# The Analytical Framework and Theory for Software Developers' Internationalization Process : Integrating Transaction Cost Approach with Internationalization Approach

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# The Analytical Framework and Theory for Software Developers' Internationalization Process : Integrating Transaction Cost Approach with Internationalization Approach

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## I Introduction

This paper aims to build the analytical framework for explaining what foreign market entry strategies for software developers (thereafter this term is left off as SD) are inclined to be sequentially selected. In the first phase comparing with how to select foreign market entry strategies for manufacturers, the foreign market entry behaviors of SD are explored taking their industry characteristics unique to them into consideration.

In this observation whether the sequential development of foreign market entry strategies tends to depend on the transaction cost approach is reviewed. In addition to it, the analytical framework for explaining empirical evidence is also presented.

## II The Uniqueness of the Foreign Market Entry Behavior of Service Industry Firms

Whether service firms differ from manufacturers in their entry modes is illustrated as below. For example, the creation of a wholly-owned subsidiary via a foreign direct investment in a manufacturer is true not only for a subsidiary but also for a branch, an office and a project office in a service firm, although both are representing full-control modes. As one type of shared-control modes, a joint venture set up a manufacture is equal to a partnership, a consortium and an affiliate company of a service firm. As another type of shared-control modes, transferring managerial resources by a contract

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in a manufacturer is seen as much as a licensing and a franchising adopted by a service company. Among them, full-control modes distinguish service firms with manufacturers (M. Krishna, et.all,. p.21)

Aside from the above indication of entry modes, whether the logic of internationalization of service firms differ from the one of manufacturers is more important to be discussed. Dunning, J.H.(1989) clarifies that service multinational enterprises can enjoy scale economies from the globalization of their businesses in several aspects of a value chain. Campbell, A.J. & Verbeke, A.(1994) stress that service multinational corporations can gain scale economies from their marketing activities. Both conclusions on the globalization of service firms are derived from the same logic related with multinational manufacturers.

Against the above researches Capar,N. & Kotabe,M.(2003) propose that the relationship between the international diversification levels of service firms and their business performances tends to follow U-shape curve, and test such an evidence with an empirical method, in which explore the unique logic of internationalization and multinationality of service forms different from the one of manufacturers. The grounds are found out in that the economy of scale can't be easily functioned in international diversification of service firms and local adaptation is strongly necessitated for the firms, and service outputs are intensively required for the simultaneity (inseparability) of production and consumption, in addition to inseparability of service.

Basically service firms are comprised of many kinds of industries, which may be rather distinctive from manufacturers. Under such a constraint the perspective of capital intensive versus knowledge intensive can be applied to service firms if the analytical analogy true for manufacturers is explored into the service ones typically shown by Contractor,F.J.,Kundu,S.K.&Hsu,C.(2003) in which capital intensive service firms tend to raise the ratio of abroad operation profits to total sales and return on asset as they develop the globalization of businesses compared with knowledge intensive service firms employing the index of multinationality measured by the share of abroad sales volume of total sales and the ratio of employees abroad number of total ones.

## Ⅲ Theoretical Approach to the Foreign Market Entry Behavior of Software Developers

In this section first we describe the characteristics of SD among service industry firms and consider what main motives for internationalization of SD are.

In general it is thought SD belong to the typical knowledge-intensive industry. According to the empirical research covered by Contractor and et. all, their global developments are naturally limited as their industry has a characteristic of knowledge-intensive industry. Their host countries are also confined as long as it is more desirable that they have such industry characteristics.

In this meaning the worldwide involvement of SD may be enforced to face with the upper limit, opposed to the situation that hotels, restaurants, hypermarkets and department stores have evolved in globalization of their businesses with their chains development. That is, the industry characteristics constraint the location of SD in the world.

Therefore SD should consider the determinants in selecting foreign market entry modes without ignoring the limit of their globalization degree and the uniqueness of SD to become international actors related with industry characteristics and business models. There should be ten factors influencing on SD's internationalization levels.

