The Relationship between DOI, Internationalization Process and Firm Performance

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In the globalizing market, internationalization is one of the core strategies that influence growth and performance of multinational enterprises (MNEs). The growth through international expansion brings economies of scale and scope. However, it is also well known that the growth adds complexity to a firm which is usually difficult to manage. MNEs, hence, are often faced with the strategic dilemma in regard to the degree of internationalization (DOI).

The effect of DOI on firm performance remains unconfirmed in spite of many attempts to empirically examine it. The inconsistent results can be attributed to the point that the relationship is much more complex and dynamic than thought so far. It can also be because the researchers have overlooked possible effects of the internationalization process. In other words, the performance of MNEs with the same DOI might be different if they have gone through different processes in implementing their internationalization strategies. Therefore, we focus on the three aspects of internationalization process; how rapidly an MNE reaches a certain DOI (speed), how broad the business in which the firm operates is (scope), and how regular and rhythmical the international expansion is (regularity).

In this regard, this study was conducted with the following objectives; (1) to examine the performance-related consequence of DOI, (2) to explore the moderating effects of the three variables associated with the internationalization process and (3) to provide a more integrative framework that guides toward the optimal DOI and directs the process in which MNEs attain the DOI.

For this research, four hypotheses were developed. First, the relationship between DOI and firm performance is expected to be inverted U-shaped. However, the relationship can be affected by the speed of internationalization process. If the speed is moderate, the MNE can achieve more benefits from international expansion before reaching the optimal point of DOI and avoid the sudden decrease in profitability of further internationalization beyond the point. On the other hand, when the speed is too high, the MNE may obtain less benefits and suffer from greater costs of international expansion. In addition, the performance effect of DOI can vary with the business scope an MNE operates. Finally, the irregularity of internationalization process is expected to negatively moderate the relationship between the DOI and firm performance. In other words, it would be better to continue the gradual expansion within a proper period, pause while it is adapted, and re-expand before it forgets what it has learned rather than to reach a certain DOI through sudden expansion and continued non-expansion.

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The hypotheses were examined with the research sample of 218 manufacturing firms which were publicly listed in the Korean Stock Exchange as of March 2009. The result of regression analysis shows the U-shaped relationship between DOI and firm performance, i.e., firm performance declines to the optimal point of DOI but starts to improve beyond the point owing to the scale economies and the learning effect. However, this U-shaped relationship is shown to vary with the characteristics of internationalization process. First, the internalization speed moderates the relationship between DOI and firm performance positively. Before reaching an optimal point, the speedier the internationalization process gets, the more negative the effect of DOI on firm performance gets. However, once DOI exceeds the optimal level, the speedier the process is, the more positive the performance effect of DOI is. Regularity of internationalization is also shown to affect the performance-related consequence of DOI. As the internationalization process gets irregular, the effect of DOI on firm performance shifts from the U-shaped to the inverted U-shaped. With the sudden radical expansion and the long-term inactivity, an MNE recognizes some difficulties in absorbing the knowledge and exploiting it in other market entries.

Despite the implications of the research results, this study cannot be free from limitations; the research data which cannot provide the detail information about foreign market entry order and business diversification of the sample MNEs, the measurement of DOI which does not consider other aspects of internationalization, and the measurement of firm performance focusing only on the financial dimension. More meaningful results are expected if future studies address the limitations.

Key words: DOI, Internationalization, Performance

Ⅰ. Introduction

During the past two decades, the phenomenon of globalization has received considerable attention and has impacted on both business practice and academics. One manifestation of the globalizing world is the emergence of MNEs and the firms' internationalization. International expansion is one of the core activities firms carry out in this globalizing market whether the entry mode is exporting, licensing or direct investment. Indeed, it is difficult recently to find a pure domestic firms which do not feel the need to enter foreign markets.

Managers often cite international growth as a desirable goal for their firm (Brush, Bromiley and Hendricks, 2000; Hall, 1967; Whetten, 1987). Growth through international expansion brings increasing economies of scale and scope (Chandler, 1990) and other 'economies of growth' (Penrose, 1959). In addition, the larger firm size has been associated with visibility, prestige, the ability to withstand environmental shocks (Hannan and Freeman, 1984) and other managerial benefits (Morck, Shleifer, and Vishny, 1990). For these reasons, international growth is often viewed as an important organizational outcome and firms have a number of motiva-

tions to expand (Penrose, 1959). At the same time, it is well known that growth adds complexity to a firm and this complexity is usually difficult to manage (Covin and Slevin, 1997; Penrose, 1959). Therefore, firms are often faced with the strategic dilemma regarding the extent of international expansion (Mishina, Timothy, Pollock and Porac, 2004).

The internationalization of a firm is also an important issue in the academic sector as much as it's practically important. Accordingly, it has been studied for a long time by the researchers of international business and strategic management (e.g., Hymer, 1960; Vernon, 1966; Grant. 1987; Gomes and Ramaswamy, 1999; Capar and Kotabe, 2003; Lu and Beamish, 2004).

When it comes to the consequences of the international expansion, the effect of DOI on firm performance remains unclear despite many attempts to empirically examine it (Tallman and Li, 1996; Hitt, Hoskisson and Kim, 1997; Geringer, Tallman and Olsen, 2000). While the early studies tended to focus on the benefits of increasing the DOI such as avoiding or taking advantage of market imperfections, the economies of scale and the risk diversification across markets, the following stream of research started to argue the costs incurred during the internationalization. Nevertheless, the results were not consistent and new perspectives have emerged. Some researchers began to suggest the nonlinear relationships between DOI and firm performance (Hitt et al., 1997; Gomes and Ramaswamy, 1999; Li and Qian, 2005). In more detail, past research, with a few notable exceptions, has largely been limited to examining the linear forms of association between internationalization and performance (Gomes and Ramaswamy, 1999), but considerable theoretical evidence is reported to suggest that the form of the relationship might be non-linear since internationalization is believed to have both positive and negative impacts on firm performance (Daniels and Bracker, 1989; Hitt, Hoskisson and Kim, 1997). Due to these differences in perspectives on the relationship, the confirmed effect of DOI on firm performance is not identified yet. These mixed results can be attributed to the point that the relationship is much more complex and dynamic than thought so far. However, it can also be because the researchers have overlooked the process of the internationalization (Vermeulen and Barkema, 2002). In other words, the performance of firms that report the same DOI may be different if they have gone through different processes in implementing their expansion strategies.

