

Intellectual Property Management and Value-Added Strategy of the Industrial Technology Research Institute

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This paper analyses the strategies, which public research organizations apply to add value to their intellectual property. Industrial Technology Research Institute (ITRI), Taiwan, is used as an example and reference is made to the American system. The strategy and approach in response to the Basic Law of Science and Technology (in Taiwan) is discussed with reference to the Technology Transfer Centre (TTC), the factors that impact technology transfer pricing, the process for technology transfer, the factors to consider in technology transfer, industrial co-operative model and patent orientated technology transfer. Thereafter, the strategy and approach with regards to technology derivative value-added business is discussed. After analysing the strategy, some real case studies are discussed (Bio-chip, partial transfer of patent rights and the auctioning of patents). Lastly, some recommendations are made regarding the creation of IP-centric technology transfer mechanisms.

Keywords: Value-added strategy, intellectual property management, Technology Transfer Centre (TTC)

In a knowledge-economy based age, creation, acquisition, accumulation and application of intellectual property rights (IPR) are an effective way for industry to enhance competitiveness. Developed countries have been strengthening their technology transfer environments consecutively, to facilitate technology transfers of research institutions and universities. Therefore, constructing a technology transfer environment and establishing a technology transfer mechanism to encourage universities and research institutions to transfer their technologies to industrial circles, becomes a priority.

Numerous world-renowned businesses are currently adjusting their IPR strategy. In addition to expanding their intellectual property management departments, they are redirecting their conventional defensive strategy into an aggressive strategy using patents as weapons to form de facto standards. Take the CD-R industry as an example. Philips, Taiyo Yuden, etc., receive huge sums of royalties from Taiwan's CMC Magnetics, Ritek, etc. Furthermore, IBM, for example, currently owns more than 35,000 patents around the globe; its technology licensing income in 1990 was a mere US\$30 million, compared to 1.7 billion in 2000, accounting for about 21% of its net prof-

its before taxes. Patents are also a commodity, as has been adequately shown by the value of intellectual property rights as well as a company's attention to IPR.

In Taiwan, the Basic Law of Science and Technology took effect in 1999. It stipulates that government research results can be passed down to executive agencies. To this date, numerous technology transfer organizations have been established in universities and government research agencies, including Academia Sinica, National Taiwan University, Tsing Hua University, Chiao Tung University, National Cheng Kung University, Feng Chia University and Kaohsiung Medical University. Non-profit research institutions are also actively adjusting their organizations and strategies such as to promote IPR. Developing an effective technology transfer organization is each agency's priority.

Key Factors in Technology Transfer Successes of American Universities and Research Institutions

To encourage the utilization of government-funded research results to develop industrial benefits, the United States formulated the Bayh-Dole Act in 1980 to pass research results over to research agencies or universities. In 1996, the Federal Technology Transfer Act was drawn up, and in the meantime various technology-related legislations were enacted to en-

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courage commercialisation of scientific research results. Consequently, as more and more IPR were released and processed, American universities, started to form office of technology transfer or offices of technology licensing or foundations. It has now become legally obligatory to set up offices when the federal laboratories exceed a certain size. These institutions, all of which have considerable autonomy and flexibility, engage their business by means of corporate operation and management similar to law firms and accounting firms.

Technology transfer does not have any fixed formulae or pattern. It needs to tie in with different technology needs as well as the terms of both licensor and licensee. If it strongly demands execution in accordance with government policy, without giving consideration to market mechanisms, the effort often becomes futile. Society often demands non-exclusive licensing from Government-funded R&D results, in order to share the benefit. Some industries, however, are reluctant to accept the benefit of such licensing, leading to a waste of IPR.

