

# Policy for Active Technology Transfer with International Experience of Technomarts

Byung-Joo Kang

Hannam University

Deog-Seong Oh

Chungnam National University

## 1. Introduction

Only relatively recently has technology been conceived of as a major factor in economic growth and national development. However, people have begun to realize that economic growth lacking a strong technological base faces severe growth limits in this era of knowledge-based societies.

Beginning in the late 1950's, much research has been conducted to identify the relationship between technological development and economic growth. The general conclusion from this research of 40 years is that "technology is an essential factor in economic growth" (Solow; 1994, Denison; 1979, Kim Jung-Hum; 1998).

For a firm to succeed it should produce high quality products and reduce production cost relative to competitor by introducing new technology. Technology development is an essential factor in this process. A

majority of firms in developing countries including Korea, are small to medium sized, so technology transfer is an alternative to independently developing technologies. Firms in developing countries prefer technology transfers over self-development because it is less costly in time and money.

A common perception held among economic analysts in Korea under the IMF (International Monetary Fund) supervision is that technology will remedy economic stagnation. Political discussions such as "the relationship between the investment of technology transfer and economic growth" is a popular topic in public debates, and "governmental policies of technology transfer and diffusion" is being stressed more than ever before. However, the infrastructure, laws and organizations necessary to the smooth transfer of technology are presently quite weak in Korea.

The aim of this paper is to analyze the major types and processes of

technology transfer and to suggest directions and tasks in establishing a technomart through a survey of domestic and foreign case studies. Laws, organizations and institutional aspects which are essential in establishing a technomart will also be analyzed.

## 2. Survey of the Technology Transfer Literature

### 1) Definition of Technology Transfer

Technologies within a country are

changing through the introduction of foreign technologies and innovations in domestic technologies. Advanced countries develop necessary technologies through their accumulated technology development capability, and they easily digest, absorb, and renovate technologies which were imported from foreign countries. However, developing countries are more likely to rely on transferred technologies because they lack technology development capability. Since technologies are not homogeneous, and contents, characteristics and types differ and are understood in different ways based on the persons who define them, technologies can be classified in to six categories (Table 1 ).

Table 1. Classification of Technology

Criteria of classification	Types of Technology	Researchers
Degree of specification	Technology in general, special technology for a system, special technology for firms	Hall & Johnson (1970)
Degree of changes	Revised technology, dramatically renovated technology, new technology, alternative technology	Abernathy & Utterback (1978)
Factor of technology	Production technology, operation and management technology, architecture technology, research and development technology	Lee Jin-Joo, Lee Juk-Kyo (1979)
Profit seeking	Public technology, private industrial technology	Annals of Science and Technology (1990)
Process of adaptation	Basic architectural technology, commodity architect technology, commodity investigation technology, production and management technology	H u r Young-Do(1991)
Area of use	Commodity technology, production technology, processing technology	Lee Jin-Joo(1993)

Technology can be comprehensively defined as an object of transaction. Thus, property rights, know-how, technological and skilled manpower, education and training programs, and technology-embodied merchandises are all considered as technology in this respect (Kang and Oh, 1998).

## 2) Types and Methods of Technology Transfer

Domestic technology transfer occurs when individuals or firms which hold a technology transfers it to others. However, technology transfers between nations is carried out through both formal and informal channels and is generally more complicated than a domestic technology transfers. One of the delicate issues when domestic firms seek to import technologies from foreign countries is determining through which channel the technologies should be transferred and how the quality of transferred technology is to be evaluated.

Technologies are transferred through the literature of science and technology, exchanges of technical experts, overseas training programs, visiting experts, industrial property rights, patent using rights, know-how using rights, and the investment of full and joint ventures. Six types of technology transactions are commonly employed in technology transfer.

Licensing is the most commonly used method of technology transfer. Technology users pay a certain proportion of income from selling the products of using imported technologies as a compensation for employed technology.

The second method of technology transfers is turnkey. The technology source supplies a machine operative key to the user. Sophisticated new technologies are mainly transferred by this method. However, this system is criticized as requiring additional costs while reducing practical knowledge acquisition.

Joint venture is another useful type of technology transfer when more than two firms want to build a tightly capitalized venture firm to produce merchandise or services. This type of technology transfer shares the market, production skill and management know-how among entree firms.

The fourth method of technology transfer is the purchase of technology embodied products. Production cost and research expense are reduced for firms in developing or less developed countries.