Even though it has long been recognized that organizations are faced with constraints regarding their growth and development (e.g., Penrose, 1959; Cyert and March, 1963), little research has directly examined how different rates and patterns of internationali-

zation result in different performance among firms. This study explores how the relationship between degree of internationalization and firm performance is moderated by some characteristics of its internationalization process.

The process of expansion matters as foreign operation is a highly complex task (Malnight, 1995, 1996). The firm has to learn how to operate in a variety of cultural and institutional settings and how to deal with new suppliers, customers, government officials and competitors. In addition, since the capacity of a firm to expand and absorb new experiences is limited (Penrose, 1959; Cohen and Levinthal, 1990), learning how to operate in various foreign settings takes time and is not accumulated in proportion to expended time. Hence, it demands balanced growth in order to realize the potential of substantial performance benefits.

This study is aimed at exploring the relationship between the DOI and the firm performance along with a firm's own characteristics of the international process. To put it in another way, the objectives of this research is as follows; (1) to examine the performance-related consequence of DOI, (2) to explore the moderating effects of the variables associated with the internationalization process and (3) to provide a more integrative framework that guides the optimal DOI and directs the process in which MNEs attain the DOI.

II. Literature Review

There are two sects in studies regarding the relationship between DOI and firm performance: one is linear while the other is the non-linear. The former is categorized into the positive and negative relationship and the latter includes the U-shaped, inverted U-shaped and horizontal S-shaped relationship. <Table 1> summarizes the previous studies after 1990.

The research that hypothesizes the positive effect of DOI on the firm performance assumes that internationalized firms can employ a number of mechanisms to create and exploit market power (Caves, 1981; McCutcheon, 1991; Scherer, 1980). For instance, they can blunt the competitors' efforts through predatory pricing as the possible short-term losses may be offset by gains from future higher prices (Saloner, 1987). The internationally diversified firms can also be more flexible in capital formation because it can invest from cross-subsidization and, therefore, they can access internal as well as external financial resources (Lang and Stulz, 1994). The positive effect of DOI on performance has been reported in some previous research (Vernon, 1971; Grant, 1987; Qian, 2001).

However, other scholars criticized the argument about the positive effect in that the economic and psychic costs accompanied with

<Table 1> Summary of empirical studies on the relationship between the DOI and the firm performance[1)]

Authors (year)	Measurement of DOI	Empirical results
Morck and Yeung (1991)	number of subsidiaries, number of host countries	not significant
Kim et al. (1993)	sales-based entropy index	(+)
Sullivan (1994)	multi-item index	S-shaped
Tallman and Li (1996)	FSTS, number of host countries	(+)
Hitt et al. (1997)	sales-based entropy index	inverted U-shaped
Delios and Beamish (1999)	number of subsidiaries, number of host countries	(+)
Gomes and Ramaswamy (1999)	composite index	inverted U-shaped
Geringer et al. (2000)	FSTS	(-)
Lu and Beamish (2001)	number of subsidiaries, number of host countries	U-shaped
Ramirez-Aleson and Espitia-Escuer (2001)	number of host countries, entropy index based on the number of foreign subsidiaries	not significant
Qian (2001)	FSTS	(+)
Capar and Kotabe (2003)	FSTS	U-shaped
Contractor et al. (2003)	3-components index based on FSTS, FATA, foreign to total employees)	S-shaped
Lu and Beamish (2004)	composite index based on the number of subsidiaries and countries	S-shaped
Annavarjula et al. (2005)	multi-item index	(+)
Li and Qian (2005)	3-components index based on FSTS, FATA, foreign to total employees), sales-based entropy index	inverted U-shaped
No and Park (2008)	FSTS	S-shaped

* FSTS: foreign sales to total sales, FATA: foreign assets to total assets, ROS: return on sales, ROA: return on assets, ROE: return on equity

internationalization were not considered. Increasing the DOI might raise the transaction cost and managerial information-processing demand. Firms with the higher DOI are often faced with the greater uncertainty and complexity (Kim and Ban, 2006). These incur

1) Adjusted from Contractor, F.J., Kundu, S.K. and Hsu, C-C. (2003), "A three-stage theory of international expansion: the link between multinationality and performance in the service sector," *Journal of International Business Studies*, 34, p. 6.

higher costs of coordination and management. Indeed, Siddharthan and Lall (1982), Geringer, Tallman and Olsen (2000), and Michel and Shaked (1986) reported the negative effect of DOI on firm performance.

On the contrary to the above arguments, some researchers have begun to develop theory to posit non-linear relationships between DOI and firm performance. The early argument, among the non-linear relationships, is the U- or inverted U-shaped one.

The studies which suggest the U-shaped relationship assume the liabilities of newness and foreignness in entering new foreign markets. However, the liabilities decline along with accumulation of experience and knowledge as time goes by and the benefits from multiple markets increase according to the increase in DOI.

On the other hand, the research that shows the inverted U-shaped relationship notifies problems resulted from too high DOI while accepting the benefits from internationalization like economies of scale and risk diversification. Beyond a certain optimal DOI, the costs of the problems may exceed the benefits, which makes the inverted U-shaped graph.

Finally, there has emerged a new suggestion that the curve is more complex and dynamic than expected. It is a horizontal S-shaped curve. The effect is argued to be negative at the initial stage of internationalization, then positive at the middle and finally negative again. This has been supported in Sullivan (1994), No and Park (2008), etc.

Likewise, the relationship between DOI and firm performance is a topic which has attracted attention of many researchers in the field of international business for a long time. However, it still remains unconfirmed. Recently, the possible moderating effects are explored and this study suggests that the relationship varies with the process of a firm's internationalization. In detail, it depends on how rapidly it reaches a certain DOI (speed), how broad the business in which the firm operates is during the internationalizing period (scope) and how regular and rhythmical the international expansion is (regularity).

III. Hypotheses

3.1 DOI and Firm Performance

DOI can be understood as the share of foreign operations, i.e. foreign sales, foreign assets, foreign subsidiaries or profits, within a firm's business portfolio (Tihanyi, Griffith and Russell, 2005). In the field of international business (IB), the scholars have argued that MNEs can access diverse resources and transfer their core competences to different markets through internationalization (Bartlett and Ghoshal, 1989). In addition, international

expansion enables firms to enjoy scale economies (Porter, 1985), arbitrage transaction based on the differences in factor costs across markets (Kogut, 1985) and extend the life cycles of their products through moving from maturing and standardized country markets to new and growing markets (Vernon, 1966). Drawing on Kobrin (1991) and Porter (1990), No and Park (2008) summarized the benefits from internationalization. First is that as the common expenses are distributed into multiple country markets, the burdens to the firm are relieved. It is particularly important in R&D intensive industries or firms because R&D is an activity that needs substantial financial investment but once successful, it can be shared and replicated with less additional costs. Second is the increase in learning and international experience. Third, the firms can tap into various resources such as cheaper labor forces or country-specific resources. Finally, cross-subsidization is facilitated.

