PISSN 2234-8867 EISSN 2287-8793
Journal of East Asian Economic Integration Vol. 18, No. 4 (December 2014) 339-366
http://dx.doi.org/10.11644/KIEP.JEAI.2014.18.4.285

Effects of Internationalization on Innovation in the Service Industry: Evidence from Korea*

Jaeho Lee
Associate Professor, Kyung Hee University
jaeholee@khu.ac.kr

Ji-Hwan Lee**
Associate Professor, Korea Advanced Institute of Science and Technology
jihwanlee@business.kaist.ac.kr

Baeho Choi
Korea Development Bank
bhchoi@kdb.co.kr

This paper examines the impact of internationalization on the product, process and organizational innovations of Korean service firms. Despite the increasing importance of the service sector and the discrepancies in the natures of the manufacturing and service industries, the internationalization-innovation link in the context of service firms has rarely been examined empirically on a large sample. Based on the results of the logistic regressions using the 2006 Korean Innovation Survey data, we found that Korean service firms' international expansion is significantly and positively associated with their product and organizational innovations. In addition, the magnitude of the estimates in our models revealed that internationalization has a greater impact on product innovation than on process or organizational innovation.

Keywords: Internationalization, Export, Innovation, Service Industry, Korea
JEL Classification: M16, L8, O3

I. Introduction

A body of literature suggests that knowledge creation and innovation via learning has become increasingly critical for the success of a company with

* This paper is a revised version of KCB-WP-2010-008 titled as "Impact of Internationalization on Innovation in the Service Industry" in KAIST Business School Working Paper Series (October 2010). We are grateful to the three anonymous reviewers for very helpful comments and suggestions.
** Corresponding Author

the advent of knowledge-based economy (Grant, 1996; Zahra and George, 2002; Vila and Kuster, 2007). A firm's ability to acquire, absorb, assimilate, adapt, create, exploit and use new knowledge is now considered one of the most important sources for sustaining competitive advantage (Wang and Ahmed, 2007). In this regard, a firm's international expansion tends to reinforce its organizational structure and business processes, thereby improving its capability for knowledge creation and extension (Castellani and Zanfei, 2007; Prashantham, 2005). International diversification has been proven to affect technology-based companies' ability to learn and perform in global markets (Hitt et al., 1997; Zahra et al., 2000).

Empirical studies have investigated how internationalization may affect knowledge acquisition and learning effort, by analyzing the relationship between internationalization (via export mode) and firm innovation. Salomon and Shaver (2005) examined the impact of learning from export experience on firm innovation, measured by patent application counts, using a sample of Spanish manufacturing firms. In subsequent studies, Salomon (2006) investigated the role of export strategies in innovative productivity, and Salomon and Jin (2008) analyzed how learning from export experience might show heterogeneous impacts in different industries. Generally, a positive relationship between internationalization and firm innovation was found in this stream of research (Filipescu et al., 2009; Castelliani and Zanfei, 2007; Trofimenko, 2008). While these studies were undertaken using a variety of data collected from manufacturing companies, we found little research that focused on the association between these rather widely used variables-internationalization and innovation-in the context of the service industry. While some studies on the service industry also exit, they mainly concerned the impact of internationalization on overall firm performance (Capar and Kotabe, 2003; Goerzen and Makino, 2007) rather than on more specific variables such as innovation.

While manufactured goods have dominated world trade over the years, the importance of trade in services is also growing, particularly for industrialized nations. In Singapore, exports comprise 69% of the total service production, while most European countries export between 10% and 20% of their service products, and the USA exports around 5% (Patterson, 2004). In Korea, whose economy is highly dependent on foreign markets, exports of service products accounted for 11% of national total exports in 2009. Furthermore, the outward foreign direct investment (FDI) flows in the service sector worldwide were $476 billion in 2002-2004, while those in the manufacturing sector remained only

one-third ($165 billion) of the service sector FDI outflows (UNCTAD, 2008). In 1987-2005, 52% of all cross-border mergers and acquisitions (M&As) occurred in the service sector, while 30% and 18% were in the manufacturing and the primary sectors, respectively (UNCTAD, 2008). Given such a trend, it is not surprising that research on service innovation has been conspicuously increasing (Gallouj and Weinstein, 1997; Miozzo and Miles, 2002; Drejer, 2004; Toivonen and Tuominen, 2009).

Given this background, this study aims to contribute to the research of the internationalization-innovation link by examining such relationship in the service industry using a large dataset from South Korea (henceforth, Korea). We think that it would be a meaningful endeavor to apply this research framework to the service industry, given that a number of innovations have also been witnessed in this sector - for example, information technology, banking, and legal advice. While the potential strategic importance of international expansion on innovation can be emphasized in all industries, innovation in the service industry appears to be different from that in the manufacturing industry (Ietto-Gillies, 2002). Whereas radical and tangible innovations tend to be conspicuous in the manufacturing sector, relatively incremental and less tangible innovations are prevalent in the service sector. In many cases, service innovation is not a direct outcome of a priori innovation planning. It often comes to be recognized as innovation only a posteriori, when dealing with customer needs and feedback (Sung, 2010; Toivonen and Tuominen, 2009). Among the variety of classifications of innovations related to the service sector (e.g., Miles, 1999; Avlonitis et al., 2001), we adopted a conventional classification into product, process and organizational innovations[1] (Gallouj and Weinstein, 1997).

In the next section, we briefly review the existing research on internationalization and innovation in general, as well as in the service industry in particular, to formulate four hypotheses. After describing our dataset and methodology, we analyze and discuss the results of the empirical tests. The paper concludes with suggestions for future research.