A fifth way of technology transfer is technology transaction between domestic firms and branch firms located in foreign countries. Multinational firms are expanding their markets by locating production lines in one country and distribution lines in other countries.

Table 2. Evaluations of Technology Transfer and Transactions

Classification	Contents	Evaluation
Licensing	<ul style="list-style-type: none"> <li>- Most common technology transaction in private sector</li> <li>- Technology user pays a certain proportion of sales as a user fee to the technology supplier</li> </ul>	<ul style="list-style-type: none"> <li>- User's ability to absorb the technology enhances transfer</li> <li>- Cost of developing technologies reduced</li> <li>- Technology supplier has empowered within the technology transaction contract</li> </ul>
Turnkey	<ul style="list-style-type: none"> <li>- Technology transfer happens when technology supplier provides to the demander fully operational production facilities</li> <li>- Technology user relies entirely on supplier</li> </ul>	<ul style="list-style-type: none"> <li>- Newly developed technologies can be transferred.</li> <li>- Technology user avoids insufficient skilled manpower problem</li> <li>- Inefficient method of technology transfer considering expenditures.</li> </ul>
Joint venture	<ul style="list-style-type: none"> <li>- A third firm is established by more than two entrees for commodity production</li> <li>- The market, production skills and management know-how are shared.</li> </ul>	<ul style="list-style-type: none"> <li>- In case of high level technology, package type of technologies can be transferred to the partner and securely maintained</li> </ul>
Buying technology embodied products	<ul style="list-style-type: none"> <li>- By buying sophisticated facilities, technologies are transferred</li> </ul>	<ul style="list-style-type: none"> <li>- Production research expenses reduced for technology users.</li> </ul>
Inner firm technology transfer	<ul style="list-style-type: none"> <li>- Technology transfer between domestic firms and branch firms located in foreign countries</li> </ul>	<ul style="list-style-type: none"> <li>- Especially efficient with large scale technologies</li> </ul>
Imitation of products and production process	<ul style="list-style-type: none"> <li>- Primarily imitating ready-made products</li> </ul>	<ul style="list-style-type: none"> <li>- Stimulates technology renovation</li> <li>- Possible technology innovation in other fields</li> </ul>

Lastly, the imitation of production processes and buying technology embodied merchandise from advanced countries are other methods of technology

transfer. Technology could be transferred smoothly when those who want to imitate the production process or finished products possess a high

level of technology and that technology is employed in the imitation.

### 3. Function and Role of the Technomart

#### 1) Definition and Necessity of the Technomart

A technomart is a market in which technology suppliers and acquirers interact, while providing an effective distribution structure and diverse supporting functions for technology transfer. The necessity for a technomart is summarized in three aspects as follow.

The first necessity is the enhancement of national competitive power and enlargement of technology infrastructure. The competitive power of a nation is not only determined by educational level and production capability, but also by various resources and the status of social overhead capital. National competitive power is enhanced by protecting property rights, enlarging the technological infrastructure, constructing a network for active communication between firms and individuals, and by establishing an open competitive market.

The technology infrastructure, a new type of overhead capital based on technology, is classified as personal capital, physical capital and knowledge. The technology infrastructure is a

major source of competitive power as technology advancement is accelerated, trade and investment is globalized and becomes public goods which accomplish the multiple objectives for increasing the development capacity of a society (Justman & Teubal, 1995).

The second necessity is the construction of comprehensive technology innovation system to acquire and activate technology. Organizations and regulations for technology development and transfer were prepared in sectoral base in Korea. Since technopolis, science park, research park, ERCs (Eminent Research Centers), and RRCs (Regional Research Centers) have been managed and operated separately by individual organizations so far in Korea. Those facilities have been inefficient due to functional separation or overlapping. Technologies created by universities and national research labs have not been smoothly transferred to SMEs (Small and Medium Size Enterprises) and spin-off venture firms were not actively created for above reasons.

To encourage technology innovation through development and transfer, transactions between technology developers and users should be increased. The establishment of a technology innovation structure at the national level which combines technology infrastructure and supporting system is necessary. This technology innovation structure should

be a complete infrastructure such as a cooperative technology development structure among firms, universities and research labs. It should create and maintain close relationships between technology producers and users, and a distribution structure of knowledge and information between research groups and governmental organizations. Since technology includes many complicated factors to be transacted, a technomart is needed for the active technology transaction between technology producers and users as a market (Austrian Government, 1997).