However, internationalization is accompanied with costs. In almost every market entry, firms should pay the psychic and economic costs. Among them are the liabilities of newness and foreignness. The former is involved with equipment purchase and establishment, staffing, internal system development, external network development and so on while the latter means maladjustment to cultural, political or social circumstances and disadvantageous treatment. Increasing DOI can also give rise to the greater risk caused by the increased complexity and uncertainty associated with operating in different foreign markets. These do require higher costs of coordination and management (Kim and Ban, 2006). Moreover, the managers should demand and deal with much more information to make a decision, but, due to bounded rationality, they feel difficult in optimal decision-makings and often make barely suboptimal decisions.

Likewise, firms implementing the internationalization strategy are faced with the costs as well as the benefits. However, what gives implications is that beyond a certain degree of internationalization the growth rate of profits starts to decline and, that is, the marginal returns become negative. Instead, the marginal costs become positive after a firm's DOI exceeds the certain point because of the expenses of coordination of and control over foreign operations dispersed across markets and those incurred by complexity from the increasing cultural diversity (Tihany et al., 2005).

Firms may usually select similar country markets for the initial stage of internationalization to avoid the potential complexities and uncertainties resulted from the expected and unexpected environmental differences (Johanson and Vahlne, 1977). This allows the firms to transfer their capabilities and technology originally developed for their home country markets to foreign markets and to

exploit managerial and administrative resources in more efficient ways, and so the benefits rise faster than the accompanied costs (Gomes and Ramaswamy, 1999). Therefore, firms which show the lower DOI than the optimal degree are not overwhelmed by too much information and are able to maintain the efficiency of their internal and external network.

However, as the firms are gradually forced to enter geographically and socio-culturally distant countries, they may encounter substantial obstacles stemming from heterogeneous backgrounds, regarding all aspects, of suppliers, distributors or customers with whom they should interact. Their foreign subsidiaries are located in separate and are given their own roles. Then they should move as a network. Unfortunately, if the network is composed of too many foreign subsidiaries and very complex, it becomes difficult to transfer knowledge, know-how, capital and products etc. efficiently. That is, the marginal cost of DOI increases.

Consequently, an inverted U-shaped relationship can be suggested between DOI and firm performance, where performance goes up along with DOI up to a certain point and then declines. This has been argued for the manufacturing firms (Tallman and Li, 1996; Hitt et al., 1997; Gomes and Ramaswamy, 1999). Whereas internationalization allows them to standardize products, rationalize production and allocate their resources in more efficient ways, a higher level of internationalization increases the governance cost attributed to managerial complexity. This relationship between DOI and firm performance of manufacturing firms seems to be different from that of service firms although their motives of internationalization are generally similar to each other. The difference can be attributed to the unique characteristics of services such as intangibility, inseparability, perishability and heterogeneity (Boddewyn, Halbrich and Perry, 1986). For example, the intangible and heterogeneous aspects of services usually require more intensive and intimate interaction with customers and because of the linguistic and cultural differences of foreign customers, the service firms should adapt their products and other managerial components. In addition, the inseparability of production and consumption and the perishability requires the physical presence and local facility in every foreign market they enter. Furthermore, the service sector still tends to be more controlled than the manufacturing sector in many countries. All of these are the factors which increase the cost of internationalization. Despite these disadvantages, the reason why they internationalize is that in the long run they can experience the lower cost and the increasing benefits by obtaining knowledge, diversifying the cost-producing activities and developing a global brand (Capar and Kotabe, 2003). In this respect, the U-shaped rela-

tionship has been suggested and supported in the service firms (Capar and Kotage, 2003) and the S-curve has sometimes been evidenced where the relationship again turns to the negative in the final stage (Contractor et al., 2003).

To conclude, internationalization accompanies both the benefits and the costs. However, for the manufacturing MNEs, the marginal benefits gradually decrease while the marginal costs increase. When both of them equals, the net returns from internationalization peaks and after that, further internationalization leads to poorer performance. In other words, inverted-U shaped relationship is expected between DOI and firm performance.

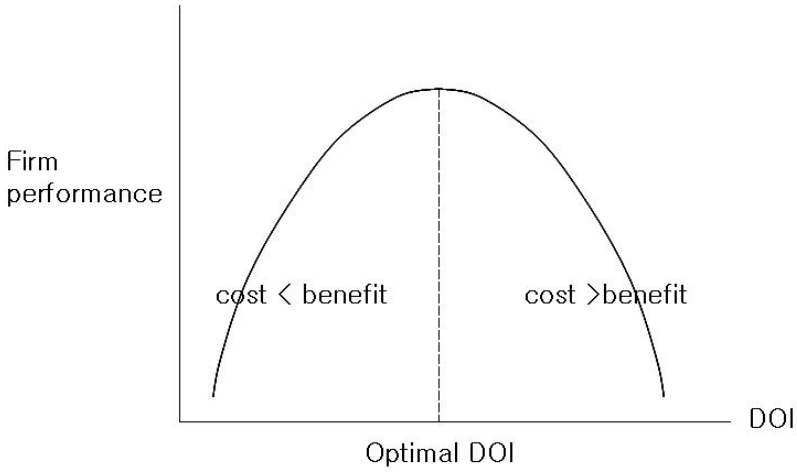
H1: There is an inverted U-shaped relationship between the degree of internationalization and firm performance.

3.2 DOI, Internationalization Process and Firm Performance

3.2.1 DOI, speed and firm performance

The effect of DOI on firm performance may be influenced by the extent to which a firm is more internationalized during a given period. That is, even though two firms report same DOI, their performance can be different depending on the speed at which they achieve the DOI (Vermeulen and Barkema, 2002).

To elaborate, despite in the left part of <Figure 1>, a firm may not experience the improving performance in accordance with increasing DOI, if the firm has internationalized too rapidly. On the contrary, even



<Figure 1> The inverted U-shaped relationship between DOI and firm performance

though a firm's DOI is over the optimal point, the firm may be able to decrease the rate at which the benefits from internationalization are offset by the costs if it can enjoy the learning effect through a moderate speed of internationalization.