II. Theory and Hypotheses

Exporting requires companies to set up logistic distribution channels and adapt

[1] In this study, "market innovation" in Gallouj and Weinstein (1997) was incorporated into "product innovation."

their existing products to local tastes, preferences and country-specific formal rules (Lopez, 2005). Internationalization is a very costly activity, which forces companies to pay for large fixes costs for international expansion. Melitz (2003) argues that only a few productive firms are able to take part in exporting, because they can earn enough profits to cover the costs necessary for undertaking exporting activities. Vernon (1966) showed that product innovation can be an indirect driver that prompts companies to start exporting. Cassiman and Martinez-Ros (2007) found that companies are more likely to engage in exporting operations when they significantly increase innovative activities. While firm heterogeneity and competitive advantage with distinct productivity and innovativeness can lead to internationalization, this research considers the opposite direction in the link between internationalization and innovation.

International expansion in general-regardless of the motivation or level-exposes firms to new customers and competitors and to diverse cultural sets, institutional rules, norms and regulations (Eriksson et al., 2000). Successful firms manage to learn from internationalization by actively seeking knowledge about foreign markets, such as opportunities to gain clients and potential threats from competitors, as well as various issues related to operating in a new environment (Craig and Douglas, 1996). Differences in the technological and regulatory environments also influence the firms' technological learning and strengthen their motivation to assimilate new technology (Nakata and Sivakumar, 1996).

The impact of internationalization on innovation is based on a theoretical foundation. The evolutionary theory of the firm has provided research on multinationals with a new insight where multinationals' strategic behaviors are associated with their innovative activities and output (Filippetti et al. 2009). Firms engaging in foreign business activities may benefit considerably by improving their overall level of managerial capability. Information flowing from the foreign market, often via intermediaries or directly from customers, can enhance a company's ability to innovate (Salomon and Jin, 2008; Salomon and Shaver, 2005). Grossman and Helpman (1991, 1993) argued that mutual exchange of knowledge between domestic and foreign markets is promoted because firms are exposed to knowledge inputs that are unavailable when operations are limited to the domestic market. Companies may also derive benefits from the technological expertise of their foreign buyers (Clerides et al., 1998), and learn valuable information about consumers' product preferences and competing products by interacting with foreign agents (Salomon and Shaver, 2005). Companies exposed to varied technological and regulatory environments in the

process of competing in different international regions and targeting multiple market segments are expected to operate differently to those that compete only in domestic markets. The knowledge and information obtained in foreign countries can be used to promote innovation activities.

In case of the service industry, a firm can innovate its products by introducing a service which is novel to the firm or industry, or significantly improving a set of characteristics embedded in the 'use' of the service product, such as its technical and service specifications (Gallouj and Weinstein, 1997)-for example, an updated software version by a developer, an internet banking system developed by a financial firm, or an adaptable standard contract developed by legal advisers[2]. Service firms with foreign activities, regardless of the type of firm, have the opportunities to enhance their capabilities in order to undertake product innovation by bringing diverse market and technological information into the characteristics of the products in the process of creation and revision. Based on the UK's financial services sector, Frenz et al. (2005) showed that even just being involved in a multinational enterprise has a positive influence on the propensity to innovate. Moreover, the firm has an opportunity to gather information from foreign buyers, who are often willing to provide service designs and to offer technical assistance to improve their supplier's operations in the context of their own sourcing activities (Evenson and Westphal, 1995). In summary, the knowledge, information and experiences gained from experience in overseas markets and technologies can be incorporated into the firm's new (service) product development. From this follows our first hypothesis:

H1: Internationalization of a service firm will be positively associated with its product innovation.

The above hypothesis can be extended to other types of innovation. While product innovation pertains to the incremental or radical improvement of the quality and function of a product in its technology and service specifications, process innovation relates to the changes in methods by which the service is produced (Gallouj and Weinstein, 1997). Although the unique properties of service activities make the distinction between product and process innovation "fuzzy" (Gallouj and Weinstein, 1997), product innovation is embedded in 'the

[2] Gallouj and Weinstein (1997) argued that there would be little distinction between service innovation and manufacturing innovation when innovation is approached in terms of 'characteristics' of technical and service specifications-or products-found by related agents. This characteristic approach is based on Lancaster (1966)'s definition of product innovation.

implementation/commercialization of a product with improved performance characteristics such as to deliver objectively new or improved services to the consumer' (OECD, 2005), while process innovation relates to 'the implementation/ adoption of new or significantly improved production or delivery methods' (OECD, 2005). Process innovations tend to be more radical than product innovations because the former is the very first step that is necessary to make in order to transform the whole logistics activity into a more customer-oriented one (Finger, 2007). In this paper, we define process innovation as radical or incremental change in the "methods" of supplying and delivering service products, contributing to a significant increase in productivity-as in the case of an IT company developing an enterprise resource planning (ERP) system to effectively coordinate the diverse activities involved in designing new version of software, or of a bank launching a new web-based interface to introduce internet banking. In using such a definition that separates the two fields of innovation, we are following the conventions of the Oslo Manual. The intense competition that a service firm encounters when internationalizing its business encourages the firm to improve its business processes and knowledge base by learning extensively from its foreign operations and gaining hands-on experiences in the host-country market. Service firms that pursue international expansion must attempt to enhance process technologies in order to deliver the service more effectively in the global market. Further, they should strive to tailor the logistics and after-sales service to meet the specific needs of particular customers (Salomon and Shaver, 2005; Vernon, 1979). From this, our second hypothesis follows:

H2: Internationalization of a service firm will be positively associated with its process innovation.

The resource-based view on the firm has led to the new development in the theories of the innovation in which strongly innovative companies tend to strengthen their own unique knowledge base and accumulate related capabilities that are geared up for by organizational reconfiguration and transformation (Knight and Cavusgil, 2004). According to the Oslo Manual, organizational innovation must be clearly separated from product and process innovation in its measurement. Organizational innovation includes the introduction of the significantly changed organizational structures and the implementation of advanced management techniques and resultantly changed corporate strategic orientations. It has been observed that, in comparison to manufacturing firms,

service firms do not require large-scale capital investments in physical assets to create a presence in foreign markets (Bouquet et al., 2004). Service firms will be more likely to acquire value-creating assets through human capital rather than through their physical infrastructure (Erramilli and Rao, 1993; Campbell and Verbeke, 1994). Since many services are by nature labor-intensive or people-oriented, one of the key factors for successful foreign market entry through internationalization is to introduce organizational innovation so that a workforce can be equipped with a high level of skills, customer-centered minds, and specialized knowledge for adaptation to foreign cultures.