The third necessity is fostering venture industries and activating patent utilization. The technomarts allows venture firms to link technology suppliers, and the technology market advances technology development through intensifying the partnership between universities, research labs and firms, and also by simulating technology transfer.

One important industrial policy is to accelerate business start-ups through the utilization of property right such as unused patents and technologies not transacted but held by universities, national and private researches labs and individuals. Therefore, to provide one-stop service for patent application, the technomart is necessary.

## 2. Functions and Types of the Technomart

The technomart offers three types of functions: facilitating technology transactions, providing technology information and sponsoring technology exhibitions and events.

Technology transaction is a key role of the technomart. Technologies, technology embodied merchandise, skilled personnel and education programs produced by universities, research labs and individuals are transacted through the technomart. A technomart also perform a meditating function such as activating unused technologies and patents which are possessed by domestic and foreign national research institutes and arbitrating unused technologies and patents which are held by domestic and foreign private firms.

Information gathering and organization is another role of the technomart. General information about technology machinery and materials are surveyed and managed, general business information about joint ventures, PR(Public Relations) and a variety of catalogues are collected and distributed by the technomart. Technology suppliers and users are connected through the technomart's internet and web-sites.

Events such as technology exhibitions, business negotiations and

technology presentations are held by the technomart to activate exchange of technology-related information. Broadly speaking, there are two types of technomarts. The temporary technomart is held at one place for a limited period of time. However, a wide range of technologies are exchanged and transacted, year around, at permanent technomarts. Technomarts are changing gradually from limited exhibitions to periodical transaction markets.

Technomarts are also classified into various types according to their functions. Based on their key functions, technomarts are classified into three types : information-centered, transaction oriented, and mixed type.

An information-centered technomart

is a comprehensive information distribution system which gathers and manipulates information on technology transactions and supplies and diffuses it to the technology community. Technology users are quickly able to locate needed technology collaboration partners through technomarts' internet or web-sites.

A transaction-oriented technomart is a physical market where various technologies are traded through the direct contact of buyers and sellers on a regular or irregular base. This type of technomart is held by region, products, or technology field, separately or comprehensively. Technology-related symposiums and presentations are also held by such technomarts.

Table 3. Types and Characteristics of Technomart

Classification	Information-Centered Technomart	Transaction-Oriented Technomart	Mixed Type Technomart
Characteristics	Comprehensive information distribution system to gather and manipulates information on technology transactions, suppling it to technology demanders	Various technologies, through the direct contact of technology sellers and buyers are traded on a regular or irregular bases	A typical technomart where advice, brokerage and transaction of technologies are provided
Evaluation	Technology demanders easily and quickly find needed technology and technology collaboration partners through the internet or web-site network of the technomart	Held by region, products, or field of technologies to be handled separately or comprehensively. Technology related symposiums, and presentations also held	Supports technology transfer and transactions for SMEs and promotes joint investment for SMEs in developing countries

A mixed type of technomart is a typical technomart where advice, brokerage and transaction of technologies are provided, and the entire business transaction, from investigation of technology to venture business, is also supported. UNIDO(United Nation's Industrial Development Organization) Technomart was established to support technology transfer and transaction for SMEs and to promote joint investment for SMEs in developing countries.

### 3. Case Studies Based on Type of Technomart

Technomarts in advanced countries

are often driven forward by the local governments as a tool of regional development and are also supported by the industrial sector. Multinational firms are a major contribution to technology transfer; they make up the majority of technomart participants.

#### 1) Information Centered Technomart

(1) Japan Technomart Ltd.

Japan Technomart Ltd. was built in 1985 with the support of MITI(Ministry of International Trade and Industry). There are 13 branches nationwide with