It is because there is a limit of international expansion that a firm can absorb, manage and control during a given period of time. It should possess the coordination and control competencies and the capabilities to acquire, assimilate, transform and exploit knowledge to benefit from internationalization (Zahra and George, 2002). However, these don't always increase along with time or along with DOI.

Vermeulen and Barkema (2002) suggest that time compression diseconomies emerge according to the speed of internationalization process. The concept of time compression diseconomies was introduced in Dierickx and Cool (1989) at first and means that ceteris paribus, the higher the speed of a process is, the poorer the returns are. They took an example of a case that MBA students of an 1-year program may not accumulate the level of knowledge as those of a 2-year program even though the students of the 1-year program invest doubled inputs in every aspect except time.

The concept can be applied to firms. For example, two firms' present DOI are same, but one took two years while the other spent one years. Then, their benefits from and costs of the same DOI may not be equal even though the latter firm has doubled all inputs other than time. This is mainly resulted from the top management team's bounded rationality and limited attention. They cannot put the appropriate amount of time and attention to establishing foreign subsidiaries, integrating them with the existing subsidiaries' systems and network and controlling them from the entrepreneurial perspective. In addition, too much expansion within too short period hinders the firm from acquiring and exploiting new experience because the organizational structure and members' attitude, which contribute to above-mentioned activities, cannot keep up with the speed of internationalization (Barkema and Vermeulen, 1998). Moreover, such external factors as the cultural distance between the home country and host countries, industrial structures, political environment and so on generate costs, which adversely influence the firm's cash flow.

In conclusion, the speed of internationalization process affects the relationship between DOI and firm performance. If the speed is moderate, the firm can attain more benefits from internationalization before the optimal point and avoid sudden decrease in profitability of further internationalization beyond the point. On the other hand, when the speed is too high, the firm can enjoy less benefits and suffer from greater costs of internationali-

zation. Accordingly, it can be hypothesized as follows:

H2-a: The speed of internationalization process negatively moderates the relationship between the degree of internationalization and firm performance.

3.2.2 DOI, scope and firm performance

The performance effect of DOI can be affected by the diversity of businesses that a firm is engaged in, i.e. business scope. For a firm diversified into many and rather unrelated business sectors, there may exist losses caused by the time compression diseconomies and the lack of absorptive capacity (Vermeulen and Barkema, 2002).

It needs new knowledge, routines, business practices and corporate cultures to enter a new business sector. The entry becomes far more difficult and complex when the new business is operated in a new foreign market.

That is, if a firm implements internationalization with business diversification together, the managers are overloaded with too much information to deal with and only manage to make suboptimal decisions. They can understand, assimilate fully neither the new business nor the new country market.

Although some previous researchers argued the positive effect of business diversification on the basis of scope economies, the diversification into businesses which do not exploit the firm's strategic resources would not add rents and such diversification is expensive and reduces firm performance (Geringer, Tallman and Olsen, 2000).

In a firm of which business scope is relatively broad, the managers' attention is scattered and consequently cannot focus on both markets and businesses. Moreover, the absorptive capacity is taxed and the firm may also be unable to achieve some synergies intended when devising the strategy.

Likewise, it is difficult to attain the theorized scope economies from business diversification, particularly in foreign markets. Rather than the suggested benefits, there seems to exist more risks associated with complexities, limited absorptive capacity and bounded rationality. Such risks can be expected to adversely influence the relationship between DOI and firm performance. Therefore, it is hypothesized as follows:

H2-b: The business scope of internationalization process negatively moderates the relationship between the degree of internationalization and firm performance.

3.2.3 DOI, rhythm and firm performance

The benefits from internationalization is

mainly based on the learning effect (Kobrin, 1991). A firm can accumulate experience, transform it into information, know-how and knowledge, and transfer them into other markets. However, every firm doesn't enjoy the equal learning effect from a same DOI.

It requires absorptive capacity (Cohen and Levinthal, 1994) for a firm to achieve the learning effect but the quality of the absorptive capacity is heterogeneous among firms like their internal resources. The capacity is also limited, so it may not be possible to exert it as much as the firm wants. To make matters worse, it may be lost if unused during a certain period. Accordingly, it can be said that the advantages of the learning effect is not always proportionate to the firm's DOI. It depends on the extent to which the firm exerts its absorptive capacity.

When a firm implements too much international expansion within a short time, it will feel limited in learning from establishing, operating and controlling foreign subsidiaries compared to when it internationalizes gradually. In addition, after the radical expansion, the long-term inactivity causes the firm to forget what they learned (Vermeulen and Barkema, 2002). Therefore, rather than reaching a certain DOI through sudden expansion and continued non-expansion, it would be better to expand internationally within a proper period, remain until it is adapted and re-expand before forgetting what it learned. It is possible to learn much more and report better performance when repeating these steps regularly and rhythmically.

The example of two assumed firms may help the understanding of the impact of internationalization rhythm. Both of them achieve the same DOI at the end, but the processes are quite different. Firm A has a regular and rhythmic pattern of expansion while Firm B's pattern is irregular with rapid and sudden expansion and long non-expansion. The firm performance is expected to be superior in Firm A to Firm B because it doesn't overstretch and tax its limited absorptive capacity and its process is regular and not sudden. Firm A is able to interpret and understand its regular experience, develop it into knowledge and know-how and apply to somethings new. It starts again to expand before forgetting what it learned during the previous process. On the other hand, managers of Firm B may be overloaded and pressured due to the sudden and radical expansion process and this leads to inefficiency and demotivation. Moreover, the organizational structure and systems keep unadjusted to new markets for quite a time because of too concurrent expansion.

Consequently, in spite of an equal DOI, its relationship with DOI can be influenced by the extent to which the process is rhythmic and regular. It is, therefore, hypothesized

H2-c: The irregularity of internationali-

zation process negatively moderates the relationship between the degree of internationalization and firm performance.

Ⅳ. Methodology

4.1 Sample

The sample consists of the manufacturing firms publicly listed in the Korean Stock Exchange in March 2009. The reason why only the manufacturing firms were examined was that as most of the service firms tend to be devoted to sales operation in foreign markets, it was expected to be inappropriate to compare to manufacturing firms.

Among the 454 manufacturing firms, ones for administration were eliminated. In addition, the sample should include only firms which have been listed since 1999, which have at least one foreign subsidiary and for which all the data for this research are available.