Service firms that pursue internationalization tend to make huge investments in education and training of employees for this reason. They transfer managers to local branches and/or subsidiaries overseas. As the managers' expertise in international market research improves, such experience reduces the potential risk and complexity inherent in penetrating foreign markets (Westhead et al., 2001). Managers with international experience can develop and take advantage of international social networks (Coviello and Munro, 1997) that facilitate organizational change. Furthermore, service firms engaging in foreign business activities may need to re-create their organizational structures and administrative systems such that they can easily appropriate the new forms of market knowledge and technology learned from a foreign market (Cavagnoli, 2011). Competing in foreign markets may bring firms closer to state-of-the-art management practices that are adopted in the contemporary global environment, again fostering learning. Consequently, internationalization of service firms is likely to involve improvement of certain organizational skills and capabilities that lead to more effective learning. From this, our third hypothesis follows:

H3: Internationalization of a service firm will be positively associated with its organizational innovation.

Finally, following the suggestions made by international business scholars (e.g., Shaver, 2006), we focus on the "magnitude"-not just the "significance"-of the impact of internationalization on different types of innovation. Service firms are able not only to increase their sales and improve their profitability through foreign business activities but also to accumulate wide ranging knowledge and experience in the process of selling their services (Trofimenko, 2008; Burpitt and Rondinelli, 2000). However, such knowledge and experience may not be equally applicable to all types of service innovations. While a direct comparison of service and manufacturing industries is beyond the scope of this study, such

a conception can be deduced from the unique nature of services. Typically, service innovations are not the direct outcome of a *priori* innovation planning. Innovations often become visible in the process of service provision while dealing with customer needs and feedback and they are recognized as innovations only a *posteriori* (Toivonen and Tuominen, 2009). Furthermore, the resources and capabilities that service firms require for service innovation in the internationalization context tend to be 'intangible' and embedded in human factors rather than in physical R&D elements. A high degree of contact between service provider and host-country client requires the service firm to establish local branches and to relocate key personnel who are able to deal with significant cultural differences (language, customs and formal and informal communication symbols) (Patterson, 2004).

In many cases, services are consumed at the same time that they are produced. Such "simultaneity" means that service firms naturally have continuous opportunities to contact customers, whereas manufacturers are relatively isolated from end users by a channel consisting of some combination of distributors, wholesalers and retailers (Fitzsimmons and Fitzsimmons, 2010). The limited separability of the stages of production and consumption will also allow customers to participate more easily in the business process as critical evaluators and informants, even in overseas markets. Thus, foreign branches or subsidiaries of service firms are expected to acquire a larger variety of knowledge on, for example, customer preferences and competing products, and to transfer it to the parent company, who can then attempt to incorporate it in the design of a new (service) product. By contrast, it may be more challenging or time consuming to acquire knowledge for new process technologies or organizational practices, through which the product is developed and circulated, from customers, and then apply them to the transformation of a firm's own processes and organizational structures.

In addition, many intangible services are actually offered in combination with tangible goods (Sasser et al., 1978). Offering new goods (e.g., a vegetable burger or an anti-lock brake) through current processes (at a fast-food restaurant chain or at an auto repair shop) is often considered product innovation in the service sector. The effect of internationalization-or overseas sales-on understanding and identifying new ways of increasing customer satisfaction and creating new market space would thus be more conspicuous in case of product-rather than process or organizational-innovation. Even when services are not much associated with physically tangible goods, combining a new product (i.e., the

deliverable to the customer) with a current process might be easier than transforming both product and process or introducing a new process for a same product. As a convenient example, a management consultancy that is successfully expanding overseas businesses can combine its experiences in various markets to develop a new (service) product for a domestic client-for example, strategy-making for a fast-growing venture that has just begun to seek market opportunities in a specific foreign country or region. The consultancy can offer that new product without new arrangements or configurations of its processes or organizational structures. This is because it can still be done in the traditional manner, by conducting a consulting project using newly acquired information and knowledge of the specific market. When the consultancy recognizes that it lacks certain talent for the new project, it can seek and hire external expertise rather than reconfiguring its work processes or organizational practices. While this may be too simple an example, it demonstrates a general possibility that an internationalizing service firm's efforts to exploit newly-acquired local knowledge are likely to contribute more to product innovation-at least more quickly-than to process or organizational innovation. From this, our fourth hypothesis follows:

H4: Internationalization of a service firm will make a greater impact on product innovation than on process or organizational innovation.

III. Method

1. Sample and Data

The Organization for Economic Co-operation and Development (OECD) suggested a guideline (called the "Oslo Manual") that helps to identify, measure, collect and interpret the data on product, process and organizational innovations, so that each country can standardize the measurement of each type of innovation, to make it easier to compare data internationally (OECD, 2005). Korea Science and Technology Policy Institute (STEPI), adopted this manual, developed its own method to survey Korean companies. Every third year, STEPI undertakes an annual survey, known as Korean Innovation Survey (KIS), to monitor the innovation activities by the manufacturing and service sectors, respectively. Since STEPI's surveys are backed by the government, the response rates are normally higher than those of other surveys initiated by private institutions. In 2006, the response rate was 60.9%. Our dataset is based entirely on KIS 2006 (STEPI, 2006).[3] Our final sample comprised 2,023 service firms, which belonged

to 20 different service industries, classified by the three-digit Korean Standard Industry Classification (KSIC) codes.