In the United States, there is an abundance of IPR-related information, and Internet searches for databases are also very convenient. The most commonly referred databases are patent databases, court decision databases as well as various other professional databases established by for-profit groups. In addition to these databases, there is an assortment of technical patent database search services provided by professional businesses. Many universities, R&D institutions, private enterprises, etc, use such data to frame their R&D directions, negotiate technology licensing or cross licensing, before launching their research and development. Creating information channels and establishing co-operation networks through personnel exchanges and co-operation of industry/academia, industry/research, and industry/government, are means for facilitating technology information circulation. Logically, technology transfer results rely on professional knowledge and professionals, whose qualities directly contribute to success or failure of the results of technology transfer. American technology transfer professionals usually have a combination of at least two of the following professional knowledge—technology, law and management. Licensing managers of technology transfer offices often major in science or engineering, thereafter acquiring a master in technology management, JD degree, or even qualify as lawyers.

In summation, the key factors for the successes of technology transfer at American universities and research organizations are as follows:

1 Basic Environment: (i) Rich and excellent technological inventions; school faculties and researchers with enterprising spirits, (ii) Fair incentive systems with substantial encouragement to appropriately reward R&D agencies, inventors, technology transfer personnel as well as other related people who have rendered service, and (iii) IPR is reasonably protected

2 Organization and Process: (i) Active patent licensing policy, which is supported and thoroughly carried out by senior manager, (ii) Simplified invention disclosure processes and (iii) Trained and experienced technology transfer personnel, who are equipped with science, engineering, marketing, and legal knowledge. Technology transfer personnel with an understanding of the needs of research agencies and industry, and ability to be solely responsible

3 Ambient Environment: (i) Vivid new venture atmosphere and numerous enterprise founders with venture experiences, (ii) Venture capital companies, which are brave in investing in the early stage technology, and (iii) Excellent industrial network relations, including technology brokerage, information services, technology advisory services, legal consulting services, etc.

America's successes in technology transfer did not occur overnight. It has undergone years of effort and statutory legislation to enable today's results.

Utilization of Research Results and Industrial Co-operation Model of ITRI

Strategy and Approach in Response to the Basic Law of Science and Technology

ITRI has more than thirty years of experience in propelling the conception and development of a wide variety of fledgling industries, including semiconductors, displays, communications, photo-electronics, 3C's, precision machinery, micro-mechanical electronics, special chemistry, and biotechnology. Since June 2000, in response to the IPR released by the new law (Basic Law of Science and Technology), ITRI has combined the expertise of its patent engineers and legal personnel from the headquarter and each laboratory, to establish the Technology Transfer and Services Centre (TTSC). The Centre was formed in an attempt to further push ITRI innovation and R&D towards knowledge-based and high-value development, by open laboratories. Strategically, it reinforces

the research of advanced technologies, produces high-value patents, strengthens patent licensing-based technology transfer, raises patent incentive rewards, and spurs employees to enhance patent applications. ITRI actively amends IPR management as well as technology transfer management related regulations, strengthens IPR education and training, enhances personnel's IPR knowledge, and protects IPR. In 2004, ITRI added technology derivative value-added business to its operating policy and set high business growth goals. Therefore, TTSC was reorganized by branching out its legal affairs and IPR management divisions. As a result, the Centre was established to manage and grant impetus to technology derivative value-added businesses of the institute as a whole. The Centre caters not only to global industrial trends; but also strives to promote domestic industrial IPRs value-added concepts and approaches to enhance industrial competitiveness. The Centre's major tasks include ensuring high-quality IP and maintaining IP efficacy, IP value-added work and commercialization, industrialization, and the enhancement of R&D results.

From the initial-stage of IP creation, the mid-stage of IP added value, and the final-stage of commercialization and incubation, are all-important tasks of TTC. As a result, TTC fulfils the following five functions:

(i) In addition to ITRI's existing 6,000-plus patents, TTC also combines domestic and foreign patents to enhance values. Currently, the National Science Council has commissioned TTC to conduct research on whether National Science Council's nearly 2,000 patents can complement those of ITRI.

(ii) Presently, TTC has more than 30 patent engineers and 15 legal personnel in charge of patent filing and maintenance. These personnel are responsible for the efficacy of ITRI's existing 6,000-plus patents and to take charge of response to PTO's office actions in patent filing process.

(iii) Engaging in IP portfolios and adding value to these IP portfolios.