Finally, 218 manufacturing firms were chosen as the research sample.

4.2 Measurement

4.2.1 Dependent variable

Firm performance is a very complex and multi-faceted concept. It can be viewed from perspectives centered on financial outcomes, operational outcomes, or overall effectiveness.

This paper used a financial indicator to measure the firm performance; ROA. It can be criticized in that operational and strategic performance were not taken into account. However, it is the accounting-based report that the executives, managers or outside investors usually rely on to evaluate the firm performance. In addition, as it has been adopted to measure the performance in lots of previous research, it is easy to compare the research results of the present study with those of the past. It is also acknowledged as one of the most objective and readily available indicators.

This study calculated ROA through dividing returns by total assets. The data for calculation were gained from KISLINE.

4.2.2 Independent variable

Although the concept of DOI is theoretically and practically critical, estimating the DOI of a firm is still problematic. According to Sullivan (1994), some researchers, relying on the loosely structured or even unstructured frameworks, have attempted to infer the DOI of a firm by examining the evolution, structure, and processes of relationships among its strategic, market, organizational and attitudinal characteristics of international expansion.

This, however, tended to inflate or deflate the relationship among variables. Given the limitations of the previous measurement of the DOI, several multidimensional indices of DOI have been suggested. Nevertheless, many studies still rely on a single-item index because the data is readily available and the single items facilitates replication. Such single-item proxies include foreign subsidiaries' sales as a percentage of total sales, foreign assets as a percentage of total assets, and the number of foreign subsidiaries. Among them, the foreign subsidiaries' sales as a percentage of total sales has been most popularly adopted (Kumar, 1984; Dunning, 1985; Grant, Jammine and Thomas, 1988; Geringer, Beamish and daCosta, 1989).

This study also used the percentage of foreign sales to total sales (FSTS) as a proxy for DOI. The data for this came from KISLINE.

4.2.3 Moderating variables

4.2.3.1 Internationalization speed

In this research, the internationalization speed means how many foreign entries a firm undertook within a certain period of time (Vermeulen and Barkema, 2002).

Indeed, the internationalization speed is the concept that has been examined in studies on international new ventures or born-global firms. They defined it as how quickly the firms have internationalized and measured it with how many years it took to generate the first foreign sales after the establishment (Autio, Sapienza and Almeida, 2000; Bloodgood, 2006). From another perspective, it was proxied with the change in DOI for a given number of years, e.g. from the year 1993 to the year 1997 in Wagner (2004).

This study measured the internationalization speed by the average increase in the number of foreign subsidiaries per year within the expansion period we examined. Here, a large number of expansions per year indicate a speedy and fast-paced internationalization process.

4.2.3.2 Business scope

Most widely acknowledged measurements of business scope of a firm are entropy index, Herfindahl index and the number of business segments.

Despite their own merits, business diversification is sometimes measured by the simple count of businesses as it is often difficult to collect the data necessary to use either entropy or Herfindahl index. In general, firms are not willing to announce such detailed information.

In this study, too, the number of businesses which a firm operates was used as a proxy variable to measure the business scope in consideration of availability of data. It has a strong point in that showing the scope of business in a direct way. In this study, the

number was counted by the 3-digit KSIC.

The data for the number of businesses in which a firm operates were obtained in the DART, the electronic disclosure system of Financial Supervisory Service.

4.2.3.3 Internationalization rhythm

Rhythm of a firm's internationalization process captures the extent to which the process is regular and rhythmical. It was measured with the kurtosis of the first derivative of the number of foreign subsidiaries of the firm over time (Vermeulen and Barkema, 2002). It signifies how concentrated in time the international expansion is and how long the non-expansion is continued. The extent to which the changes in internationalization are compressed in time is measured through the kurtosis of this distribution:

$$kurtosis = \left\{ \frac{n(n+1)}{(n-1)(n-2)(n-3)} \sum \left(\frac{x_i - \bar{x}}{s} \right) \right\} - \frac{3(n-1)^2}{(n-2)(n-3)}$$

where n is the number of observations, x_i is the number of expansions in year i, and s is the standard deviation of the number of expansions.[2)]

A high kurtosis means a sudden and radical expansion in a short time and non-activity for a long time. On the other hand, a lower kurtosis implies the internationalization process is regular and rhythmic and the distribution is shown to be relatively flat.

4.2.4 Control variables

In order to examine the effect of DOI on firm performance more precisely, this study include firm size, internal resources and Industrial factors as control variables in the statistical model.

Firm size should be controlled as large-sized firms may be able to benefit from the economies of scale or scope (Franko, 1989) while too large firms can become inflexible and inert (Hannan and Freeman, 1977). A firm's internal resources have been evidenced to affect firm performance and, therefore, are included as control variables. This study categorized the internal resources into technological resources, marketing resources and organizational slack. Industrial factors are also controlled according to the industrial organization theory which argues firm performance is influenced by the industrial structure. Market concentration and industrial growth rate are the representative factors which determine the industrial structure and profitability.

2) Vermeulen, F. and Barkema, H. (2002), "Pace, Rhythm, and Scope: Process Dependence in Building a Profitable Multinational Corporation," *Strategic Management Journal*, 23(7), p. 644.

4.2.4.1 Firm size

Measurements of firm size, which have been primarily used in previous studies, can be categorized into three; sales, the number of employees and the amount of assets. This paper operationalized firm size with the amount of total assets. In doing so, I calculated it with the natural logarithm to avoid the effects of extreme differences of the amounts of total assets among the sample firms. The data were collected from KISLINE.

4.2.4.2 Market concentration

Market concentration indicates the extent to which the industry output is produced by a few number of large firms (Melville, Gurbaxani and Kraemer, 2006). It is also used as the index to show the intensity of industrial rivalry in an indirect way. Although many indices have been developed to measure the degree of the market concentration, the most frequently used one is CR_k.

CR_k is the index showing the total market shares that the large, dominant firms take up in an industry. The formula is as follows:

$$CR_k = \sum_{i=1}^{k} S_i$$

where S_i is the market share of the i th firm and k is the number of the dominant firms. The bigger the value of CR_k is, the more concentrated the industry market is. This index is easy to measure and also indicates directly the market share of a few number of large-sized enterprises. Therefore, it has been very widely acknowledged.

This study also adopted the CR_k as the measurement of the market concentration. The data of each industry according to 2- digit KSIC were collected from the Korea Institute for Industrial Economics and Trade.

