Technology Marketing

Chapter 2: Valuation of Technology as the Marketing Subjects

In this chapter, technology distinction standards, selection methods etc. to properly derive the marketing subject technology will be studied. In the valuation of a technology subject, the value as a transfer subject must be recognized to guarantee transfer feasibility, and this is examined in terms of all transfer parties, economical life cycle, transfer possibility etc.

Part 1: Examination of Technology Possessed
Part 2: Valuation of the Technology Subject

Previously, the characteristics of the technology as the marketing subjects and the technology marketing were examined. These characteristics must be fundamentally considered in planning & executing technology marketing activities. Continuing from that, this chapter will examine the technology subject that will be the target of marketing. As in the saying that if the enemy and I are known in a war, there is no danger, it is important to first examine the subject technology for which the marketing will be conducted. However, valuation which is the money value of technology and market valuation of technology is dealt with separately, so it is omitted from this section.

Firstly, the position in the technology life cycle, technology asset & portfolio, technology risk etc. of the technology possessed by the firm or research center will be examined for the selection of technology; after then, the detailed evaluation in relation to the sales target technology will be explained.

Part 1: Examination of Technology Possessed

1. Technology Life Cycle

Technology life cycle stage classification is similar to the product life cycle consisting of creation, growth & maturity, and decline.

[Figure 1] Technology life cycle

efficiency
Introduction stage
growth stage
maturity stage
decline stage
time

Introduction stage

- Much investment by the firm
- Little or no profits

Growth Stage
- Knowledge & competitiveness accumulate and profits gained
- With the purpose of improving the technology, comprehensive tests are conducted with very different designs
- As more superior designs are discovered, further improvement gradually become impossible

Maturity Stage
- As profits gradually rise, performance improvements continue
- Product features are agreed upon by the producer and customers, and in accordance with market expansion a movement from product innovation to process innovation can arise
- As the industry becomes more stable, more confidence is gained with the use of specialized high value equipment

The PC industry in the 1990's is an example of this. That is, the subject of challenge was to produce more hardware boxes with features limited to what consumers favored more quickly and economically.

Decline Stage
- A situation where the technology has reached its physical limits, additional R&D investment & effort has been increasing the state of saturation, or a situation where additional sales cannot occur.

In the case of technology, not only the absolute physical limitations but also the relative limitations of the technology compared to other technologies must be appraised.

Generally, competing technologies are interrelated in the growing spiral form. This is because the procedures of new technology require a high level of investment, but the technology replacing it has its starting point at a level very similar level to the highest capacity of the existing technology.

technology capacity
time consumption

2. Technology Assets & Technology Portfolio

Technological resource is the fundamental asset of firms producing high tech products. Like human resource, marketing & financial resources, this kind of technology resource must be managed with a long-term point of view. This technology resource requires protection using patents and licenses where possible.

Firms must know the utilization scope of technology currently in use as well as technology not in use. Through this, strengths and weaknesses of competitors can be determined by which the competitive effects of the technology can be appraised. The technology portfolio technique is often used as a method to select technology resources that influence competitiveness through the level of technology significance, relative standard of technology, control effects etc.

[Figure 2] Technology portfolio

high
low
level of technology significance
relative technology standard
technology sector

<Source> Sang-hyeok Seo, "A study on the technology innovation strategy of the advanced technology industry" Science & Technology Policy Institute (1998)
Original source: Burgelman et al, "Strategic Management of Technology Innovation", Irwin (1998)

Technologies in the 1st technology sector have a high level of significance but low technology standard, and the 3rd technology sector is the opposite. Both the level of significance and technology standard in the 2nd technology sector are high and greatly contributes to

competitiveness. Through not only challenging R&D but also the purchase of new advanced equipment etc. it actively promotes the maximization of technology capabilities.

The following figure appraised technology assets in terms of competitive impact and control. Here, the competitive impact of technology can be evaluated by rate of cost-effectiveness, value addition rate, differentiation probability etc.

high
medium
low
competitive impact
control

<Source> Hak-yun Kim ibid, original source: Eric Viardot, ibid

There was an instance when Texas Instruments used a portfolio of a comparison between competitive impact and the rate of technological & commercial success for the selection of computer technology.