(iv) Active utilization of patents: including patent licensing or forming new venture, etc.

(v) Establishing related promotions, management mechanisms and formulating incentive procedures.

Most of ITRI's R&D results derive from technological R&D projects supported by the Ministry of Economic Affairs (MOEA). So ITRI's utilization and management of these R&D results are all conducted

in accordance with the Basic Law of Science and Technology and the operating rules concerning the ownership and utilization of R&D results derived from MOEA sponsored project, which regulate ITRI R&D results, ownership, utilization, income allotment, results management and personnel management systems, and so on. Rules regulate that ITRI R&D results shall engage in technology transfer that is fair, open, non-exclusive and compensatory, and that local research organisations or enterprises shall be given priority. To achieve the purpose of assisting businesses or transferring technologies to businesses, ITRI is in principle entitled to sub-license its technology to businesses and get technologies from foreign party. Marketing departments or personnel project leaders and inventors are obligated to promote inventions, and related IP. Corresponding prices for technology transfer can be the licensing fee, royalty, or equity. Technology transfer pricing shall in principle be based on market prices, and references are made to the factors: market potential and competitiveness after commercialisation, alternative technological sources, industry's receptivity, R&D costs as well as number of potential licensees, efficacy of technologies at market value, and other related factors.

Before technology is transferred, a release process must be conducted. When ITRI obtains R&D results, it publicly announces by appropriate means, such as on the Internet or publishing in nationwide newspapers or notifying the related industry associations or describing the R&D result in public, etc.

The industrial cooperation model (Figure 1) between ITRI and company usually takes the form of one of the following four types: early stage technology transfer, late stage technology transfer, technological service and subcontracted development. The technology partner model usually takes the form of one of the following three types: joint specification, joint development, and subcontracted research.

The so-called early stage technology transfer company takes the expected produced R&D results as his licensed object in the initial R&D stage of the research agency and signs an early stage technology transfer agreement. The partner needs to launch relatively less investment in cooperating with the research project and has the limited rights of using the R&D results.

Late stage technology transfer means that, after ITRI has produced R&D result, it will then be transferred or licensed to the partner for use.

The so-called technological service means that ITRI is commissioned by a company to provide advice, evaluation, personnel training and cultivation related to technology.

Commissioned research means that ITRI is commissioned by a company to provide R&D activities for mechanization.

New Strategy and Approach: Technology Derivative Value-Added Business

In response to the arrival of a knowledge-economy based era, as well as changes in Taiwan's industrial structure and competition in international technological industries, ITRI's technological development will accelerate towards proactive research, strengthening connections to the international technology industry. As a result, utilization of ITRI's R&D results as well as industrial cooperation model also need some adjustments in the hopes of creating new industries and new opportunities and assisting traditional industries in transition and upgrading. To achieve its goals and

vision, ITRI will focus on three items of core business: industrial technological R&D, knowledge-based service and technology derivative value-added. The strategy for the third item is cultivating a knowledge-intensive industry, using good IP and participating in new venture businesses to share the risks and R&D results with industry.

Technology derivative value-added business means business that is operated by ITRI, with its existing technologies and IP applications, generating income without the need of providing very much direct labor force, including:

IP Value-Added Application, wherein, in response to industrial needs, ITRI's related IP (patents, special technologies, logos, copyrights, circuit diagram layouts, etc.) is put through related technology transfer or licensing, forming patent portfolios, expanding application fields, IP incubation to enhance commercialization values, or stemming others' violation, taking part in patent alliance, cross licensing.