4.2.4.3 Industrial growth rate

Industrial growth rate implies how prospective the industrial growth is in the future, and so it is related to the degree of industrial attractiveness. It can be measured by the change in industry ROA, industry ROS, or industry sales either per year or for a certain period of time.

This study calculated the change of 2-digit KSIC industry ROA per year. The necessary data were gained from the Bank of Korea.

4.2.4.4 Technological resources

Technological resources are necessary to build up the competence for sustainable competitive advantage, and so lots of scholars have tried to define it since the late of 1970s.

Lall (1993) defined it as the ability to use the technological knowledge in order to absorb, exploit, adopt and transform the existing technologies while Flower (2000) explained it as the ability to combine several present knowledge in a unique way and to convert it into a design, operating manual or manufacturing process. Given these definitions, the

technological resources can be expected to reflect how much intellectual property the firm has, how competent it is in regard of technology or how much it invests in technology development.

The most widely accepted measurement of the technological capability or resources is the R&D expenditures of a firm. The R&D expenditures appear to provide a proxy for the proprietary knowledge assets the firm creates. In addition, they also reflect the ability of the firm to acquire sophisticated technologies.

Therefore, this study also measured it by the ratio of R&D expenses to total sales. This is consistent with major prior research (e.g., Gatignon and Anderson, 1988; Schoenecker and Cooper, 1998; Li and Qian, 2005).

4.2.4.5 Marketing resources

In general, marketing resources include market knowledge, access to customers, information about competitors and so on and is defined as the ability to identify and obtain knowledge and information needed in the process of new product development and to successfully carry out the activities of sales and distribution.

The most commonly acknowledged measurement is to operationalize it with advertising intensity. This is because the marketing resources reflect a firm′s ability to position its desired image in customers′ minds, which requires effective advertising. Advertising activity becomes increasingly critical marketing resources driving a firm′s success of the internationalization strategy as the marketing management has been standardized as a result of globalization. Accordingly, the advertising intensity of a firm has been used as a proxy variable for the marketing resources and this study also adopted the measurement. It was measured by the ratio of advertising expenses to total sales (Gatignon and Anderson, 1988; Cui and Lui, 2005).

4.2.4.6 Organizational slack

Organizational slack is usually assessed in terms of financial indicators. It can be classified into available, recoverable and potential slack (Bourgeois, 1981; Bourgeois and Singh, 1983; Singh, 1986). Available slack represents resources which are available and not yet committed for particular allocations. Recoverable or absorbed slack is defined as resources which the organization has absorbed, but which could be recovered by increasing efficiencies. Potential slack means future ability to generate resources.

This paper also categorized the organizational slack into the three measures as in Bourgeois (1981); available, recoverable and potential slack. However, to avoid multicollinearity problems, only the available slack measure, which was reported not to have significant relationships with other indepen-

dent and moderating variables, was used.

To reflect available or unabsorbed slack, the quick ratio as a measurement of liquidity (Geiger and Cashen, 2002). The quick ratio is defined as current assets divided by current liabilities, which indicates the extent to which current assets cover the current liabilities (Herold, Jayaraman and Narayanaswamy, 2006).

V. Results

<Table 2> shows the results of correlation analysis among variables. It signifies that there is no problem of possible multicollinearity between the independent or moderating variables.

First of all, it is noticeable that the negative correlation coefficient is between DOI and firm performance even though it does not evidence their causal relationship. It implies that DOI may give a negative effect on firm performance and reminds of the costs incurred by internationalization.

There is also a negative correlation between organizational slack and firm performance. It signifies the possibility that the slack can be interpreted as an evidence of organizational inefficiency rather than a buffer against some radical changes from the resource-based view.

In addition, the positive relationships are found between DOI and firm size and between speed of internationalization and firm size. It shows the necessity to adopt firm size as a control variable. Firm size also has positive correlations with technological resources and marketing resources, which are well-known relationships.

Next is about the results of the moderated regression analysis employed to test both the relationship between the DOI on the firm performance and the moderating effects of three variables associated with internationalization process on the relationship.

The results are shown in <Table 3>. In this analysis, firm size, the two industry factors and the three firm-specific factors are included to control their possible influences on the firm performance. Model Ⅰ is a base model that regresses only the control variables and then DOI and the squared DOI are added into Model Ⅱ as independent variables. Finally, Model Ⅲ includes the three interaction variables.

Among the control variables, industrial growth rate shows the consistently negative effect on firm performance. It is the result which challenge the traditional argument of the industrial organization theory that the way for a firm to survive and succeed is to be located in an attractive market, i.e. industry. The industrial growth rate, one of the representative indices of the industrial attractiveness, is shown to hamper the firm per-

<Table 2> Descriptive Statistics and Correlations

	Mean	S. D.	1	2	3	4	5	6	7	8	9	10	11
1	26.401	1.079	1										
2	.479	.077	.169*** (.000)	1									
3	-.194	2.736	-.045* (.054)	.217*** (.000)	1								
4	.008	.013	.047** (.046)	.155*** (.000)	.030 (.144)	1							
5	.013	.021	.005 (.425)	.065** (.010)	.043* (.065)	.123*** (.000)	1						
6	1.761	1.052	-.147*** (.000)	-.103*** (.000)	.064*** (.000)	.049** (.040)	.037* (.094)	1					
7	.200	.223	.275*** (.000)	.108*** (.000)	-.002 (.474)	.100*** (.000)	-.213*** (.000)	-.049** (.042)	1				
8	.200	2.027	.118*** (.000)	-.002 (.474)	-.007 (.398)	.108*** (.000)	.026 (.180)	-.007 (.407)	.014 (.311)	1			
9	.190	.848	.027 (.168)	-.024 (.200)	.051** (.035)	-.008 (.384)	-.041* (.071)	.003 (.461)	.083** (.002)	.004 (.449)	1		
10	.546	2.241	-.038* (.089)	-.117*** (.000)	-.018 (.265)	-.041* (.075)	-.033 (.122)	.049** (.040)	-.007 (.396)	.110*** (.000)	-.036 (.103)	1	
11	.349	.329	.031 (.135)	-0.13 (.328)	-.230*** (.000)	-.054** (.027)	.003 (.452)	-.061** (.015)	-.064** (.012)	.003 (.454)	.013 (.324)	-.010 (.356)	1

*: p < .10, **: p < .05, ***; p < .01
1: Firm Size, 2: Market Concentration, 3: Industrial Growth Rate,
4: Technological Resources, 5: Marketing Resources,
6: Organizational Slack, 7: Degree of Internationalization,
8: Speed of Internationalization, 9: Scope of Business,
10: Rhythm of internationalization, 11: Firm Performance

formance in <Table 3>.

