

Technology Transfer Principle & Strategy

Chapter 1: The Fundamental Principle & Strategy of Technology Transfer

Understanding the necessity of technology transfer & the importance of technology outsourcing

- Technology acquisition strategy in management strategy
- Forms of technology outsourcing
- The necessity of technology transfer in technology outsourcing

Understanding transfer methods for each form of technology transfer

- Determining technology transfer types & subjects
- Understanding methods of approach for each form of technology transfer

Understanding each form of technology transfer procedures & contract types

- Determining standard technology transfer work procedures
- Understanding technology licensing procedures & methods
- Understanding cross licensing

Part 1: The Necessity of Technology Transfer

1. Strategic Management & Business Strategy

Recently, The rapid development of information & communication technology based on the internet is presenting to corporations the urgent problem of adaptation and survival in the fast-changing competitive environment. The so-called strategic management is a series of decision making activities and procedures in establishing and executing effective strategies for the pursuit of corporate missions and achievement of aims. The decision making process where the opportunities and threats of the environment faced by or expected to be faced by one's company are combined with the internal capabilities of the company. It is a method of achieving corporate aims in an uncertain competitive environment whereby schemes and plans are established to enable competition in a more favorable situation than other companies. The favorable situation means securing attractive business areas and possessing continuous competitive advantage, and the fundamental factors and required conditions for this can be seen in <Table 1>.

[Table 1] Fundamental factors and required conditions for competitive advantage

Fundamental factors	Required conditions
Recognizing and setting favorable positions	Opportunities & threats from the external environment
Optimizing business area setting	Concentration of internal competencies for the realization of competitive advantage
Maintenance of dynamics	Systematization & action process, capability to enable dynamic change required

The strategies in business area are established in consideration of these fundamental factors and required conditions. Based on these business strategies, specific technology acquisition strategies are determined. That means, corporate competitiveness can be secured through effective

connection between business strategy and technology acquisition strategy. Especially, If we examine the technology acquisition process in terms of corporate management strategy, there are 5 stages in the decision making process as seen in <Figure 1> including technology management strategy establishment, derivation of required technology based on the established technology management strategy, analysis of internal technology development capability in relation to derived technology issues, technology acquisition strategy establishment based on the established technology management strategy, internal development & technology outsourcing in accordance with the established technology acquisition strategy etc.

[Figure 1] Corporate technology acquisition procedure

- Technology Management Strategy
- Derivation of Technology Needs
- Evaluation of Current Technology
- Acquisition Strategy Establishment
- In-house Development
- Outsourcing / Technology Transfer
- Outsourcing / Necessity of Technology Transfer
- Early Product Release / Market Preoccupation
- R&D Costs Reduction
- Risk of Uncertainty Minimization
- Gap Confirmation
- Decision on the Required Technology Order of Priority
- Confirmation of Potential Route for Technology Acquisition

Especially, for the successful performance of technology transfer & outsourcing in this series of technology acquisition procedures, precisely understanding the business sections established in the technology management strategy and the order of priority in technology said to be the most significant factor.

2. Technology Outsourcing

Outsourcing is the supply of various management resources required in corporate activity from not internal but external sources through contracting. In the case where technology related management resources are externally supplied, it can be considered as technology outsourcing. There is no opposition to the view that technology outsourcing will rapidly become widespread following the recent changes in the management environment. It is because there is no other way but to adapt and find countermeasures to the changing management environment for survival, and achieve essential corporate aims whether it is a corporation or not. As the atmosphere in relation to the necessity of technology outsourcing increases, the demand for industries in technology rises, and this calls upon the supply of technology. That is, when there is demand business opportunities are created, and this kind of business opportunity, in most cases, attracts and absorbs market participants. The general subjects of technology outsourcing are as follows.

[Table 2] Technology outsourcing subjects

Technology outsourcing subjects	<ul style="list-style-type: none"> -2 Complete corporations & technology required for commercialization (production, sales etc.) -3 Sectional & key factor technology which can supplement in-house technology -4 Technology services required in the technology development & commercialization process -5 Research facilities & equipment -6 Research personnel
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The technology transfer business formed in accordance with the demand increases in this kind of technology outsourcing can make it simple and efficient along with market activation. If the required technology can be supplied easily and competitively, this can reduce the need and scale of in-house R&D, and will be useful for companies in securing competitiveness through the preoccupation of opportunities in the market. Furthermore, in terms of costs, there is a strong point in that cost savings can be gained with the reduction in R&D organization maintenance costs. <Table 3> below concisely summarizes the management environment factors that promote this kind of technology outsourcing.