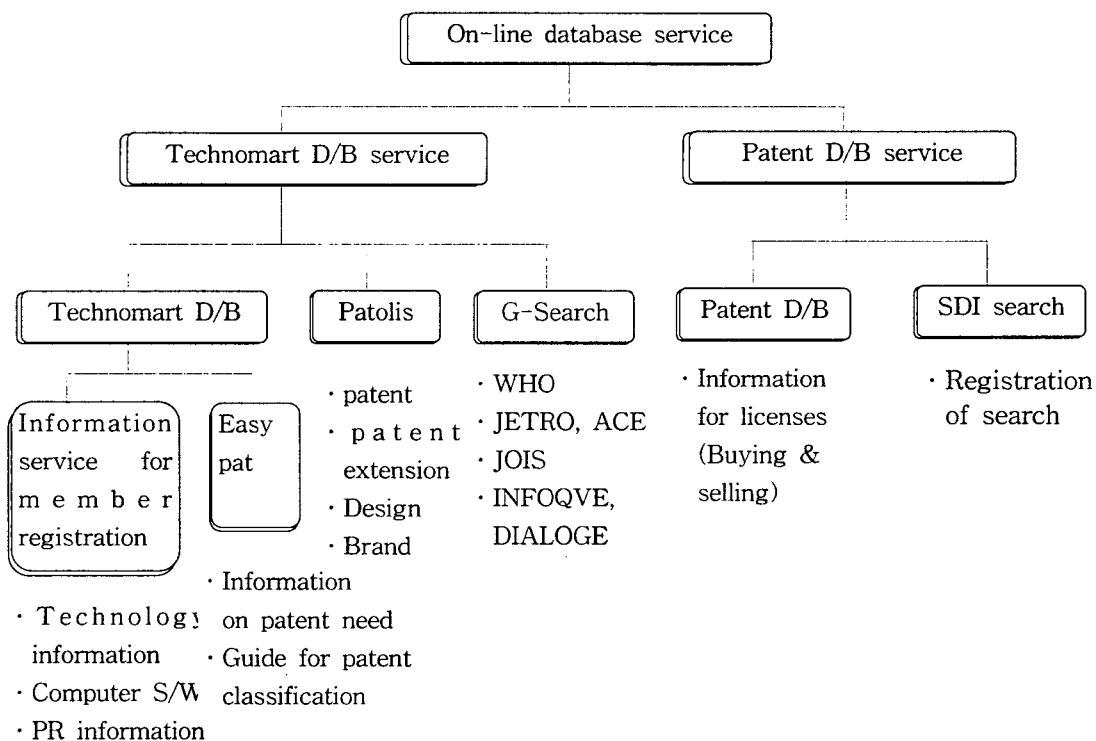


Figure 1. Distribution System of Technology Information



headquarters in Tokyo and a secondary headquarters in Osaka. The basic role of Japan Technomart is gathering transferable technology information and establishing databases to provide on-line service.

Five major projects are conducted by the Japan Technomart Ltd. including on-line database service projects, survey and research projects, teaching and advising projects, advertisement and promotion projects and event organization and foreign projects.

There are three kinds of memberships in Japan Technomart Ltd. Qualified members are financial agencies such as banks and stock companies. Regular members are large firms which frequently utilize the technomart. Lastly there are unqualified members who belong to neither of the two groups.

## (2) Technonet Asia

This organization was formed to carry out a project for the IDRC (International Development Research Center) in 1993. The main functions of Technonet Asia are technology transfer, mediation of joint venture activities, and the exchange of science and technology information in the Asia-Pacific region.

Sixteen public institutions from eleven countries participate in this organization with headquarters in Singapore. Four current major projects

of Technonet Asia are CIDA (Canadian International Development Agency) program( technology transfer and arbitrating of joint ventures for SMEs between Korea and Canada), STEW(Special Technical Workshop), Seed Fund( fund raising for Technonet Asia) and Technonet Asia(promotion of joint ventures and technology transfer among member countries).

## 2) Transaction Oriented Technomart

### (1) Japan Technology Transaction Information Center for SMEs

The role of this organization is to activate technology exchange between SMEs and to transfer new technologies from large firms and public research labs to SMEs. It is basically domestically oriented. Technology Plaza, managed by local governments, is a nationwide event. Event such as National Technology Exchange Plaza are held annually, and Block Technology Exchange Plaza is also held once every year in seven different blocks.

### (2) Buckingham Technomart in the United Kingdom

This organization is supported by Barclay's Bank which provides funds for research and development of high