1. ineffective scale economies
2. service embodied in a specific person which can't be separated from an individual whose capability and human relationship are specific.
3. Continuous transaction which becomes intangible asset and influences on selecting market entry modes.
4. Asset specificity emphasized in market entry modes more than scale advantage (capital intensity)
5. Relatively easier integration of brand image
6. Smaller development cost as an absolute sum.
7. Accounting contractual cost related with a contractor (previous cost) and policing cost happened to audit whether the contractor has behaved in keeping with the contractual conditions which give an impact on the business performance of its consigner.
8. Language abilities vital for the success of business
9. Access to Main customers including contractors or embedding them
10. Outsourcing versus Developing (Internal development)

Here we expect many SD may begin with developing soft products in entering a foreign market and then tend to shift to outsourcing over time from the below reasons.

In the first stage of internationalization, many SD may feel it hard to look for and

find out foreign customers. Then they want to get jobs of developing software from their domestic major SD or foreign famous SD. By these works they can start exporting software according to the specific manual and order contents given by the consigners. Taking these initial conditions into consideration, SD had better invest enough cash into their internal development.

In the second stage of internationalization, most of SD must get conscious to perform the above 10 factors as much as they can to the degree of their facing with more foreign customers at the same time. Among these asset specificity and capital intensity seem to become most powerful independent variables in determining internalization or externalization of SD. That is why we should review the possibility of applying the traditional transaction cost approach to the internationalization of SD.

Originally the traditional transaction cost theory has focused on explaining the foreign market entry behaviors of oligopolistic manufacturers. The firm specific factors such as size, rich international experience, the number of holding technologies protected by patents for a certain time period, huge investments into research and development (R&D) can provide such oligopolistic manufacturers with choosing many opportunities for internalization. In particular product technologies leading to global defacto standard can ease to develop the global market.

On the other hand, SD have to face with a limit to monopolize their markets among many service industry firms except for an operation soft and application soft provided by Microsoft etc. Due to the low development cost per one soft project relative to the new products of high technology makers, SD mustn't be involved in competing scale extension. The firm specific advantage of SD can't be measured by the development cost.

But the emulation often happens to soft products and they are relatively easier to be emulated and copied by their competitors and customers etc, even if the products are so new. Therefore dissipation risk should be substantially discounted in counting the value of soft products.

Because of these particular reasons discussing the internationalization process of SD doesn't seem to be adequate as far as introducing the traditional transaction cost approach is concerning.

Then let's more refined transaction cost theory posited by Krishna, M.E. & Rao, C.P. (1993) introduce in the next and review the applicability of their theory to the expected internationalization process of SD, that is, to make sure the prophecy of more refined transaction cost theory.

According to Krishna, M.E. & Rao, C.P., there are three points to be focused on such as ① the trade off between control(profits of integrating businesses) and resource commitment cost in the transaction cost approach, ② the relationship

between asset specificity and entry mode choice, ③ the relationship between capital intensity and entry mode choice.

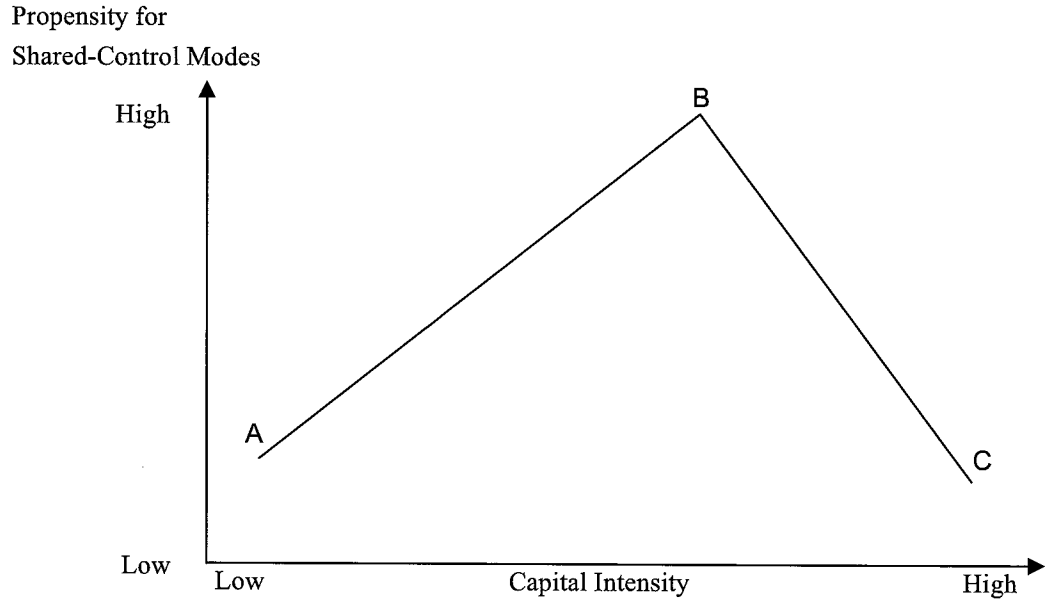
By integrating such three relationships into reconsideration, the observed relationship between capital intensity and desire for shared-control modes can be in particular formulated.