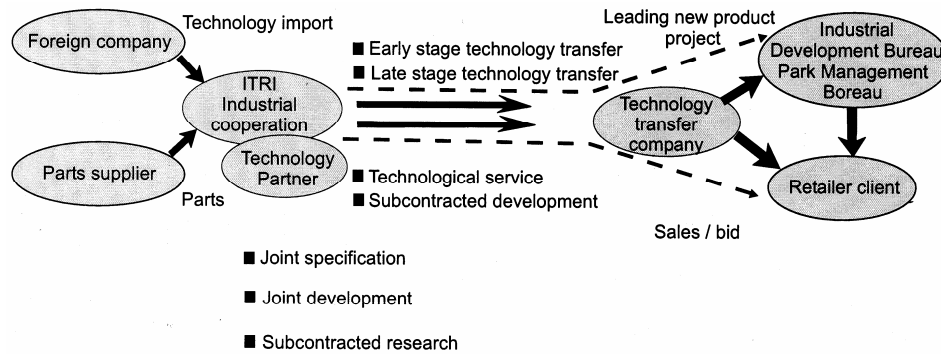


Figure 1—ITRI's industrial cooperation model

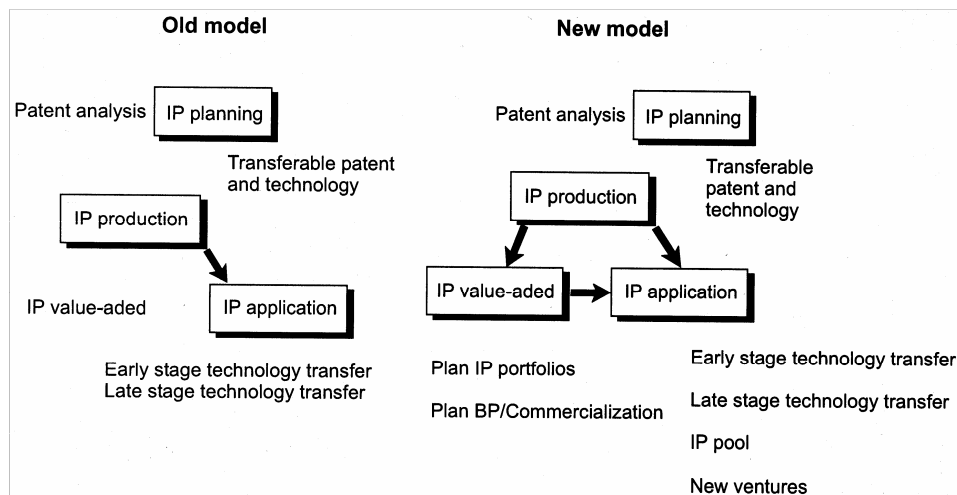


Figure 2—Comparison between ITRI's new and old utilization model of R&D results

New Venture Businesses and Incubation Service:

This includes: (a) New venture businesses which are derived from ITRI's R&D results and incubated by ITRI; as well as new venture enterprises not derived from ITRI's R&D results, but that are incubated and invested in by ITRI belong to this category.

(b) Incubation services which are incubation and assistance services using the professional capabilities of ITRI's Incubator open laboratories in order to assist natural persons or enterprises in creating new enterprises; services available include related software and hardware, equipment, laboratories, markets, operations, management, investment, fund-raising, and legal services.

(c) Capital gain income, the income, obtained from stock equity sold.

Therefore, before and after integral planning, ITRI adjusts its industrial cooperation mechanisms to strengthen IPR as its focal point, and to push ahead with technology derivative value-added business (Figure 2).

The major difference between the new and old utilization model of ITRI R&D results lies in that, before IPR are produced, patent analysis is carried out. After IPR are produced, IPR value-added planning and IP portfolios are strengthened. Major approaches include the following five items:

1 Conduct IP evaluation: To promote and utilize patents more effectively, TTC invites planning and promotion personnel of each laboratory to the patent evaluation meeting. TTC's patent engineers assist in conducting evaluation process and, in terms of protection, strategic value, and application potential in descending order; these patents are then divided into three levels.

2 Creating IP portfolios, strengthening cross-laboratory's joint patent marketing: Effective patents are divided into 6 big technical fields and 473 IP portfolios for convenience in patent marketing and promotion.

3 Reward invention, retain talent: After the Basic Law of Science and Technology took effect, half of ITRI technology transfer income can be retained for the use of promotion, maintenance and incentives. To retain talent, ITRI especially reward inventors as well as personnel with contributions to patent promotion: (a) inventors are given 25% of the income retained by ITRI; (b) team members with contributions to patent promotion are rewarded by the upper limit of 15% of the income retained by ITRI.