Table 1 shows that high-technology-linked industries tend to engage in more foreign business activities than other industries do. While "software consultancy

Table 1. Distribution of Sample Firms by Industry

KSIC Code	Industry	Total		Firms with Overseas Sales	
		No.	(%)[1]	No.	(%)[2]
510	Wholesale trade and commission trade	315	(15.6)	64	(20.3)
601	Land transport; Transport via pipelines	175	(8.7)	5	(2.9)
610	Water transport	110	(5.4)	31	(28.2)
620	Air transport	17	(0.8)	7	(41.2)
631	Supporting and auxiliary transport activities; Activities of travel agencies	192	(9.5)	31	(16.1)
640	Posts and telecommunications	52	(2.6)	1	(1.9)
650	Financial intermediation (except for insurance and pensions)	103	(5.1)	3	(2.9)
660	Insurance and pensions	53	(2.6)	0	(0.0)
670	Activities auxiliary to financial intermediation	51	(2.5)	0	(0.0)
721	Computer and related activities	70	(3.5)	8	(11.4)
722	Software consultancy and supply	177	(8.7)	42	(23.7)
730	Research and development	31	(1.5)	10	(32.3)
741	Legal and accounting services	119	(5.9)	10	(8.4)
742	Market research and management consultancy	27	(1.3)	2	(7.4)
743	Architectural, engineering, and technical services	226	(11.2)	15	(6.6)
744	Science and technology services	23	(1.1)	4	(17.4)
745	Advertising	77	(3.8)	6	(7.8)
746	Design services	18	(0.9)	1	(5.6)
749	Other engineering and technical services	95	(4.7)	10	(10.5)
871	Motion pictures and broadcasting	92	(4.5)	6	(6.5)
Total		2,023	(100.0)	256	(12.7)

[1] Percentage of firms in each industry from the entire sample.
[2] Percentage of firms with overseas sales from the total number of firms in each industry.
Source: STEPI (2006).

[3] This is the latest survey for the service industry of which raw data is made available to the public by the STEPI.

and supply" firms made up 8.7% of the total sample, 23.7% of the firms in this industry provided services to foreign countries. Further, although the firms categorized under "research and development" were only 1.5% of the sample, of those companies, 32.3% were engaged in foreign business activities. This high tendency to international expansion, despite the relatively small sample size, was also found in "science and technology services" firms, where 17.4%

Table 2. Definition and Examples of Innovation Activities

	Definition	Examples
Product Innovation	Services that are either new or significantly improved in their fundamental characteristics, or their technical specifications, in their incorporated software or other immaterial components, in their intended use, or user friendliness, and which lead to an increase in the firms' turnover	• Caller display on the phone or call waiting in telecommunication • Publication of a new customer catalogue on compact disc in wholesaling industry • Introduction of trailers with eight globe-shaped containers instead of the usual four in road transport companies • Introduction of new multimedia software applications that can be used for educational purposes in software consultancy companies • A new method of purifying water abstracted from lakes for use as household drinking water in technical consultancy companies
Process Innovation	A new or significantly improved production technology, new or significantly improve methods of supplying services and delivering products which importantly contribute to an increase in productivity	• Introduction of an intelligent network in telecommunication • New data processing system to sort customer information in wholesaling industry • A new computer mapping system, used by drivers to work out the fastest delivery route in road transport companies • Developing software applications through computer-aided design (CAD) in software consultancy companies • The development of a standard for construction work carried out in already densely built-up areas in technical consultancy companies
Organizational Innovation	The introduction of new methods or the significant improvement of existing methods, in terms of methods of working, organizing, and creating external cooperation networks. It contributes to the increase in the effectiveness and efficiency of firms' internal capabilities	• Significant changes in internal knowledge sharing • Introduction of new organizational hierarchies • Strengthening of external cooperation or the increasing of outsourcing

Source: STEPI (2006) provides the definitions of three types of innovations based on OECD (2005) ([Gallouj and Weinstein (1997) also categorized innovations into these three areas]. Examples of product and process innovation are directly from OECD (2005) and those of organizational innovation from STEPI (2006).

of the firms were involved in foreign business activities. By contrast, although the firms that provided financial services accounted for a considerable proportion of the total sample, their participation in international expansion was relatively trivial-only 3 out of 207 firms engaged in foreign business transactions.

The definitions and examples of each innovation provided by KIS are shown in Table 2. Table 3 presents the number of firms in our sample that conducted product, process or organizational innovation in KIS 2006. From the total of 2,023 firms, 15.2% (307 firms) introduced one or more significantly improved products into the market, 11.8% (238 firms) improved methods of supplying services and delivering products, and 28.4% (574 firms) introduced novel methods, or considerably improved extant methods of working and/or organizing, to enhance their internal capabilities by adopting new types of organizational

Table 3. Innovation Activities by Industry

Industry	Product Innovation		Process Innovation		Organizational Innovation	
	No.	(%)	No.	(%)	No.	(%)
Wholesale trade and commission trade	32	(10.2)	42	(13.3)	82	(26.0)
Land transport; Transport via pipelines	5	(2.9)	9	(5.1)	19	(10.9)
Water transport	1	(0.9)	2	(1.8)	17	(15.5)
Air transport	3	(17.6)	2	(11.8)	4	(23.5)
Supporting and auxiliary transport activities; Activities of travel agencies	12	(6.3)	13	(6.8)	41	(21.4)
Posts and telecommunications	14	(26.9)	7	(13.5)	22	(42.3)
Financial intermediation (except for insurance and pensions)	17	(16.5)	12	(11.7)	42	(40.8)
Insurance and pensions	2	(3.8)	3	(5.7)	13	(24.5)
Activities auxiliary to financial intermediation	8	(15.7)	4	(7.8)	13	(25.5)
Computer and related activities	27	(38.6)	16	(22.9)	29	(41.4)
Software consultancy and supply	85	(48.0)	39	(22.0)	85	(48.0)
Research and development	14	(45.2)	4	(12.9)	14	(45.2)
Legal and accounting services	5	(4.2)	9	(7.6)	11	(9.2)
Market research and management consultancy	7	(25.9)	3	(11.1)	13	(48.1)
Architectural, engineering, and technical services	36	(15.9)	30	(13.3)	67	(29.6)
Science and technology services	8	(34.8)	5	(21.7)	9	(39.1)
Advertising	5	(6.5)	5	(6.5)	18	(23.4)
Design services	2	(11.1)	3	(16.7)	5	(27.8)
Other engineering and technical services	13	(13.7)	12	(12.6)	35	(36.8)
Motion pictures and broadcasting	11	(12.0)	18	(19.6)	35	(38.0)
Total	307	(15.2)	238	(11.8)	574	(28.4)