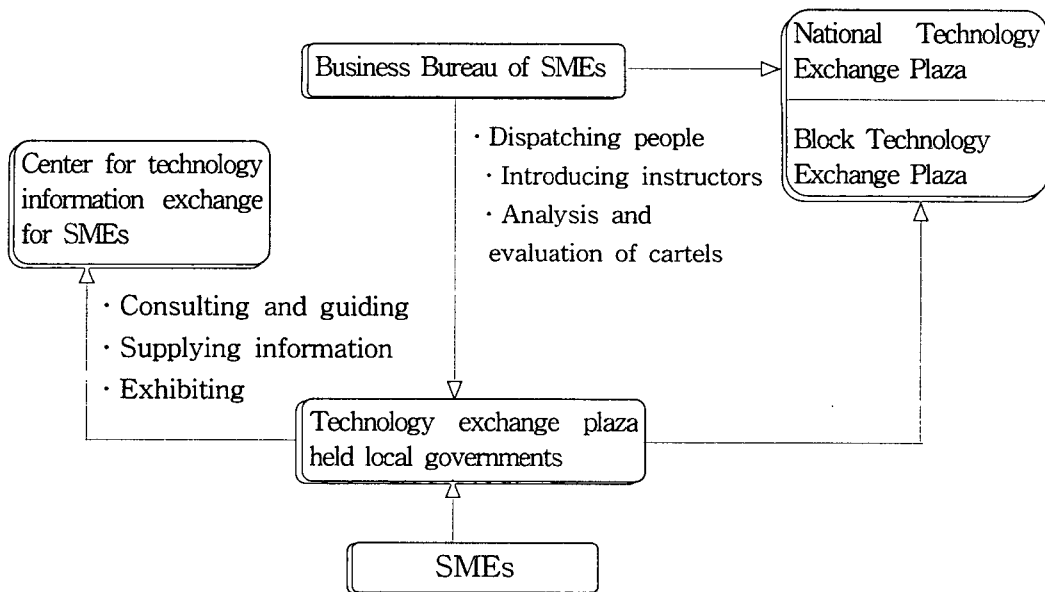


Figure 2. Structure of Technology Exchange Plaza Project

technology. About 100 high-tech related experts in 60 branches in the U.K. perform consulting for high technology research and development.

An international conference supported by the British Technology Group for the presentation of research results on high technology has been held annually since 1987. The aim of this organization is to exchange high technology, participants are experts in high technology.

### 3) Mixed Type of Technomart

#### (1) UNIDO Technomart

This organization was established in 1991 by the Industry and Technological Information Bank of UNIDO(United

Nation's Industrial Development Organization), the financial support bureau and consulting firm for technology transfer. It has been held annually by UNIDO and less developed countries. Its aim is to support technology transfer and joint ventures for SMEs in developing countries. INTIB(Industrial and Technological Information Bank) in UNIDO gathers and organizes transferable technology information and distributes it to 73 countries in Latin America, Asia and Eastern Europe.

#### 4) Others

##### (1) Korean Technology Market (KOTM)

KOTM was formed in Taejon in 1998

Table 4. Comparison of Technomarts by Type

Classification	Example	Major projects	Establishing Supporting Organizations	Functions	Others
Information centered technomart	Japan Technomart Ltd.	-On-line D/B service -Survey & research -Advice & consult -Advertisement -Event and foreign project	-MITI	-Establishing D/B by gathering transactable technologies -Support, distribute and exchange technology information by on-line service	-Permanent technology transfer through D/B -No technology transactions
	Technonet Asia	-CID & INC program -Special Technical workshop(STEW) -Techno Asia SEED Fund	-IDRC -CIDA -USAID -JICA	-Exchanging science and technology information -Technology transfer -Mediating venture investment	-Initiated as a project in 1993 by Canadian IDRC
Transaction oriented technomart	JTTIC for SMEs	-Technology exchange project support -Technology exchange plaza -Block technology exchange plaza	-Project team for SMEs	-Activating technology exchange between SMEs -Transferring technology from large firms to SMEs	-More domestic-oriented technology transfer
	Buckingham Technomart in U.K.	-Holding international conference for the presentation of high technology research results	-Barclay's Bank	-Providing research and development funds for high-tech -Consulting jobs for research and development plans in private firms	-Quality of participants in the conference is relatively high because aim of this organization is exchanging high technology
Mixed type technomart	UNIDO Technomart	-First technomart held at Beijing, 1991 -Technomarts held at New Dehli 1992,1993	-Industry and Technological Information Bank of UNIDO	-Standardizing & Synthesizing the transferable technology information	-Supporting SMEs venture investment in developing countries -Gathering technology information
Others	Korea Technology Market (KOTM)	-Industrial technology information service -Mediating skilled experts -Coaching and advising technology information	-Taejon city -Local Authority for SMEs -Chammbler of commerce	-Facilitating technology transactions of advanced and new technologies -Creating venture firms through cooperation of universities, research labs and firms	-Various events and basic technology transfer projects prepared

as a nonprofit corporation whose aim is to foster promising venture firms through transferring technologies already developed by domestic and foreign firms and research labs.