Namely the estimated model includes all the main effects, including asset specificity and moderators and the hypothesized interaction effects. Preliminary analysis led the authors to believe that the relationship between capital intensity and entry mode choice is not liner over the range of values considered in the analysis, apparently following the pattern portrayed in Figure 1.

As capital intensity increases from "low" to "moderate" levels ( i.e., from A to B in Figure 1), the propensity to employ shared-control modes increases, as expected. As it increases from "moderate" to "high" levels (i.e., from B to C in Figure 1 ), the propensity to share control diminishes, contrary to expectations. The reasons why firms avoid shared-control modes at high levels of capital intensity aren't always clear; perhaps they feel compelled to protect their rather heavy investments by integration. Notwithstanding its origin, this nonlinearity necessitated the inclusion in the model of two quadratic terms, $[\text{capital intensity}]^2$ and asset specificity $\times$ $[\text{capital intensity}]^2$.

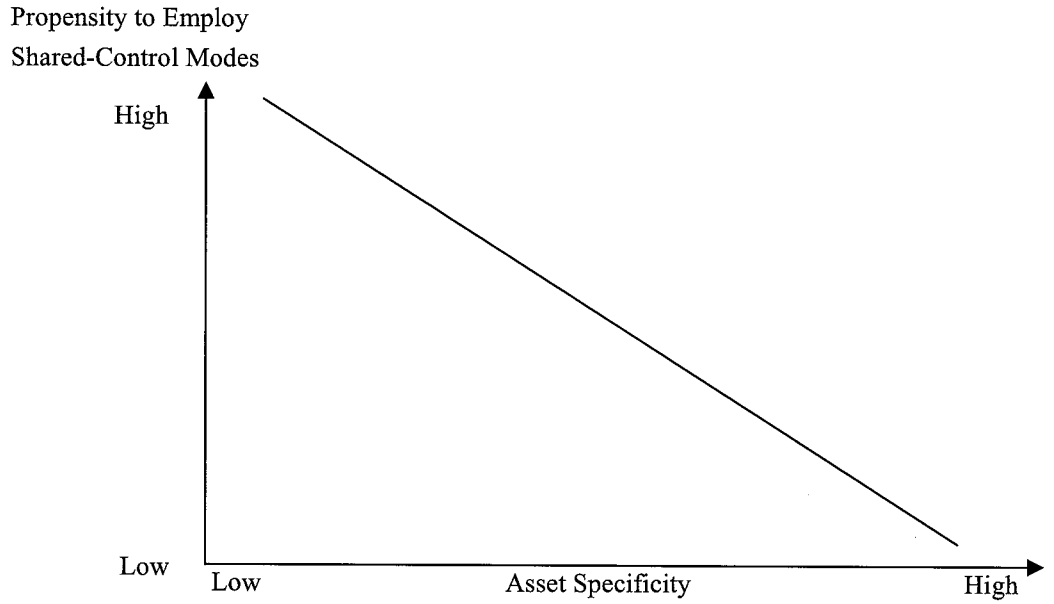
To understand the relationship further, Figure 2 could be examined. Note the estimated probability of employing shared-control modes at low and high levels of asset specificity. As a firm's asset specificity moves to "very high" levels, the slope of a line can be depicted to slow down, whereas low-specificity firms prefer shared-control modes (joint venture) to full control ones (wholly-owned subsidiary).

**Figure 1**
**Observed Relationship between Capital Intensity and Desire for Shared-Control Modes**




Source; Erramilli, M.K & Rao, C. P. (1993) , p.28, Figure 3.

**Figure 2**
**The Observed Relationship between Asset Specificity and Propensity to Employ Shared-Control**




Source; Referring Erramilli, M.K & Rao, C. P. (1993), p.31, Figure 4.