[Table 3] The necessity of technology outsourcing

Necessity	Details
Technology integration & combination	Many key technologies are needed in line with the technology integration & combination trends, however all these cannot be developed in-house
Reduction in technology life	Increased risk in technology development due to reduced life cycle of technology products, quick appearance of similar or substitute technology
Rapidly changing market demands	There is a need to speed up new product release through externally supplied technology in order to meet market demands and preoccupy opportunities
Reduction in technology acquisition costs	There is a need to reduce R&D costs by outsourcing in order to be competitive
Diversification of risk	In order to diversify the risk in relation to the uncertainty of modern times, there is a need for risk avoidance through the diversification of R&D

3. Technology Transfer

Modern times can be commonly called a society of knowledge and intellectual value. Instead of the natural objects or objects visible to the eye, the unseen knowledge of the brain and the application of knowledge are the main focus of modern society.

Attention is given to other applications which affect awareness of economic value, this is called intellectual property. Intellectual property which meets the predetermined requirements and develops into a legal right is called intellectual property right. Intellectual property in current society is important especially in solving economic problems but there are standard limitations in their creation and production. Therefore, in most cases it can be considered that demand is larger than supply. Its economic value is dramatically increasing compared to the past and in proportion to this, an era will come where intellectual properties will turn into money.

As described above, technology in business require strategic management dimensions for active transaction for it to be traded like commodities. Also, to encourage an environment of increasing performance for technology transfer, business opportunities like consulting and advice from various relevant experts, technology introduction and recommendations etc. must be created. Technology transfer is more difficult and specialized than transfer of general goods, and there are greater possibilities to increase professional services and business opportunities. As a result, corporations, organizations, and individuals commercializing the supply of technology transfer information, introduction and agency, and various specialized services, consulting etc. between the technology provider and the demanding party, are appearing. Services that can be provided by specialized businesses in relation to technology transfer consulting etc. are very diverse, but when these services are properly provided and activated the bottleneck phenomenon in technology distribution disappears, and the era where technology is transferred like goods can come about more rapidly. In relation to technology transfer fixed price is received for professional advice and consultation and the business areas provided can be divided into three stages management strategy, technical

analysis, negotiation and contracts. <Table 4> shows the arrangement of these major tasks. In a similar way, this transaction can be applied not only within Korea but also internationally.

[Table 4] Major consultation tasks for each stage

Necessity	Details
Strategy establishment	<ul style="list-style-type: none"> -8 Establishment & consultation on technology management / commercialization strategies -9 Solutions for major technology issues -10 Establishment of technology implementation strategy
Consultation on technology analysis	<ul style="list-style-type: none"> -11 Sorting and recommendation technology requiring implementation -12 Technological & economic analysis of technology implementation subjects -13 Determination & analysis of rights in relation to technology implementation subjects -14 Proposals of major technology transfer condition settings & negotiation function domain
Consultation on negotiations & contracts	<ul style="list-style-type: none"> -15 Establishment & consultation on negotiation strategy of major conditions -16 Examination & construction of draft contracts -17 Agency of related certifications & permit lodgments -18 Technical fee calculation and remittance (payment) support tasks

Part 2: The form and strategy of Technology Transfer

1. Types and Characteristics of Technologies subject to Technology transfer

Assets that have economic value can largely be divided into tangible assets, which have specific form, and intangible assets, which do not have specific form. Here, the technology to be transferred can be included in the intangible category. The concept and the category of Intangible technology is very wide and flexible. In a narrow sense it means manufacturing site, manufacturing method, confidential skill, and know how, and in the wider sense it means the entire intellectual property which has economic value. With the aim of creating smooth technology transfer and distribution the technology transfer promotion law which was established on January 28, 2000 defines technology as patents registered in accordance with relevant laws such as the patent law, utility models, designs, semiconductor allocation design, capital assets based on technology, software and intellectual assets technology as well as design, whereby these are deemed to be the objects of technology transfer.

Traditionally, commodities subject to commercial transfer were focused on tangible assets, intangible assets like as technology subject to commercial transfer comparatively became more frequent only recently. It is true that the innate limitations in the transfer of technology and other intangible assets have prevented the development of technology transfer. However, it is also true that because of these characteristics, business operation using unique methods and strategies is possible rather than transfer of tangible assets. As a result, it can be said that planning and executing business strategies based on the understanding of the various characteristics of intellectual property is a short cut to business success. One of the most noticeable features of intellectual property is that, initial research and development requires much time and money, but during usage and distribution only small expenses are necessary.