Major projects of KOTM include providing industrial technology information, mediating skilled experts, introducing universities and research institutes to local SMEs, coaching and advising on technology information and holding seminars and symposiums for technology transfer.

#### 5) Comparative Analysis

Four type of technomarts are compared and evaluated in this section (Table 4) : information-centered, transaction-oriented, mixed type and others.

Within technomarts direct technology transactions do not occur, but support is provided in information-centered technomarts for technology transfer by establishing a database for transferable technology information. Technologies are transacted in transaction-oriented technomarts on a periodical or non-periodical basis. Standardizing and synthesizing are the major jobs for mixed type technomarts, but direct technology transactions do occur as needed.

Each technomart analyzed above has common characteristics by type and function. In the case of Japan Technomart Ltd, the major function is

exchanging technology information between domestic firms under the auspices of MITI; the exchange of technology information between foreign firms and domestic research labs is a major function of Technonet Asia. In case of transaction-oriented technomart, technology exchange between domestic SMEs is a major role of JTTIC (Japan Technology Transaction Information Center) for SMEs, and international conferences is the key task in Buckingham Technomart. KOTM is still in the initial stages of development so in order to take advantage of its newer position, KOTM is trying to contrive a comprehensive type of technomart which holds all the characteristics of the three previous technomarts.

### 4. Establishment of Technomart

#### 1) Basic Model

Technomarts are classified into three categories by function. Basic elements composing a technomart are technologies to be transacted, technology suppliers and demanders, and technomart managing institutions and supporting systems. Technologies to be transacted are composed of transferable or cooperative technologies, technology information, technology embodied merchandises, and related programs.

Technology demanders are technology innovation firms, venture firms or technology intensive SMEs, and technology suppliers such as universities, public research centers, firms and individuals. Technomart managing institutions are an information center, which collects and manages information, mediating organizations for technology transactions, and support systems for consultation on patent and legal affairs, advertising organizations, and consulting firms.

To smoothly execute the proper functions of the technomart, three organizations or facilities such as below are needed.

- Physical market to hold events, technology presentations, and seminars to act as a catalyst of technology transfer between technology demanders and suppliers.
- Cyber market to provide information needed in technology transfer and transaction through the information media such as internet, multi-media, and electronic markets.
- Supporting facilities to provide advice and consultation in the field of patent, finance, and technology evaluation.

Technomarts have been developed from non-periodical events which cover a wide range of technologies to periodical events which deal with only a certain area of technology. However, a permanent type of technomart which

maintains these three facilities mentioned above has not yet appeared.

Technology transactions require time because the technology demander should check the quality of technologies to be purchased, but such technology evaluation is more different than the evaluation of ordinary market goods. Therefore, technology transactions do not occur frequently, even if many events like the technomart are held. Therefore, the establishment of a technomart should proceed step by step.

The initial stage of establishing a technomart is as follows. It is desirable to set-up a technomart where technology sources (universities, research labs, researchers) and demanders, venture firms and investors are clustered and where gathering and transferring technology information is less costly.

The second stage of the technomart is a growing the developmental period. A cyber technomart is established when the knowledge of gathering and transferring technology information is accumulated at a high level. Once the cyber technomart is built-up, information on technology transaction and transfer is available with no barriers in time and space.

The third stage of the technomart is its maturing period. A physical transaction-oriented technomart is created in this stage based on experiences and information from the

operation of a cyber market. The simultaneous operation of both the physical and cyber markets is optional.

There are several ways to establish a technomart. A technomart is composed of many organizations and institutes such as the technomart itself, supporting organizations, technology sources, technology users, brokerage agencies, and project operation agencies. All of these organizations are located in one place in the case of a site type technomart. Therefore, a large lot of land and a huge amount of money is needed to build a site type technomart. But, in case of network type technomart, all of the technomart related organizations are not necessary to locate at one place. If all of the technomart-related organizations are networked, technology transfer is possible. A network type technomart is less costly to establish than a site type technomart. The site type technomart is extremely difficult to build because a large parcel of land and a huge amount of money is needed to locate all the needed facilities in one place; however, technologies are not transacted frequently. As a result, building a site type technomart is not feasible in terms of "scale economy," and therefore a network type technomart is more desirable.

## 2) Tasks to be Executed for Effective Technomart Operation

While the goal may be to build a technomart to activate technology transfer, the building of the technomart infrastructure is even more important. The operation mechanisms of technology transaction market works more properly when a systematic distribution network for technology-related information is built and the quality of the mediating agency is enhanced. Three tasks, stated below, are requisite.