Source: STEPI (2006).

structures and creating external cooperation networks.

In all service industries, organizational innovations were observed more frequently than product and process innovations. More than 40% of the surveyed firms in the following six industries reported organizational innovations: "market research and management consultancy" (48.1%), "research and development" (45.2%), "software consultancy and supply" (48.0%), "posts and telecommunications" (42.3%), "computer and related activities" (41.4%), and "financial intermediation" (40.8%). Many high-technology-related service firms indicated that they had successfully brought product innovation into the market. Specifically, 48.0% "software consultancy and supply" firms, 45.2% "research and development" firms, 38.6% "computer and related activities" firms, and 34.8% "science and technology services" firms were reported as having conducted effective product innovation. The firms in these industries also provided that they were actively upgrading their service processes by improving the quality of their service delivery and the responsiveness to consumer needs. The percentage of high-technology-based firms was relatively higher (12.9-22.9%) than that of the other industries.

2. Variables

Independent variable. KIS respondents are required to report the ratio of overseas sales to the total sales. When a company reported this ratio to be greater than 0%, we regarded this company as having engaged in foreign business activities via internationalizing modes such as exporting, licensing, and FDI. This measure captures whether or not the focal firm sold to foreign markets in a given year. Our independent variable takes the value 1 if a firm reports overseas sales, 0 otherwise. We consider entry into a foreign market by a service company to be a significant step forward. Use of a dummy variable to measure the internationalization rather than a ratio is therefore appropriate. The innovation data as a whole was collected at the binary level, so the dummy independent variable was considered as being more consistent with dependent variables. Using a binary variable to measure foreign business activities in model specifications has been quite common, as shown by Salomon and Shaver (2005) and Patterson (2004). Because knowledge needs time to filter back to the focal firm and be incorporated in their innovation activities, the benefit of internationalization may not be realized until a future time (Salomon and Shaver, 2005). For this reason, we employed overseas sales data in 2003 to measure the internationalization variable for comparison with the innovation data during

the subsequent period of 2003-2005, in order to allow for the time lag between internationalization and innovation. It is supposed that the internationalization activities undertaken in 2003 take an effect of generating innovation in that and consequent years over the period of 2003-2005.

Dependent variables. Although it is plausible to quantify innovative activities, for example, by the reported number of new and modified product, process and organizational innovation activities realized in given years, it has been noted that reporting of innovation may be subjectively biased, because self-reported values may be based on subjective assessments (Archibugi and Pianta, 1996). To avoid this problem, we used a binary variable to indicate each innovation. The innovation variables in KIS were also indicated on a binary scale.

When a service company successfully introduced product, process or organizational innovations, it was assigned dummy value 1 for each innovative activity respectively, otherwise 0. Dummy variables representing innovation performance have also been used in prior studies (e.g., Frenz et al., 2005). If a service firm gave at least one positive answer to questions which asked if the company developed goods or services that are new or significantly improved in their fundamental characteristics of their technical specifications, in their incorporated software or other immaterial components, or in their intended use or user friendliness, the service firm was regarded to have carried out product innovation. In a similar manner, a service firm that introduced a new or significantly improved production technology (i.e., new or significantly improved methods of supplying services and delivering products in such ways as ERP or automated production) was considered to have performed process innovation. Finally, if a service firm adopted a new method or significantly improved existing method of working, organizing and creating external cooperation networks, it was treated as undergoing organizational innovation.

Control variables. To capture industry effects, we included six dummy variables: “science, technology and design” for firms whose three-digit KSIC codes were 730, 743, 744, 746 and 749; “telecommunications, computer and software” for KSIC codes 640, 721 and 722; “commercial business” for KSIC codes 741, 742 and 745; “distribution” for KSIC code 510; “transportation” for KSIC codes 601, 610, 620 and 631; and “financial services” for KSIC codes 650, 660 and 670. We attempted to estimate the role of external and internal stakeholders in the promotion of various types of innovations. For this, we employed the following variables: “shareholdings of foreign investors,” “R&D workforce ratio,” and “postgraduate workforce ratio.” In addition, we extracted

other dummy variables that may influence the innovation activities of service firms. If the service firm enhanced its internal capabilities and acquired knowledge as a result of the contribution of external partners such as affiliated companies, competitors in the same industry, clients, suppliers, or IT-service organizations (Moon, 2011), the dummy variable corresponding to each relationship takes the value of 1, and 0 otherwise. Finally, we controlled a firms' adoption of measures for protecting innovation output (Päällysaho and Kuusisto, 2011). If a firm made use of methods to protect their inventions or innovations such as acquisition of patents, the dummy variable "innovation protection" takes the value of 1. Otherwise, it takes a value of 0.