What on earth are SD likely to follow the above two lines on Figure 1 & 2? In order to examine this, add their industrial characteristics to the theoretical model's figures. SD are compelled to know some constraints before penetrating the world market for their software due to different languages and unfamiliar cultural context, which make a bad effect on exporting software and acquiring orders to develop software, though many SD may reach business chances to some foreign countries throughout internal development. But except for some country markets advantageous to SD, most of them seem to suffer from developing new markets. That is why SD are inclined to conclude joint development agreement for a new software and rely on consortium or try to search for a new software developer trusted by the SD.

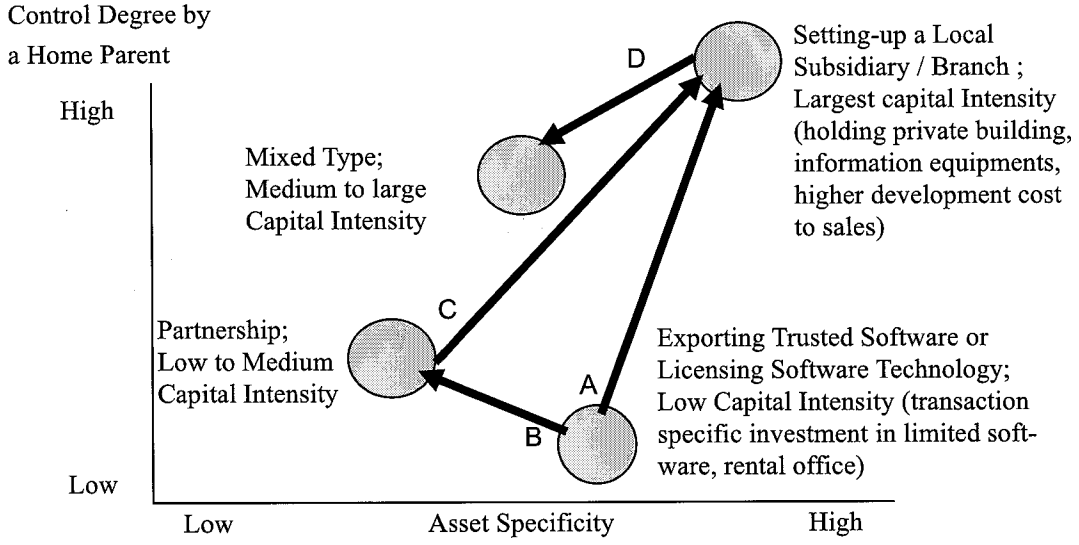
Therefore the internationalization process or sequences of entry modes changed by SD should be obviously explored by a theoretical approach.

In figure 3 the expected sequential development of market entry modes chosen by SD is illustrated introducing asset specificity and internal control degrees connecting capital intensity. This figure might be revised version of original figures sketched by Krishna, M.E. & Rao, C.P.

If SD are likely to prefer internalization approach, they move on the lines from A to D. On the other hand, SD start with B throughout C, finally turn to D, their option comes to follow such an internationalization approach as served by Root, F (1982).

The selection process for SD are mainly likely to follow the internationalization approach since several explanative factors support strongly the route B→C→D.

**Figure 3 The Assumed Sequences of International Market Entry Modes : The Cases of Software Developers**




Note; The Pass by Internationalization Approach = B→C→D
The Pass by Internalization Approach = A→D
Source; Fujisawa referred the model proposed by Krishna, M. & Rao,C.P., 1993.

Generally internationalization of SD begins with a trusted developer type exporter serving their consigners with software or exporting a technology for developing software their customers have been wanting. In both entry modes, SD have to satisfy the specification requested by their customers and such specification resembles so strong tacit knowledge that asset specificity can be highly required for the SD. As long as the SD involve with exporting products and/ or technologies, their capital intensity is low because a rental office is usually their main business place. According to the model of Krishna, M.E. & Rao, C.P., shared-control modes aren't fitted to this first stage. At the same time SD can't exert strong control over such earlier international operations.

Over time SD come to accumulate many kinds of knowledge about many foreign markets and how to develop software while their company name and brand power have been well known by the potential customers and competitors in the world. Then SD are inclined to choose developing and producing and selling software with their original brand in their own channel and sometimes in the outside channels. These internal complete operation methods necessitate huge investments in developing software at the main inland and overseas business units as well as extending sales networks abroad. As a matter of fact, purchasing fee of PC and training cost for fostering many excellent engineers become increasing. Consequently these SD realize the maximization of capital intensity in this phase. As the SD make an effort to develop software inside them, asset specificity in their software is extremely high. In this meaning, taking advantage of added value chain makes the SD choose sole investment, that is, setting up wholly owned subsidiaries or branches or project offices in target market countries and the nations whose software skill is abundant. There the SD can get sole projects and original software development.