In regard to the effect of DOI, it is reported to have the U-shaped relationship with firm performance in Model II and Model III. We hypothesized the inverted U-shaped relationship by focusing on the complexity and uncertainty which increase after the optimal DOI because of the bounded rationality and the time compression diseconomies. However, the result shows the stness and foreignness rather than the later effects of the increased complexity and uncertainty. It indicates that firm performance declines to a certain point of DOI but starts to be enhanced beyond the point owing to the scale economies and the learning effect. Consequently, it represents the opposite result to the hypothesized relationship and rejects H 1. A partial derivative

<Table 3> Results of Moderated Regression Analysis on Firm Performance

	Model Ⅰ	Model Ⅱ	Model Ⅲ
SIZE	.011 (.376)	.036 (1.221)	.026 (.892)
CR	.040 (1.369)	.034 (1.160)	.036 (1.203)
IGR	-.234*** (-8.281)	-.238*** (-8.421)	-.240*** (-8.508)
TR	-.055** (-1.945)	-.046 (-1.641)	-.061** (-2.151)
MR	.019 (.681)	.001 (.022)	.006 (.222)
SLACK	-.039 (-1.376)	-.042 (-1.505)	-.045 (-1.620)
DOI		-.314*** (-2.835)	-.288*** (-2.603)
DOI squared		.244** (2.226)	.284** (2.425)
SPEED		.007 (.240)	-.051 (-1.489)
SCOPE		.029 (1.057)	.054* (1.702)
RHYTHM		-.010 (-.373)	.024 (.753)
DOI squared ×SPEED			.102*** (2.956)
DOI squared ×SCOPE			-.075 (-1.442)
DOI squared ×RHYTHM			-.063** (-1.967)
Adjusted R^2	.055	.060	.069
F	13.073***	8.328***	7.635***

*:p<.10, **:p<.05, ***:p<.01
SIZE: Firm Size, CR: Market Concentration, IGR: Industrial Growth Rate,
TR: Technological Resources, MR: Marketing Resources,
SLACK: Organizational Slack, DOI: Degree of Internationalization,
SPEED: Speed of Internationalization, Scope: Scope of Business,
RHYTHM: Rhythm of internationalization, PER: Firm Performance

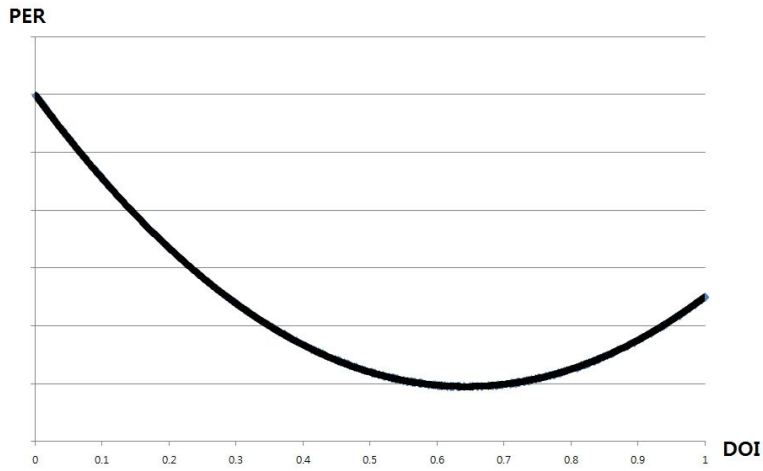
of the estimated regression equation for Model Ⅱ taken with respect to DOI shows that firm performance becomes poorest if DOI=0.6434 (See <Figure 2>). That is, firm performance

continues to decrease until DOI, or the ratio of FSTS, reaches 64.34%. Beyond this 64.34% threshold level, firm performance improves along with DOI.

However, this U-shaped relationship can vary with the characteristics of internationalization process. This research divided the characteristics into speed, business scope and rhythm (i.e. irregularity) during the expansion period.

The interaction variable of the squared DOI and the internationalization speed is shown to affect positively on firm performance at the significant level of .01. To put it in another way, the internationalization speed moderates the relationship between DOI and the firm performance positively. The speedier the internationalization process is, the more negative the effect of the DOI on firm performance before an optimal point is. However, once DOI is over the optimal level, the speedier the process is, the more positive the performance effect of DOI is.

On the other hand, irregularity which is labeled as the rhythm in the table is shown to have the negative moderating effect on the relationship of DOI with firm performance. The interaction variable of the squared DOI and the rhythm shows the negative sign. It implies that as the internationalization process gets irregular, the effect of DOI on firm performance shifts from the U-shaped to the inverted U-shaped. It means that a firm can enhance its performance by increasing the DOI up to a certain point even though the expansion process is not regular. However, given the irregular internationalization process, the DOI beyond the optimal point causes the



<Figure 2> Result of DOI-Performance Relationship

increasingly worse performance. This can be explained with the limited absorptive capacity and the limited learning effect. When the process is rhythmic and regular, the liabilities of newness and foreignness can be covered through absorbing and learning from experience accumulation. However, if the process is irregular with the sudden and radical expansion and the long-term inactivity, there emerge some limitations in absorbing the knowledge from the experience and applying it to other expansion cases. Furthermore, when the DOI gets higher, the firm will suffer from the sudden increase in information inflow and finally the poorer performance.

VI. Discussion and Conclusion

This study examined the impact of the DOI on firm performance which is a topic lots of researchers have paid attention to. However, it is different from the previous studies in that this paper focused on the internationalization process in order to explore the performance-related consequence of MNEs' foreign expansion. In doing so, the statistical method of the moderated regression analysis was used to test both the main effect of DOI on firm performance and its interaction effect with the internationalization process. The empirical results for the 218 sample are summarized as follows.

First, as contrasted with the expectation that the performance effect of the DOI is inverted U-shaped, the Korean manufacturing firms were shown to experience the deterioration of their performance during the initial stage of internationalization while they can benefit from increasing the DOI after a certain point.