If additional expenses required for duplication & reproduction for use and distribution are insignificant, all revenues generated here can be considered as profits. Because of this, the technology and intellectual property could have high economic value. These characteristics of intellectual property are as shown in [Table 5]

[Table 5] Characteristics of intellectual property

Characteristics of intellectual property	-Not visible and does not have physical form
	- Recovery value is relatively high because of the limitations in creation and production due to the high level intellectual origin
	-Evaluation and valuation is very difficult, and transfer price and conditions are decided through negotiation rather than by the market.
	-Exclusive with announced conditions, exclusive legal right is possible
	- Time and money consumption during initial creation, development, and production is high, but costs involved in duplication & reproduction for use and distribution is low enough to be negligible
	- Life cycle is relatively short, value fluctuation is severe

2. Methods of Technology Transfer

(1) Method of technology sale or transfer

Technology transfer & acquisition is the transfer of rights in accordance with a contract, and of these a transfer for a consideration is called the sale of technology. By the sale of the relevant technology, comprehensive control and management is handed over to the buyer who pays the price (sales price). Besides the difficulty in working out the value and the process of patent registration, this is similar to product sales. Not just the already registered patents but also the sale of patents in application can become the subject of a transfer (simply by recording patent application number). The owner demands a high and fixed price for full transfer of rights to the buyer but the buyer will not easily agree unless the buyer is convinced of the economic value & potentiality of utilization of the patent. As a result, as shown in <Table 6>, it is usual that sales only occur in special circumstances.

[Table 6] Motives for the transfer & sale of intellectual property (patents etc)

	- in the case where the owner of the patent does not have the capability to execute and there are problems in licensing to a 3 rd party
	- in the case where there is a problem in developing a basic patent into a commercial product
	- in the case where it is disposed for early recovery of the R&D costs
	- in the case where it is difficult to produce the finished goods, based on partial patent
	- sales by specialized technology development and sales companies in the ordinary course of their business
	- in the case where an individual inventor raises research & invention funds

In the case where profit is sought with a transfer or sales of patent rather than the technology licensing, the greatest problem is the determination of sales price. Because it is different from a running royalty based on business results like in the licensing method, a one-off fixed sales price is difficult to determine prior to the implementation of business. Methods of determining the sales price range from the relatively simple cost approach (total cost + appropriate profit) to very intricate methods where opportunity cost and even the expected profits are included, but in reality it is decided by the negotiations within the scope of the prices proposed by the parties involved in the sale.

In the transfer & sale of patents, the sales price is important but there is also a need to closely regulate the payment (receipt) procedures & methods. The sale & transfer of patents require the contract agreement between the two parties, but is only effective when registered with the Intellectual Property Office. However, cases of non-cooperation with regards to registration after the receipt of the sales price, or obstacles in payment receipts after registration is complete cannot be excluded. Finally, in the case of a patent sale based on contract where there are two or more joint owners, the sale or transfer is not possible without the agreement of the other owners, and this is the problem with joint ownership of patents. So, with the sale of patents etc. following the payment method as shown in <Table 7> below is the normal procedure.

[Table 7] Payment method of the sales price for patents etc

	- Method where the sales price and the patent rights registration are exchanged
	- Method of payment and receipt simultaneously with the notification of the completion of transfer registration
	- Method of payments in the course of a specified time frame after transfer registration, but to be more secure, a payment guarantee from a 3 rd party such as banks etc.

(2) Technology License

License is also called a method of permit to execute, and is a system that the holder of the technology rights gives permission to another party in relation to the execution rights of the relevant technology based on a contract. It means, the parties that give and take the execution & usage rights enter into a licensing contract, and on the premise of the specified conditions including payment of technical fees for a specified period etc. the permission for the execution & usage rights is given. After the period is over, execution and usage becomes invalid. If we compare it to products, it is similar to leasing or hiring.

Sales and licensing methods are mostly used in technology transfer, but there are the following differences between the two parties and these are directly connected to the selection issue. In the case of sales where the entire right including the possession right etc. is comprehensively transferred, and the supplier generally requests a very high transfer price, but the purchaser of the technology hesitates due to the high fixed price on technology which success is uncertain. However, in the case of licensing, the concept is to permit the execution and usage of the technology, so the price for its use (usage fee or royalty) becomes much lower. In the viewpoint of the technology provider, only the execution right is given with the possession right intact, so execution permits can be given in other areas or to other parties, thus can be satisfied with only the low technology usage fee, and it is favorable for the parties seeking the license as they can make payment of the usage fee in accordance with the business results.