The first task is to establish a database to collect technology transfer-related information and to process collected information. Without such a systematic and comprehensive technology transfer system, it is impossible to provide on time necessary information to users. Technology suppliers want to sell technology-related information from firms and research labs. Technology demanders want technology-related information transferred from foreign countries. Especially domestic firms and governmental agencies seek this information to implement national technology policies. There are two sources of technology-related information from abroad. One is a source from commercial and business information books which deal with transferable technologies, and another source is professional technology databases.

There are two basic kinds of professional database, commercial and public. Public databases are established by international agencies such as UNIDO.

The second task to establish an effective technomart is to systemize the distribution structure of technology transfer information for information users. One of the representative on-line information systems in Korea is KINITI(Korea Institute of Industry and Technology Information)-IR, which is a national information searching system completed in 1984 by KINITI. Foreign and domestic information on industrial property is databased and utilized by firms, research labs and universities to develop new technologies and carry out their research. Information from this database is delivered to users through an on-line searching program.

Transferring technology from advanced countries is a proven and substitutional method to enhance a nation's competitive power. However, to establish a technomart, a huge amount of capital is required. Thus, the government should provide financial support for the establishment of technomarts.

Third task is preparing a specialized team for evaluation and analysis of technology-related information. Technology information should be analyzed and assessed by experts before it is transacted. Technology consultants and

mediators are highly paid professionals in advanced countries. Educating and training experts in technology evaluation with respect to technology itself and economic considerations is one of the important tasks necessary in establishing an effective technomart.

### 3) Related Laws and Regulations

There are a few laws in the field of technology development such as the Science and Technology Promotion Act, The Technology Development Acceleration Act and the Joint Research Acceleration Act. However, a comprehensive legal structure for technology transfer which connects the results of research to technology innovation has not been established in Korea. Since the central and local governments do not have a fixed policy on technomart as yet, a comprehensive legal and institutional structure is lacking.

Projects of teaching technology have been executed in Korea by the Center for Agriculture Promotion and the Office of Rural Development. Many government sponsored research institutes in the engineering field were created in the late 1960s, and major roles for those institutes were outlined as the introducing, digesting and revising the advanced technologies from advanced countries. Joint research and trust research were conducted between

public research institutes and private firms as the manufacturing sector quickly expanded in the 1970s. The focus in the manufacturing area at that time was building research infrastructure. As the bulk of research activity was by government sponsored research institutes, development projects for special research and technology development projects for the manufacturing base were enhanced, and laws for joint research among industries, universities and research labs were enacted in the 1980s.

As the importance of basic research had been stressed from the beginning of the 1990s, more attention was given to creative research on science and technology seed such as the basic research by universities and research & development projects by government sponsored research institutes, and policies for technological innovations in SMEs. As a result of these, to support the creation of an information center for the establishment of an information distribution system and the creation of a Korean Total Technology Development Finance, several laws were enacted. Technology innovation supporting projects such as the Free Technology Transfer Project for SMEs, the Consortium Project for Regional Universities, Firms and Laboratories, PRC project are being driven in many respects by the above laws, but the establishment of an infrastructure for

technology transfer, including technomarts, is still at the beginning stage.

Korea Institute of Industry & Technology Information(KINITI) was created based on the Law for KINITI; the Information Center for Research & Development was built based on the Special Research Institute Fostering Law; the Regional Supporting Center for Technology Cooperation was established based on the Local SMEs Fostering Act, the Korea Academy of Engineering was built based on the Manufacturing and Energy Technology Base Fostering Act, and Korea Total Technology Finance Ltd. was based on the Act for KTTF Ltd. Theoretically, laws and regulations for the establishment of technology transfer infrastructure are relatively well-prepared in Korea.

However, since the majority of laws were enacted very recently, laws and regulations are not actually being utilized for technology transfer. Especially, links between technology sources(universities and laboratories) and technology users(venture firms, firms), and organizations which mediate and support technology transfer are very weak. In this respect, many tasks should be carried out to establish technology transfer networks in Korea.



## 5. Conclusions

Demands for technology transfer are growing tremendously in many industrial areas as industrial technologies become more complicated and diversified, but governmental support for the establishment of information centers is weak in Korea. Therefore, it is very difficult for individual firms to gather and utilize needed information because channels of information gathering are uncoordinated and expensive. Especially, SMEs which are major units of the Korean manufacturing sector, find it difficult to acquire technology-related information.