3. Empirical Model

To estimate the impact of the internationalization of service firms on their product, process and organizational innovations, respectively, we use the method of Generalized Estimating Equations (GEE). A GEE is a sub-model of Generalized Linear Model (GLM), but has been shown to exhibit superior results to GLM when an empirical analysis includes many explanatory variables (Zorn, 2001). The GEE method has been widely used in many statistical applications, when the classical assumption of normality and independence among variables is violated. When too many dichotomous variables are taken into account in model specifications, the assumption of normality is disrupted, while that of independence is not accomplished with repeated measurements (Ziegler, 2011). To overcome this problem, GEE has been utilized in many analyses by displaying excellent explanatory power for model specifications that employ numerous binary (dummy) independent, dependent and control variables that tend to be highly correlated (Park and Shin, 1999). Since our model specification includes many binary variables, GEE can be an alternative empirical model that improves explanatory power in our analysis. The GEE is derived using the following formula in econometric terms to estimate regression coefficients β (Liang and Zeger, 1986).

$$U(\beta) = \sum_{i=1}^{N} \frac{\partial \mu_{ij}}{\partial \beta_k} V_i^{-1} Y_i - \mu_i(\beta)$$

where μ_{ij}, *Vi*, and *Yi* denote mean of each observation, variance between the observations as a function of mean, and each observation, respectively.

We constructed two model specifications for each of the three different types

of innovation, totaling six GEE regressions. In the first model specification, we entered only control variables to investigate their effects on innovation. Then, we added independent variable capturing internationalization of services firms.

IV. Results

Table 4 presents means and standard deviations with a correlation matrix for the variables included in our specifications. Table 5 shows the results of regressions on the three types of innovations.

In Model 1 of Table 5, several control variables were found to have positive impacts on the product innovation. The service firms with the higher research and development (R&D) workforce ratios were more likely to perform product innovation (r=0.02, W=25.96, p<.01). External contributions from clients (r=0.77, W=15.96, p<.01) and IT service organizations (r=1.26, W=37.78, p<.01) had positive effects on product innovation. Innovation protection that captures the efforts of firms to protect their product innovation was also significant and positive (r=3.14, W=42.85, p<.01).

In Model 2, our main independent variable indicating whether or not a service firm had any overseas sales in 2003 had a significantly positive relation to product innovation (r=0.47, W=3.86, p<.05). This may imply that internationalized service firms may have an opportunity to acquire new knowledge on the market and technology from abroad and apply such input to innovation of their service products, lending support to H1. A Quasi Likelihood under Independence Model Criterion (QIC)[4] test for the overall model fit indicated that a variety of independent and control variables significantly improves the fit of the model at the 1% significance level. By adding the independent variable of internationalization into Model 2, we observed the better fit with the model, as the QIC in Model 2 (1,226.62) has a smaller value than that in Model 1 (1,228.68).

The coefficients for process innovation are presented in Models 3 and 4 of Table 5. Although the coefficient of the independent variable measuring a firm's overseas revenue generation in Model 4 was larger than zero (r=.30), the association was not statistically significant. This result fails to support H2. It may be that process innovation is much harder to achieve via internationalization

[4] QIC (Quasi Likelihood under the Independence Model Criterion) statistic is used to show goodness of model fit by finding an acceptable working correlation structure for a given GEE model (Hardin and Hilbe, 2003). A smaller QIC value indicates stronger model fit compared with other model specifications.

than product innovation, because process innovation requires a service firm to transform its service provision logistics in a much more fundamental way (Finger, 2007). Positive relationships with the external networks of clients (r=.38, W=3.38, p<.1 in Model 4) and IT service organizations (r=.94, W=17.72, p<.01) were found in the regressions for process innovation as well. The external network of supplier also had a significantly positive association with process innovation (r=.55, W=6.42, p<.05). The QIC tests show an overall fit with Model 3 and 4 specifications.

Models 5 and 6 in Table 5 display the regression coefficients for organizational innovation. The existence of overseas sales in 2003 had a significantly positive relationship with organizational innovation (r=.38, W=4.48, p<.05 in Model 2), in line with H3. All the dummy variables that aimed to capture the effects of external contributions presented strong and significant relationships with organizational innovation. Service firms gaining new knowledge from IT-service organizations were more likely to bring about organizational innovations than those that had never benefitted from organizations of this kind (r=1.29, W=72.45, p<.01). Firms supported by affiliated companies tended to introduce more organizational innovations as compared to the rest of the firms (r=.82, W=14.53, p<.01). External networks with clients (r=.24, W=2.89, p<.1) and suppliers (r=.32, W=4.09, p<.05), through which knowledge is transmitted and sourced, were found to contribute significantly to organizational learning and improvement. When a firm attempted to learn from its competitors, it also had a positive effect on the introduction of organizational innovations (r=0.39, W=8.06, p<.01). External contributions appeared to more strongly effect organizational innovation, compared to the other types of innovations. In addition, innovation protection was also found to have a strongly positive relationship with organizational innovation (r=1.26, W=11.92, p<.01). The results in Models 5 and 6 indicate good model fit.

Table 4. Descriptive Statistics and Correlations

	Mean	SD	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1. Product innovation	0.15	0.35	1																	
2. Process innovation	0.11	0.32	0.39	1																
3. Organizational innovation	0.31	0.46	0.40	0.32	1															
4. Science, technology, and design industry	0.19	0.39	0.04	0.03	0.30	1														
5. Telecommunications, computer, and software industry	0.14	0.35	0.31	0.11	0.17	-0.20	1													
6. Commercial business Industry	0.11	0.31	-0.07	-0.04	-0.06	-0.17	-0.14	1												
7. Distribution industry	0.15	0.36	-0.06	0.21	-0.01	-0.21	-0.17	-0.15	1											
8. Transportation industry	0.24	0.42	-0.17	-0.11	-0.16	-0.27	-0.23	-0.20	-0.24	1										
9. Financial services industry	0.10	0.30	-0.20	-0.02	0.02	-0.16	-0.14	-0.11	-0.14	-0.19	1									