Domestically, technology transfer is mainly conducted in the sales method because the licensing method of technology transfer is not properly recognized. However, because of the limitation of the sales method as previously explained, there is a need for the spread of recognition as well as the development & propagation of transfer techniques.

(3) A forms of technology transfer where it is conducted together with capital, management, know-how etc

Even if technology is purchased or licensed, the success in the commercialization of the relevant technology is not guaranteed, especially if the in-house utilization capability is insufficient. This is more the case with highly advanced technology. To solve this kind of problem, there is a need for a method where technology transfer are made together with other management resources including capital, management know-how, equipment, core components etc. In this case, technical fees can

be separately dealt with or transfer can be made including a part or the entire technical fee in relation to equipments, components etc. It worth paying attention to the recent trends in foreign countries where there is a rapid conversion from the previous technology only implementation to this kind of collective implementation.

(4) Purchase, M&A of corporations possessing technological capabilities

Although technology and related management resources can be taken as transfer subjects individually or collectively, on a wider sense, selling or purchasing companies with outstanding technology can be seen as a form of technology transfer. Even in reality, there are many cases of attempts to purchase or M&A companies possessing the required technology to achieve the aim of securing technology competitiveness rather than choosing the licensing or individual strategies to obtain technology. Likewise is the position of the company or the person with the ownership of the technology. Rather than trying to deal just with the technology alone, a strategy which combines the technology, related equipment, technical personnel, and other assets all into one is sometimes chosen. This kind of technology transfer through sales & purchase of companies that possess technology is chosen in the case where quick measures are required if the speed of technology development (change) is very fast or the life cycle of related technology & products is very short. This method of technology transfer is expected to greatly increase centered on small venture enterprises as management with technology considerations comes into full scale and with the acceleration of technology innovation. However, in this case, there is a limitation in that technology evaluation and value analysis of companies subject to sales & purchase are not easy.

(5) Technology transfer methods involving the sale of technology data such as plans, microfilms etc

In the case where aims can be achieved by just acquiring a part of the particular technology information, this can be used as a method to find simple technological solutions. This is often used in small scale projects.

(6) Technology transfer method using technical personnel as the medium

Like with industrial asset rights, if there is no requirement of active involvement by the technology provider and except when technology has been documented and objectified, technical personnel can directly be involved in the technology transfer. Transfer technology through invitation and deployment of technical personnel, resolution of technological issues through the employment of technical personnel etc. fall into this category. There are many cases where this method is used as a supplement together with the previously explained methods.

Of the numerous methods above, by which method to conduct the technology transfer depends on the type & characteristics of the relevant technology to be transferred as well as the position and strategy of each party. In specific cases, it is important to conduct this efficiently and using an appropriate method by comparatively analyzing the strengths and weaknesses of these technology transfer methods.

Part 3: Technology Transfer Procedures & Methods

1. Transfer Procedure

The fundamental technology transfer procedure can be classified into 6 stages as shown in <Figure

2>, and the characteristics of each stage can be summarized as shown in <Table 8>.

[Figure 2] Specific procedures of technology transfer
 post management
 negotiation & contracting
 marketing
 PACKAGING
 technology valuation/selection
 discovery of technology

[Table 8] Major tasks in technology transfer procedure (1)

Stage	Major Tasks
Discovery of technology	-19 Discovery of competitive technology -20 Transfer request or arranging & securing technology that is possible to transfer but is not possessed in-house
Technology valuation & demand selection	-21 qualitative/quantitative value valuation of the secured technology -22 Analyze possibility of clash with a 3 rd party owned technology -23 Establish transfer strategy in accordance with the technology type & form -24 Preliminary matching of technology demand/supply -25 Pre-analysis of whether the transferred technology can secure competitiveness if seeking to transfer overseas
Negotiation & contracting	-26 Establish strategy and consult on major conditions of the negotiation -27 Examine and draw-up drafty contract -28 Agency of related certification & permit lodgments -29 Calculate technical fee and remittance (payment) support tasks
Packaging	-30 Draw-up technology information document for the smooth execution of technology marketing -31 If possible include prototype
Technology transfer (sale) marketing activities	-32 Prepare marketing materials for technology transfer -33 Conduct activities such as the participation in Techno mart -34 Analyze methods to expect maximum effect with minimum cost -35 Discovery and contact of potential demanding parties -36 Research & analysis of demanding party (party seeking to implement) -37 Prior-proposal of technology transfer conditions to the parties seeking to receive the technology transfer

[Table 9] Major tasks in technology transfer procedure (2)