4 Leverage with domestic and foreign IPR: In addition to making use of ITRI's own IPR, ITRI also tries to make use of other's IPR to create new value-added leverage. The cooperation projects with the Columbia University, University of California and America-based SRI have started for few years.

5 Set up a new business development team: To incubate a knowledge-intense industry, ITRI adopts a new venture business model to carry out technology commercialization development and to share risks with the industry. As a result, a new business development team has been established in TTC which includes marketing, finance, law, and technology professionals to help each laboratory plan new venture businesses, search for operating team talent and capital, and to create new companies. The Centre will cooperate with a subsidiary under ITRI-ITIC, in arranging shareholder structure as well as fundraising.

Case Studies

ITRI's technology derivative value-added is described in the following three case studies:

(1) **Biochip Business Case:** In light of biochip being a typical cross-fields industry, there might be a chance for Taiwan to launch products in the international market. Therefore, ITRI adopted the IP portfolio method by bundling a variety of important and complementary patents for licensing. In so doing, ITRI promotes 'Bio-Chip R&D Alliance' by combining member's technologies, human resources, financial strength and IP together. This case is characterized by combining bio-tech, electronics, photo-electronics and IT technologies together; setting up a new venture, through licensing 41 patents from ITRI.

(2) **Assign part of the Patent Rights:** In the wake of semiconductors in Taiwan, flat panel display has become one of important industries. Since mass production in 1999, Taiwan's industrial size has expanded rapidly. By 2002, the flat panel display industry in Taiwan even surpassed that of Japan and became the world's No. 2 (second only to Korea). Due to Taiwanese' companies entered the flat panel displays industry later than Japan and Korea, Japanese and Korean companies' patent royalty claims caught up. After carrying out patent analysis and realizing the needs of domestic companies, ITRI then proposed a TFT-LCD IP portfolio partial assignment for the domestic, flat panel display companies. Furthermore, ITRI assists domestic companies in conducting patent cross-license negotiations.

(3) Sale of Patent Rights by way of an Auction:

ITRI offers local company those patents that have been possessed for more than 5 years but not yet been licensed. Through the patent selling, on the one hand, enterprises are enabled to procure ITRI's patents; and on the other hand, this patent can be revitalized for use. ITRI made a patent sale announcement in July 2003. The bid was completed in August. In all, 135 patents were sold. Seven companies won the bid, separately.

In future, Taiwan's utilization of R&D results and industrial cooperative model may take the following directions into account:

Strengthening basic infrastructure: (i) Reinforce patent analysis, plan patent layouts, and enhance patent quality, (ii) Build related database platforms to strengthen information analysis, including conducting patent strength analysis, target client analysis, benchmark models for IPR operations, and pursue the best practices, (iii) Recruit senior talent and cultivate professional technology transfer talent for a long term.

Build IP-centred technology transfer mechanism:

(i) Strengthen patent strategy: Formulate patents layout strategy, licensing strategy, maintenance and abandonment strategy, (ii) Build flexible IPR utilization model, such as option licenses, patent alliances and active licensing, and (iii) Cooperate with venture capital company to give an impetus to new venture business.

Conclusions

The key factors of utilization of R&D results and successful industrial cooperation model include: (i) an active technology transfer policy; (ii) senior manager's support; (iii) a good incentive system; (iv) experienced technology transfer professionals; (v) fine technology transfer system; (vi) good industrial network.

In preparation for the knowledge-and-economy-based era, R&D institutions need to step up IP creation, IP transfer and IP value-added capabilities of IP assets. The future R&D environment will change rapidly, and the competition will be increasingly intense. In response to Taiwan's change in industrial structure, ITRI is actively formulating a new operational policy, adjusting utilization model of R&D results and industrial cooperative models, and planning technology derivative value-added business. The key to success is speed, innovation, and IP management efficiency.

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