All types of transferred technology information from foreign countries are handled by KINITI, Korea Research Institute of Producing Technology and Industrial Promotion Complex. However, information is not highly utilized because the amount of information gathering is relatively small and there is scant connection between these organizations.

If technology users want to utilize a specific technology, acquire it by participating in foreign technology presentations or through commercial channels of information gathering. Information circulation projects of KINITI consist of establishment of database, and publication of technology transfer information, but provisions for actual technology transfer is only partially

implemented due to an insufficient budget.

Contributions of technomarts to technology transfers and transactions would result from the application of technology-related information and from direct meetings between technology demanders and suppliers. Different types of organizations such as firms, universities, laboratories, venture firms and technology transfer agencies could participate in the technomart, and they could promote the application and commercialization of technologies.

To establish an efficient technomart, at least a few organizations and facilities are required such as, libraries and research teams, technology agents, technology exhibition halls to promote technology transfer and transaction, and supporting systems which provide consulting, technology evaluation and financing. However, to build a comprehensive technomart is extremely difficult because it lacks profitability.

Accordingly, it is best to build, or evolve technomart gradually based on the needs of the demanders and the circumstances of the market. In the developmental stage, a cyber market should be established based on accumulated knowledge from the initial stage of the technomart.

Given the extreme capital demands of establishing a site type technomart, a non-site type is preferable, being centered on a technology library, a

transaction agency, and a network to support offer facilities.

## References

- Denison, Edward F., 1979, *Accounting for Slow Economic Growth : The United States in the 1970s*, Washington, D, C : Brookings Institute.
- Evenson, R. E, and L. E. Westphal, 1993, "Technological Change and Technology Strategy," *Handbook of Development Economics*, 3, J. Behrman & T. N. Srinivasan(eds), North-Holland, pp.76-92.
- Fershtman, C. , and M. I. Kamien, 1992, "Cross Licensing of Complementary Technologies," *International Journal of Industrial organization*, pp.107-136.
- Gallini, N. , and B. D. Wright, 1990, " Technology Transfer Under Asymmetric Information, " *The RAND Journal of Economics*, 21, pp.64-91.
- Harvey, Brooks, 1966, *National Science Policy and Technology Transfer, Proceedings of a Conference on Technology Transfer and Innovation*, Washington D.C. : National Science Foundation.
- Hyun Jae-Ho, Kil Bu-Jong, 1997, *A Comparative Study on Technology Transfer Legislation among Korea, U.S.A. and Japan*, Science & Technology Policy Institute.
- Jenson, R. A. and M. C. Thurby, 1987, "A Decision Theoretic Model of Innovation, Technology Transfer and Trade," *Review of Economic Studies*, 54.
- Kang Byung-Joo and Oh Deog-Seong, 1998, "Networking the Technology Sources and Technology Transfer Infrastructure" *Journal of the Korea Regional Development Association*, 10(3), pp.183-198.
- Kim Jong-Beom, 1989, *A Comparative Research for the Environment and Policy of Technology Transfer between Korea and Japan*, Science of Technology Policy Institute.
- Kweon Won-Ki, 1991, *International Technology Transfer*, Nanam Publishers.
- Lee Young-Si, Moon In-Hyuk and Kim Jae-Bok, 1990, *A Strategy of Establishing Circulation System for Technology Transfer Information in Korea*, Korea Institute of Industry.
- Science & Technology Policy Institute, 1996, *A Research on the Connection of Localization and Technological Innovation*.
- Slow, R. M, 1994, "Perspectives on Growth Theory," *Journal of Economic Perspectives*, 8, Winter, pp.13-26.
- Wang Yoon-Jong, 1994, *Technology Transfer and the Utilization of Technomart*, Korea Institute of Economic Policy.

## ABSTRACT

One of the conclusions from the researches of the last 40 years on the relationship between technological development and economic growth is that technology is an essential factor in economic growth. A majority of firms in developing countries, including Korea, are small to medium sized, so technology transfer is an alternative to developing in those technologies. Such firms prefer technology transfers over self-development because of time and money savings. This paper analyzes the types and processes of technology transfers and suggests a direction and tasks to establish a technomart through an examination of domestic and foreign case studies. Laws, organizations and institutional aspects which are related to establishing technomart are also discussed.

Key Words : technomart, technology transfer, technology transaction, information centered technomart, transaction oriented technomart