After SD worldwide have gained so many customers that they can't internally develop software offered by main and important customers abroad, they are enforced to take an option of outsourcing for some software so as to keep the delivery date of software customer have required. Subsequently the mixture of internal development and outsourcing, that is ordering the external software houses to develop software in accordance with customers' needs after the SD themselves have accepted some orders from their customers. In line with enlarging this mixture type, the role of consigners in finding out external software houses is becoming increasing. The development and production volume of software outside the SD is raised up and its share is becoming higher and higher, while the SD receive sales profit from their trusted developers. The SD naturally weaken capital intensity ratio and asset specificity. The SD might think that establishing new joint ventures with the present trusted developers or competitors is most desirable for maintaining worldwide customers.

Here one problem should be pointed out in order to conclude which approach is

more persuasive for observing the internationalization sequences of SD. If partnership stage has been stepped by SD before setting up a local subsidiary or branch or office, the internationalization approach is true for the internationalization process of SD. When SD hasn't been through the partnership phase, the internalization approach comes to have a more strongly explanative power; namely, starting from a trusted developer (consignee) and then moving directly to setting up a foreign subsidiary, branch or office.

Reviewing the actual application of the internalization versus internationalization approach, it might be concluded that SD are likely to prefer internationalization approach to internalization one as shown by the following four stages.

The first stage; a trusted software developer or a licensor

The second stage; making a partnership agreement or entering into a consortium arrangement, transaction with affiliated companies

The third stage; establishing a subsidiary, branch, office and project office

The fourth stage; the mixture of internal development and outsourcing from the perspective of a consigner

The theoretical model developed by Krishna, M.E. & Rao, C.P. is rather useful for exploring the decision-making rules of SD to internationalize their software businesses, in particular, it is highly believed that low capital intensity doesn't support shared-control modes.

## Ⅳ Decision-making model

In the first, many independent and dependent variables available to solving the problem of what entry mode is best for SD in various situations are shown and specify the all variables based on each definition.

$R_1$ : import sales volume of software developed by other companies

$R_2$ : total revenue by licensing out internally developed software technology to other companies

$R_3$ : total revenue by selling internally developed software with its original brand

$I_1$ : total cost of importing externally developed software

$M_1$ : sales promotion expenses for software imported

$M_3$ : sales promotion expenses for internally developed software with its original brand

$M_4$ : sales promotion expenses of software depending on the development ratio of consignees

$P_1$ : net profit by importing and selling externally developed software
$P_2$ : net profit by licensing out internally developed software technology to other companies
$P_3$ : net profit by selling internally developed software with its original brand
$P_4$ : total net mixed profit of by selling internally developed software with its original brand and selling its software served for another brand
$O_1$ : opportunity cost incurred due to missing the sales of internally developed software
$O_2$ : opportunity cost incurred due to licensing out internally developed software technology to other companies
$D_1$ : expenses required for developing an internal existing software, some of which will be contributing to developing the next generation software (it is postulated that its depreciation has already expired)
$D_2$ : existing software development cost incurred before licensing out internally developed software technology
$D_3$ : newly additional cost for developing the next generation software
$r_2$ : technological dissipation cost accompanied with licensing out internally developed software technology $(0 < r_2 < 1)$

What degree of share the existing software development expense ($D_1$) is expected to account for in contributing to save the development cost for the next generation software assuming that the existing software technology can create the next one is defined as $\alpha$ $(0 < \alpha < 1)$.

Then, $O_1 = R_3 - (D_3 - D_1 \alpha) - M_3$ ——①

In order not to incur $O_1$, the vital condition is to establish as below.

$R_3 < D_3 - D_1 \alpha$ ——②

The constraint ② relates to mean that huge investment cost should bear in order to succeed in the new generation software and the synergy effect between the new generation one and the existing one can't be greatly brought out, thus that is why the technological continuity is trivial, which results in not bearing $O_1$.

As $P_1$ has co-relationship with $O_1$, thus the below equation can come true.