Table 4. Continued

	Mean	SD	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
10. Foreign shareholdings (%)	3.35	24.54	0.00	-0.01	0.04	-0.04	0.02	-0.01	0.04	-0.02	0.04	1								
11. R&D workforce ratio (%)	5.26	14.95	0.31	0.12	0.19	0.13	0.33	-0.07	-0.06	-0.19	-0.10	0.07	1							
12. Postgraduate workforce ratio (%)	6.87	14.02	0.11	0.02	0.11	0.18	0.05	0.07	-0.06	-0.20	0.02	0.05	0.30	1						
13. Affiliated companies	0.07	0.26	0.10	0.11	0.21	-0.06	0.02	-0.05	-0.00	-0.04	0.12	0.16	0.01	0.04	1					
14. Competitors	0.37	0.48	0.21	0.19	0.25	0.02	0.08	-0.03	-0.05	-0.06	0.02	-0.02	0.03	0.03	0.16	1				
15. Clients	0.39	0.49	0.27	0.20	0.26	0.04	0.15	-0.01	-0.05	-0.13	0.02	0.03	0.11	0.03	0.16	0.60	1			
16. Suppliers	0.21	0.40	0.27	0.27	0.31	0.03	0.13	-0.08	0.01	-0.11	-0.01	0.00	0.12	0.06	0.20	0.40	0.45	1		
17. IT service organizations	0.21	0.41	0.35	0.29	0.40	-0.02	0.21	-0.09	-0.06	-0.11	0.06	0.02	0.13	0.07	0.27	0.36	0.38	0.57	1	
18. Protection measures	0.03	0.17	0.35	0.22	0.19	0.04	0.16	-0.06	-0.00	-0.10	-0.02	0.09	0.16	0.05	0.06	0.12	0.13	0.15	0.15	1
19. Whether a firm had overseas sales in 2003	0.11	0.31	0.10	0.07	0.09	-0.05	0.03	-0.03	0.10	0.05	-0.10	0.15	0.09	0.06	0.09	0.04	0.06	0.05	0.08	0.12

Note: Correlations greater than .55 and .44 are significant at the 1% and 5% levels, respectively; N = 2,023.

Table 5. GEE Regression Results on Innovation

	Product innovation		Process innovation		Organizational innovation	
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Industry conirols						
Science, technology, and design industry	0.46(1.52)	0.47(1.56)	-0.25(0.52)	-0.25(0.53)	-0.39(2.03)	-0.39(2.01)
Telecommunications, computer, and software industry	1.21(10.78)***	1.19(10.55)***	-0.33(0.94)	-0.34(1.02)	-0.22(0.61)	-0.23(0.64)
Commercial business industry	0.01(0.00)	0.00(0.00)	-0.51(1.68)	-0.52(1.72)	-0.64(4.58)**	-0.65(4.67)**
Distribution industry	0.12(0.10)	0.03(0.00)	-0.08(0.06)	-0.14(0.16)	-0.33(1.42)	-0.37(1.82)
Transportation industry	-0.46(1.29)	-0.53(1.74)	-0.98(7.51)***	-1.02(8.09)***	-0.93(11.46)***	-0.98(12.67)***
Financial services industry	0.21(0.28)	0.24(0.36)	-0.75(3.90)**	-0.74(3.75)*	-0.41(1.95)	-0.38(1.71)
External and internal stakeholders						
Foreign shareholdings	-0.01(7.49)***	-0.01(9.21)***	-0.00(1.85)	-0.00(2.16)	-0.00(0.00)	-0.00(0.12)
R&D workforce ratio	0.02(25.96)***	0.02(25.40)***	0.01(5.30)**	0.10(4.81)**	0.01(10.62)***	0.01(9.70)***
Postgraduate workforce ratio	0.00(0.52)	0.00(0.39)	-0.00(1.56)	-0.00(1.70)	0.00(2.84)*	0.00(2.34)
External contribution from outside partners						
Affiliated companies	0.18(0.46)	0.15(0.34)	0.33(1.59)	0.31(1.43)	0.84(15.41)***	0.82(14.53)***
Competitors	0.17(0.82)	0.17(0.87)	0.29(2.15)	0.29(2.16)	0.39(8.04)***	0.39(8.06)***

Table 5. Continued

	Product innovation		Process innovation		Organizational innovation	
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Clients	0.77(15.96)***	0.75(15.20)***	0.39(3.53)*	0.38(3.38)*	0.25(3.18)*	0.24(2.89)*
Suppliers	0.10(0.23)	0.10(0.23)	0.54(6.30)**	0.55(6.42)**	0.31(3.91)**	0.32(4.09)**
IT service organizations	1.26(37.78)***	1.25(36.74)***	0.95(18.25)***	0.94(17.72)***	1.30(74.47)***	1.29(72.45)***
Innovation protection						
Protection measures	3.14(42.85)***	3.08(39.30)***	1.40(18.56)***	1.35(17.47)***	1.33(13.34)***	1.26(11.92)***
Independent variable						
Whether a firm had overseas sales in 2003		0.47(3.86)**		0.30(1.86)		0.38(4.48)**
Goodness of model fit						
Quasi Likelihood under Independence Model Criterion (QIC)	1,228.68***	1,226.62***	1,258.00***	1,258.26***	2,074.49***	2,072.09***
Corrected Quasi Likelihood under Independence Model Criterion (QICC)	1,227.52***	1,225.33***	1,256.55***	1,256.71***	2,074.36***	2,071.72***

Note: Wald statistics in parentheses. ***, **, and * denote significances at the 1%, 5%, and 10% levels, respectively; N = 2,023.

We also hypothesized that internationalization would have a greater impact on product innovation than on process or organizational innovation in service firms. In order to identify the possibly larger impact of internationalization on product innovation, we compared the magnitude of the estimate for each type of innovation. Since we have already found no evidence that internationalization promotes process innovation, comparing the magnitude of our estimates is meaningful only with respect to product and organizational innovations. The estimates of the two significant independent variables in Tables 5 had significantly greater values with regard to product innovation (0.47) than to organizational innovation (0.38) for the overseas sales dummy. This observation is in line with H4. Furthermore, the QIC statistic of product innovation regressions (1228.68 and 1226.62) is smaller than those of process (1258.08 and 1258.25) and organizational (2074.49 and 2072.09) innovations, which indicates that GEE model fit is much stronger for product innovation compared to those for process and organizational innovation.