[Figure 3] Portfolio analysis of Texas Instruments

high
medium
low
potential impact on competitiveness
technological industrial success rate
image recognition
speech recognition
expert systems
speech synthesis

<Source> Sang-hyeok Seo, ibid, original source: Dussage et al, Strategic Technology Management, John Wiley and Sons (1998)

Figure 3 shows that the most favorable technology selection was expert systems. This technology was appraised as having not only high technological & industrial success rate but also high competitive impact.

3. Technology Risk

If technology innovation can properly determine future business direction, technology marketing activities will also become very easy. However, as explained in the introduction, it is not easy to overcome uncertainty associated with the technology itself. Technology uncertainty can be explained by the following 4 factors. 2)

1) There are many cases where new technology moves in a immature state, and it is difficult to predict future circumstances like performance, scale, price, economic outcomes etc.
2) In the case of technology newly produced in basic science research, it is difficult to make a distinction of its usage and takes much time. Scanners, MRI etc. are examples of this.
3) The impact of technology innovation is sometimes made possible by supplementary inventions. Supplementary inventions or peripheric technology inventions contributes to the system solution for the supplementation of demand. For example, the laser connected to fiber optics brought innovative changes to data transmission.

4) Technology developments are carried out to find solution for a particular problem, but there are many situations where new usages are discovered which could not be predicted at the time. For example, computers play numerous roles in cars.

If this uncertainty in technology is composed into a portfolio by dividing it into technology development uncertainty and business impact due to the lack of development aims, it is as follows.

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2) Hak-yun Kim ibid

impact on business
technological uncertainty

4. Forms of Technology Acquisition & Transfer

Technology transfer & transaction, which is the result of technology marketing activity, is a special situation faced by both transacting parties and a careful decision must be made based on corporate strategy. Important variables that impact this kind of decision include technology acquisition costs, time, risk associated with technology acquisition (e.g. violation of technological autonomy) etc.

The following <Figure 4> illustrates the relative distribution of technology acquisition methods when technology acquisition time consumption, the urgency of technology demand and technology autonomy have been taken into consideration as important strategic variables.

On the other hand, plans to distinguish proper technology acquisition methods in accordance with the speed of technology changes can be considered. As seen in the following <Figure 5>, if the speed of technology & market changes is slow, independent development is the most favorable, but if the speed of change in both technology and the market is fast corporate takeover is the most effective. The distinction of these kinds of technology acquisition methods is seen in the viewpoint of the buyer, but it is also crucial for technology marketers to analyze the purchasing conditions of technology buyers.

[Figure 4] Evaluation standards for technology acquisition methods: time consumption & technological autonomy

technology autonomy
high
low
corporate takeover
independent development
consigned development
technology implementation
joint venture
low
high
time consumption

<Source> Snag-hyeok Seo, ibid

[Figure 5] Technology acquisition methods in accordance with the relative transformation speed of the technology & market
speed of technology change
fast

slow
observation joint venture
corporate takeover
independent development
technology implementation
speed of market change

Apart from this, there are many and diverse methods and types of technology acquisition, and the method that came as a result of the advancement in technology cooperation is the strategic technology alliance. Strategic technology alliance has various advantages including risk diversification, economies of scale, competition absorption, barriers, simplification of market access etc. and the most common example is licensing.

[Table 1] Forms of strategic technology alliance

<R&D Alliance>

1. Licensing agreement: a legal right of use is acquired by paying a predetermined fee in relation to patented technologies of other firms or technologies with exclusive right
2. Cross-Licensing agreement: 2 or more firms use each other's patented or exclusive technology by way of exchange
3. Technology exchange: exchange of exclusive technology; payment of fees may or may not occur
4. Visitation and research participation: research personnel of one's company visits or participates in the R&D activities of the company in alliance
5. Personnel exchange: a continuous program where research personnel are made to stay and work for a set period in another company
6. Joint development: development of new products or technology by firms jointly investing resources
7. Technology acquisition investment: an investment in overseas firms for technology acquisition, and the target is usually small new technology innovation companies

