works and projects and defines in which field they need help by the companies. The company managers listen to them and after that each will be given 4-5 minutes time to explain about their capabilities and their abilities to implement that special project. In this way they will join with each other and they understand the needs and start interaction for implementing the projects. During a tea or a light meal that will be served by ISTT after the meeting they will find more opportunities to talk to each other and sometimes a contract is signed between them as the same time, and the link will become stronger between science park and industry and university.

Another activity that ISTT performs in this regard is organization of the annual Sheikh Bahai Technopreneurship Festival in which the superior technopreneurs, business planners and technopreneur sponsors are recognized and awarded during the festival. The plans and ideas are assessed by skillful judges (who come from the industry and university and research organizations and STPs) through meetings, interview sessions and visits. And the bests are identified to be awarded. During the festival also a number of investors who are looking for ideas or technologies from industry are invited and they are introduced to each other through negotiation meetings and exhibition. Some research grants are provided by different supporting organizations, Industries, Entrepreneurs, Universities and Elite organization.

Meanwhile, to encourage park companies' research activities the Innovative Project Awards are presented annually to companies with the best performances during a ceremony that is held by ISTT every year. These activities and the companies are selected following different assessment and evaluation sessions. These are only some of the measures that are taken to foster government-university-industry relations through science parks.

Science and Technology Parks in Taiwan

In late 70's when Taiwan was suffered from economic recession, Hsinchu Science Park was founded "for the purposes of attracting high-tech industries and professionals, encouraging the research and innovation of domestic industries and, enhancing the technology of local high-tech industries." [2] In order to accelerate the economic development in a short time, in its early stage HSP put emphasis on attracting overseas Taiwanese elites who owned the knowledge and experience of high-tech development to set up companies in the park. The strategy proved to be quite successful that high percentage of companies in the park is founded by return expatriates, and they began to show influence to the industry in a short period of time. Today HSP is home to 500 companies and its annual revenue reached 37 billion US dollars in 2013.

However, the sustainable development of a science park relies on constant research and vibrant innovation capabilities, and the best resources of innovation come from universities and research institutes. Therefore, in addition to the recruitment of overseas talents, HSP also support the industrial and academic collaboration. Taking the advantage of locating near two prestige universities Tsing Hua university and Chiao Tung University, and the most important industrial research institute in Taiwan, Industrial Technology Research Institute (ITRI), HSP get strong support from the five thousand researchers in ITRI, and two thousand professors in two universities, and is able to launch different programs to bring together the two sectors, including entrepreneur incubation, R&D collaboration programs, technology training, and many others.

IC Design Entrepreneur Incubation and Venture Programs

Due to law restriction, HSP was not allowed to operate an incubator for many years. The function of entrepreneur incubation in Hsinchu area was performed by the ITRI and the two universities. These three incubators have pretty good performance and won many domestic and international awards, not to mention the ITRI's "Incubator of the year" presented by National Business Incubation Association (NBIA) in USA. They have fostered many outstanding startups and sent to HSP. It was not until 2003 that the Regulation for Establishment and Operation of Venture Incubation in Science Parks was passed and HSP finally run an incubator of its own named Si-soft Business Center in 2010.

The center is aiming at fostering the IC design houses which develop prospective technologies in system-on-chip and related services. Because Integrated Circuit is the major industry developed in Hsinchu Science Park, and more than two fifth

of HSP companies and 70 percent of the sales revenue of the park are from this field. The development of Si-soft Business Center can help the continuous growth of HSP's IC industry. The center also got Soft-Landing International Incubator Designation from NBIA showing that it is ready for international incubatees.

HSP also worked with the National Science Council to launch the Venture Inspiring Program (2013-2018) encouraging all universities to organize venture teams to compete for venture fund and incubating opportunities. The teams which passed the preliminary selection have the privilege to be instructed by the experts/mentors from Silicon Valley, to move in to the Si-soft business incubator in HSP, and to use the laboratories in Tsing Hua University, Chiao Tung University, ITRI and other national labs. Those who stayed till finale win US$65,000 venture fund. When the program started in March 2013, it attracted more than 200 teams to compete for the chance. 40 of them were chosen and 23 of them got into Si-soft business center to be instructed by mentors. Four month later, five teams successfully registered as companies..

R&D Grants and Other Collaboration Programs between Industries and Universities

To encourage park companies' research activities, R&D grants program has been introduced to Hsinchu Science Park since 1986. Park companies could apply for grants for their research projects, and the grant amounts for each research project was up to US$170,000 or 50% of the project budget. Also the Innovative Project Awards are presented annually to companies with the best performances.

The R&D Grants program evolved with the requirement of business world and in response to the change of economic environment. After 2006, the universities and research institutes are included into of R&D grant programs in order to accelerate the cooperation between industries and academia, and to stimulate research and innovation. The current "R&D Piloting Cooperation Projects between
Industries and Academia" offers each project can get a grant up to US$335,000 or 50% of its budgets, but 30% of the grant should go to its partner in academia. The program supports 20~30 research collaboration projects each year.

In addition, HSP offers a platform to match R&D partners from academia and industries by holding R&D matching seminars on regular basis. Professors and researches are invited to present their research plans in the seminar. Thus the

audiences from park companies are able to find research plans which they are interested in, and make further contact with the project leaders.

The Evolution of R&D Grant Program for Taiwan's Science Park

Year	R&D Grants Program	Description
1986~2006	Grants for Encouraging Innovation and R&D in the Science Park	• Only for park tenants • Max. Amount: US$170,000/project or up to 50% of project budgets.
2007~2009	R&D grant project for collaboration between industry and academia	Adding grants to universities to encourage the collaboration between industry and academia
2009	Sustainable Research and development project	Set up in accordance with the economic tsunami happened in the end of 2008
2010~now	R&D Piloting Cooperation Projects between Industries and Academia	• Combine all the subsidiary grants • Max. Amount: US$335,000 or up to 50% of project budgets for each case. At least 30% of the grant should go to the partner in academic research institution.

Technology Training and Talent Supply

Technology training and talent supply are other example of how Hsinchu Science Park acts as bridge between academia and industries. The success of a science park relies on many factors, such as location, timing, business model, good management, talents and many others. Dr. Steve Hsieh, the previous Director General of Hsinchu science Park Bureau attributed the success of HSP to the high quality employees. Hsinchu Park makes many efforts to recruit high tech talents and helps to train people through different training programs.

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