$P_1 = R_1 - I_1 - M_1 - O_1$ ——③

$$\text{Here} \quad P_1 = \sum_{i=1}^{n} \prod_{1i} - \sum_{i=1}^{n} O_{1i} \quad \text{——④}$$

The above left item in the right equation shows the sales net profit of imported software over years (n) since at the stage its related opportunity cost has never been accounted. Its right item describes the opportunity cost due to not developing software inside the SD and selling it.

Therefore equation ⑤ is shown.

$$\sum_{i=1}^{n} O_{1i} = \sum_{i=1}^{n} R_{3i} - D_3 \quad \text{——⑤}$$

Generally when the opportunity cost is larger than the development cost, the internal development should be selected.

On the other hand, how SD estimate the profit accrued from licensing out the software internally developed over years (n) should be considered. If the technology licensed out can contribute to develop other software, technological dissipation risk will happen. As a result of such risk ( $r_2$) is taken into consideration, the net profit by licensing out internally developed software technology to other companies is defined as equation ⑥.

$$P_2 = R_2 - D_2 - O_2 \quad \text{——⑥}$$

The net profit accruing from licensing out internally developed software technology over years (n) may bring technological dissipation cost ( $r_2$) . When the technological dissipation cost ( $r_2$) is higher, it reduces the net sales profit of its technological license out. Therefore equation ⑦ can be shown.

$$P_2 = \frac{\sum_{i=1}^{n} \prod_{2i}}{(1+r_2)^n} \quad \text{——⑦}$$

In the third, the net profit accrued from selling internally developed software with its own brand is described by equation ⑧.

$$P_3 = R_3 - D_3 - M_3 \quad \text{——⑧}$$

It should be noted that the business types of selling such software are mainly divided into sales with its original brand and via trusted development. Here the development degree of trusted development accounted for total order volume from customers is denoted as $\beta$ $(0 < \beta < 1)$ .

The higher this degree is, the lesser naturally its sales expense is, because the consigner sells software marking its own brand and thus pays for market development activities with its own cash.

Instead of it, its sales profit ratio becomes reduced compared with selling original brand as its consignee must give up gaining some of sales profit due to its consigner (buyer)'s holding the goodwill of selling software. Consequently the ratio of the consignee's giving up sales profit to its consigner accompanied with this trusted development for consigner's brand is defined as $\gamma$ $(0<\gamma<1)$. In this way considering the business model of the consignee in exporting its software for its consignor, sales promotion expenses of software depending on the development ratio of consignees is denoted as $M_4$ and then define as $M_4=M_3(1-\beta)$.

Assuming that total sales revenue is the same in both own brand selling and OEM(original equipment manufacturing), and R&D cost is required in both types, the sales net profit accrued from the mixed type is derived from the equation ⑨.

$$P_4=\{R_3(1-\beta\gamma)-M_3(1-\beta)\}-D_3=R_3-M_3-\beta(R_3\gamma-M_3) \quad \text{——} \quad ⑨$$

From this equation⑨, $P_4$ can show a bigger value when satisfying $R_3\gamma-M_3<0$, for $\beta>0$. Therefore as long as satisfying $R_3\gamma-M_3<0$, that is, $\gamma<\frac{M_3}{R_3}$, It is more desirable for a consignee to raise the ratio of OEM supply of software developed by it in order to gain more sales net profit. such a condition that $M_3$ becomes greatly bigger than $R_3\gamma$ is best required for a consignee so long as the larger $\beta$ is, for $\beta>0$.

**Table 1 Cost Requirements and Expected Revenues by Foreign Market Entry Modes**

| Determinants of Costs Revenues / Entry Modes | Internal Development Cost | Internal Sales Cost | Dissipation Cost of Technology | Opportunity Cost | Cost of Switching Customers | Expected Revenue |
|---|---|---|---|---|---|---|
| Import Sales of Externally Developed Software | Zero | Small | Zero | Small | Zero | Small |
| Licensing Out of Internally Developed Software Technology | Big | Zero | Big | Big | Small | Medium |
| Selling Internally Developed Software with Its Own Brand | Big | Big | Zero | Zero | Big | Big |

Source; Fujisawa's original by applying the transaction cost theory to this framework.

In Table 1, what factors become more important in choosing what types of foreign market entry modes can be distinguished among import sales of software developed by others, licensing out of software technology internally developed and sales of internally developed software with its own brand depending on cost requirements and expected revenue etc.

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