However, the relationship between the DOI and the firm performance might vary with the process of internationalization. The internationalization speed moderated the relationship in a positive direction while the irregularity, i.e. rhythm negatively moderated it. When a firm internationalized with a high velocity in a certain period time, it should endure the sharp decline with increasing the DOI at first but could enjoy the more benefits after a threshold point of the DOI. On the other hand, the irregularity of internationalization negatively moderated the performance effect of the DOI. Therefore, in a firm that showd the irregular and non-rhythmical internationalization pattern, the DOI improved its performance before reaching an optimal level while hampers the performance after the level.

These results are interesting enough to provide following implications to Korean MNEs.

First of all, there was found to be a threshold where the performance effect of DOI changes from the negative to the positive.

Korean MNEs may suffer at the initial stage of internationalization due to the lack of the market knowledge and experience as well as the required costs of realizing the potential benefits. However, they can start to achieve the benefits exceeding the invested costs beyond the threshold owing to the scale of economies and the learning effect. Accordingly, firms expanding abroad need to wait and endure until they reach the threshold point.

By the way, the direction and the size of the relationship between DOI and firm performance might be influenced by the process of internationalization. This paper focused on the process constructed by three dimensions: speed, business scope and rhythm.

Among them, the speed should be controlled while Korean MNEs implement the internationalization strategy. When they establishes lots of foreign subsidiaries within a certain period time, the initial effect of DOI gets more negative up to a threshold whereas the later effect on firm performance becomes positive. The suffer they should overcome before reaching the turning point will be bigger as they expands abroad with the higher velocity. However, the benefits they can obtain will be more increasing along with the higher speed of internationalization after their DOI exceeds the optimal point. This means that Korean MNEs had better pursue the gradual internationalization before reaching the optimal point of DOI and then, accelerate the internationalization process beyond the point.

On the other hand, if a firm implements the expansion strategy in a sudden and radical way instead of regular one, doesn't have any activity for a long time and repeats this irregular patterns of internationalization process, the relationship changes to totally different one. As the process is irregular and not rhythmical, the effect of DOI on firm performance becomes positive up to an optimal point. Beyond the point, the performance begins to go downhill along with the increasing DOI. It is not until this point that a firm recognizes the limited absorptive capacity and the limited application of absorbed knowledge to its commercial ends which are illuminated with the irregular process of internationalization and it feels complex and uncertain about implementing the expansion strategy further.

Despite the implications summarized above, this study could not be free from a few limitations.

First, H1 is developed on the basis of the argument in previous literature that MNEs usually select familiar country markets in the initial stage of internationalization but fans out to physically and psychically distant markets during the later stage. However, our data failed to provide the information about whether the sample firms, during their internationalization, followed the commonly suggested entry sequence. If the relevant data

had been available, this research could have been more robust.

Next is also associated with the constrained data availability. H2-b suggested that the relationship between DOI and firm performance can be influenced by business scope. Its moderating effect might vary according to the timing when the business diversification was implemented. Internationalization which is pursued together with business diversification within a certain period could result in different performance from internationalization that is implemented after completing business diversification. However, we could not obtain such information from our research data.

Third, in measuring DOI, it could have been more proper to consider the diverse aspects constituting the concept of internationalization. Given the data availability, it was measured by FSTS here. However, internationalization of organizational structure or global vision of the executives needs to be included in the construct of the DOI.

Last is about the measurement of firm performance. Although the financial and unidimensional measurement, i.e. ROA and ROS here, are often acknowledged, it cannot avoid the criticism that the firm performance is a multidimensional construct and should be measured from diverse aspects, for example, financial performance, strategic performance and market performance. In addition, although there might be a time lag between DOI and its effect on firm performance, we could not consider it in the empirical analysis.

From the limitations mentioned above, we can make some suggestions for future studies. Multidimensional measurement of DOI and firm performance can be developed by thorough literature review, depth interview with experts and survey. In addition, it is helpful to explore other dimensions of internationalization process to understand the consequences of DOI more comprehensively.

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국제화수준 및 과정이 경영성과에 미치는 영향

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요 약

다국적기업에게 있어 국제화란 기업의 성장과 성과를 위한 핵심전략이라고 할 수 있다. 국제화를 통한 성장은 규모 및 범위의 경제 그리고 다양한 형태의 성장의 경제를 가져다준다. 반면, 국제화 수준이 높아질수록 기업이 겪게 되는 복잡성의 수준 역시 높아진다. 따라서 다국적기업들은 국제화 수준과 관련한 전략적 딜레마에 종종 빠지게 된다.

이러한 국제화 수준이 기업성과에 미치는 영향에 대해 실증적으로 검증하고자 하는 시도는 많이 이뤄졌으나 연구결과는 여전히 일관적이지 못하다. 이는 국제화 수준과 기업성과의 관계가 지금껏 연구자들이 제기해온 것보다 훨씬 복잡하고 역동적이기 때문일 수도 있고, 또는 연구자들이 국제화의 수준에만 집중한 나머지 그 수준을 달성하기까지의 국제화 과정은 간과해왔기 때문일 수도 있다. 다시 말하면, 동일한 국제화 수준을 보이고 있는 다국적기업이라고 해도 국제화 전략을 실행함에 있어 서로 다른 과정을 거쳤다면 그들의 성과 역시 달라질 수 있다는 것이다. 본 연구에서는 국제화 과정을 속도, 범위, 규칙성이라는 세 가지 차원에서 접근하였으며, 이에 따라 국제화 수준과 기업성과의 관계, 그리고 이들 관계에 있어서 국제화 과정의 세 가지 변수가 가지는 조절효과 등 총 네 개의 가설을 제시하였다.

이러한 가설은 2009년 3월 현재 한국증권거래소에 상장된 218개의 제조기업으로 구성된 연구표본을 대상으로 분석되었다. 회귀분석을 실시한 결과, 국제화 수준과 기업성과 간에는 U자 형태의 관계가 발견되었다. 그러나 국제화 과정에 따라 이러한 관계의 형태가 달라질 수 있는데, 먼저 국제화의 속도는 국제화 수준과 기업성과의 관계에 정(+)의 조절효과를 가지는 것으로 나타났다. 즉 국제화 속도가 빠를수록 최적의 국제화 수준에 이르기 전까지는 기업성과가 더욱 악화되다가 정점을 넘어서부터는 국제화 수준에 따른 기업성과가 더욱 개선된다는 것이다. 한편 국제화의 규칙성 역시 조절효과가 검증되었는데, 국제화 과정이 불규칙할수록 국제화 수준과 기업성과의 관계가 U자가 아닌 역U자 형태로 바뀌는 것으로 나타났다.

주제어: 국제화, 국제화수준, 기업성과

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