Stage	Major Tasks
Technology transfer negotiations & contract	-38 Propose of transfer conditions (Team Sheet) -39 Establish negotiation strategy -40 Negotiate on technology transfer conditions & details -41 Draw-up & analyze draft contract -42 Different for each depending on the type & form of technology
Post management	-43 Monitor compliance to the conditions of the contract -44 Actual inspection & report

2. Licensing method in technology transfer

The concept & necessity in relation to the licensing method of technology transfer and its differences to sales has already been explained. Here, the types, strengths & weaknesses etc. of licensing as shown in <Table 10,11> is concisely summarized to assist in planning, preparing, and analyzing the licensing method of technology transfer.

[Table 10] Types, strengths & weaknesses of the technology licensing method (1)

Type	Strengths & Weaknesses
Exclusive license	<ul style="list-style-type: none"> -45 The licensor provides the right to the licensee to exclusively use within the contract area & period -46 It is a standard practice to include strict conditions such as minimum sales amount, minimum technical fee, restrictions in economic product dealings etc. as issuance of an identical license to a 3rd party is not possible -47 Decide whether to accept by comparing additional conditions such as the actual benefit of the exclusive license, minimum technical fee etc. (this is in the position of the technology implementing party, and the supplier of the technology should view this in reverse)
Non-exclusive license	<ul style="list-style-type: none"> -48 This is a method where the licensor reserves the right to provide the license not only to a particular licensee but also to other 3rd parties -49 It is a method generally favored by the licensor -50 It is a method where the licensor & licensee can choose as a one-off without other burdens -51 In the position of the licensee (technology implementing party) should arrange so that there are no separate burdens such as minimum technical fee etc.
Sublicense	<ul style="list-style-type: none"> -52 The technology implementing party who has been given the license can offer a sublicense to a 3rd party under the sublicense provision -53 It can be used efficiently when a single technology is diversely utilized in terms of usage, purpose, and area -54 Must have a basis on the contract

[Table 11] Types, strengths & weaknesses of the technology licensing method (2)

Type	Strengths & Weaknesses
Cross licensing	<ul style="list-style-type: none"> -55 This method can be chosen when parties have a need to mutually exchange and use particular technology which the other party possesses -56 There are free of charge licenses and if one party profits due to economic differences, the other party is compensated for the difference -57 Technical fee reduction and competitor elimination effects can be gained through the formation of cooperative alliances -58 Need the basic capability to recognize mutual necessities
Package licensing	<ul style="list-style-type: none"> -59 A method where many technology licenses are added to a single contract, and a method where technology, equipment, components, capital etc. are comprehensively provided -60 Favored by the technology provider -61 There is the benefit of gaining the required management resources all at once, but the cost burden is large -62 Requires attention because there is a high probability of violating the fair trading related laws

3. Cross licensing strategy

Cross licensing is the mutual exchange of specific licenses between relevant parties. For example,

A company provides a license to B company for the use of its technology and simultaneously receives a license for the use of B company's technology, and this becomes a mutual execution (cross execution). The fundamental background for seeking cross licenses is for economic reasons whereby time and costs can be significantly reduced by borrowing each other's technology rather than developing and possessing it as technology becomes more integrated, combined, and advanced.

In planning, analyzing, and executing cross license contracts, how the technology to be exchanged (usage right) will be assessed and appraised is the core issue. In using exchanged technology, the economic value of the technology of both parties is the core issue. If the economic value of the technology of both parties is identical, licenses can be exchanged without cost, but if the technology value of any one party is greater than the other, one party must compensate the other for the difference. When analyzing and appraising the economic value of the technology to be mutually exchanged, the factors summarized in <Table 12> must be taken into consideration.

In the case of cross licensing of patents, there are no problems if the patents of both parties are in existence for the same period of time, but if the effective period of the patent of any one party expires first or is invalidated during that period, there is a need to specify a condition beforehand to compensate the party which incurs loss in economic value due to the termination of the patent. The future need and opportunities for cross licensing are expected to increase in accordance with technology becoming more integrated, elevated, and advanced and as competition becomes intense, and the rise in demand by foreign businesses for technology and patents that Korean cooperation owned.

[Table 12] Matters to be attended to cross license contracts

Matters to be attended	- number of patents (scope)
	- number of products using the patent (business quantity)
	- effective period for each patent
	- value of the invention (the proportion of the entire invention in the section including the patent)
	- whether it is from a new inventor, or an improved invention (the strength and independence of the patent)
	- the validity level of the patent (possibility of invalidity)