<Production & Manufacturing Alliance>

8. OEM: products are manufactured for another company which attaches their own labels and conducts marketing & service activities, and all other business activities that are portrayed as if they were carried out by the ordering firm
9. Second sourcing: in accordance with the agreement, permission to produce products developed by another firm is obtained by which a 2nd source of supply is provided to consumers for the products with the same specifications
10. Fabrication agreement: products fabricated and produced using the production facilities of another company (in the case where production facilities are not possessed or sub-contract is desired)
11. Testing agreement: test & inspection of products using the equipment & facilities of other companies

<Source> Sang-hyeok Seo joint authorship, technology round, the alternative is proposed. Korea International Trade Association (1994)

Part 2: Evaluation of the Technology Subject

Advantages for one's company

- Where is the value of the time, money, and effort to be invested in marketing this technology?
- Monetary profit arising after the transfer of this technology, provision of incentives for internal research personnel & R&D activation effects
- External image improvement, new network creation & strengthening with the accomplishment of

the technology transfer

Potential advantages for customers

Technology merchandizing is viewing technology through the eyes of the customer, and customers here are potential contractors of purchase & licensing. If the tangible & intangible advantage of the technology to the buying firm is not properly determined, the transfer cannot be achieved.

- Why would the customer want this technology?
- Why do they want to purchase or obtain a license for the technology from us?
- How much will this technology change the existing product/process? (creation of a completely new function, improvement of existing function, improvement of existing production methods, function additions to existing products etc.)

Economic life cycle of technology

Patented technology has a legally valid life, but in the view of economics, the life of technology is the period during which a firm can gain profits from the technology. This is influenced by the following factors.

- The possibility of a competitor possessing the capability of developing a similar technology or producing a competition product
- Effects of new law: the economic life of the technology can be shortened by the establishment of new regulatory systems such as the environmental protection law
- Increase in price of raw materials & technology related components: the appearance of a substitute product with higher cost-effectiveness is possible due to particular technology increase in prices of raw materials & technology related components.

Technology transfer possibility

Technology must have a strong type of intellectual property right, meaning that it must be able to be transferred without loss of exclusive right. Also, technology must be able to be used in a different place to the inventor's environment, and it should not be so closely combined with the internal technologies of the firm so that it cannot be used separately. Whether the technology is exclusive or not, that is, whether it is necessary in the core business of a particular firm, is a very important factor in considering technology transfer.

Determining the necessity of resources for technology transfer

Technology transfer generally takes place with the provision of know-how of a certain level so that the technology can be appropriately used by the purchaser. Because some technologies are too dependent on the know-how of the inventor or the invention team, there are cases where it cannot be transferred to another firm to be used for production, supplementation or further development.

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1) Kathleen R. Allen ibid

Deciding on the method of corporate know-how transfer and whether there is a need to temporarily assign particular personnel of the technology provider (licensor) to work in the company of the purchaser is very important. If the technology provider does not sufficiently provide assistance, there are cases where the technology implementer fails to learn the technology. Time and effort is

required in these activities.

Apart from this, the following factors can be used as detailed analysis indicators in relation to technology attributes, product value etc. 2)

Early Evaluation

-103 Are there any potential partners in relation to similar technologies?
-104 Is this a product technology or process technology?
-105 Is there demand for the technology?
-106 What is the intellectual property right situation?
-107 What is the maturity level of the technology?

Commercialization feasibility

-108 What is the quality level of research up till now?
-109 Is this technology new and unique?
-110 Can the technology buyer link the technology to the market?
-111 Are there any regulation related issues?
-112 What are the competition technologies?
-113 What is the advantage of this technology?
-114 Can this technology really satisfy the needs of the technology buyer?

Market Prospects

-115 Which market will be targeted by this technology or the related product?
-116 What is the maximum scale of this market?
-117 Which firms are involved in this market?

2) NTTC, “Technology Marketing” extracted from education materials, 2000