V. Conclusion

In this paper, we began with the implicit conjecture that the features of the service industry-relative to the manufacturing sector-can be applied to and may even strengthen the relationship between international expansion and innovation of service firms. Accumulated information about markets and technology acquired through international expansion is expected to be assimilated into various functions within the organization. A higher level of knowledge spillover and a greater tendency to sourcing knowledge from external parties can also promote innovation in a firm pursuing expansion in foreign countries. In a large sample from Korea, we found a significantly positive association between a service firm's international expansion and its product and organizational innovations. However, our data did not support the hypothesis regarding a relationship between internationalization and process innovation.

The findings of this study may be further refined through continuing research endeavors. The current study can be taken further by extending investigations into the possible reverse causality of innovation on internationalization, as well as on the bi-directional impacts between these two variables (for a relevant study of manufacturing firms, see Filipescu et al., 2009), controlling relevant variables in the international business context. The endogeneity embedded in the internationalization variable has to be controlled to clarify more accurate

relationship between internationalization and innovation. The use of panel data can extend time lag between the two variables and solve the concern of endogeneity. Considering the differences between the different types of firms in the service industry (e.g., supplier dominated, specialized supplier and science-based, scale-intensive physical network-based, and scale-intensive information network-based firms (Miozzo and Soete, 2001)), a more concrete insight regarding the internationalization of the service sector can be provided. Development and operationalization of scale-based measures-in addition to the dummies-for the degree of internationalization and innovation would also enhance the reliability and validity of the empirical evidence. Ongoing research should attempt to integrate more comprehensive theoretical concepts derived from various perspectives and aim to clarify the empirical relationship between international expansion and innovation in both manufacturing and service sectors.

References

Archibugi, D. and M. Pianta. 1996. "Measuring Technological Change through Patents and Innovation Surveys," *Technovation*, vol. 16, no. 9, pp. 451-468.

Avlonitis, G., Papastathopoulou, P. and S. Gournaris. 2001. "An Empirically-Based Typology of Product Innovativeness for New Financial Services: Success and Failure Scenarios," *Journal of Product Innovation Management*, vol. 18, no. 5, pp. 324-342.

Bouquet, C., Hebert, L. and A. Delios. 2004. "Foreign Expansion in Service Industries: Separability and Human Capital Intensity," *Journal of Business Research*, vol. 57, no. 1, pp. 35-46.

Burpitt, W. J. and D. A. Rondinelli. 2000. "Small Firms' Motivations for Exporting: To Earn and Learn?," *Journal of Small Business Management*, vol. 38, no. 4, pp. 1-14.

Campbell, A. J. and A. Verbeke. 1994. "The Globalization of Service Multinationals," *Long Range Planning*, vol. 27, no. 2, pp. 95-102.

Capar, N. and M. Kotabe. 2003. "The Relationship between International Diversification and Performance in Service Firms," *Journal of International Business Studies*, vol. 34, no. 4, pp. 345-355.

Cassiman, B. and E. Martinez-Ros. 2007. "Product innovation and Exports," IESE working paper, mimeo.

Castellani, D. and A. Zanfei. 2007. "Internationalization, Innovation and Productivity:

How Do Firms Differ in Italy?," *World Economy*, vol. 30, no. 1. pp. 156-176.

Cavagnoli, D. 2011. "A conceptual framework for innovation: An Application to Human Resource Management Policies in Australia," *Innovation: Management, Policy & Practice*, vol. 13, no. 1, pp. 111-125.

Clerides, S. K., Lach, S. and J. R. Tybout. 1998. "Is Learning by Exporting Important? Micro-dynamic evidence from Colombia, Mexico and Morocco," *Quarterly Journal of Economics*, vol. 113, no. 3, pp. 903-948.

Coviello, N. E. and H. J. Munro. 1997. "Network Relationships and the Internationalization Process of Small Software Firms," *International Business Review*, vol. 6, no. 4, pp. 361-386.

Craig, C. S. and S. P. Douglas. 1996. "Developing Strategies for Global Markets: An Evolutionary Perspective," *Columbia Journal of World Business*, vol. 31, no. 1, pp. 70-81.

Drejer, I. 2004. "Identifying Innovations in Surveys of Services: A Schumpeterian Perspective," *Research Policy*, vol. 33, no. 3, pp. 551-562.

Eriksson, K., Johanson, J., Majkgard, A. and D. D. Sharma. 2000. "Effect of Variation on Knowledge Accumulation in the Internationalization Process," *International Studies of Management and Organization*, vol. 30, no. 1, pp. 26-44.

Erramilli, M. K. and C. P. Rao. 1993. "Service Firms' International Entry-Mode Choice: A Modified Transaction-Cost Analysis Approach," *Journal of Marketing*, vol. 57, no. 3. pp. 19-38.

Evenson, R. E. and L. E. Westphal. 1995. "Technological Change and Technology Strategy," In Berhman J. and T. N. Srinvasan. (eds.) Handbook of Development Economics. vol. 3A, Amsterdam: North-Holland. pp. 2209-2299.

Filipescu, D., Rialp, A. and J. Rialp. 2009. "Internationalization and Technological Innovation: Empirical Evidence on Their Mutual Relationship." Advances in International Marketing, vol. 20, pp. 125-154.

Filippetti, A., Frenze, M. and G. letto-Gillies. 2009. "Is the innovation performance of countries related to their internationalization?," Brussels: European Commission.

Finger, M. 2007. "Innovation in the Network Industries," *Network Industries Quarterly*, vol. 9, no. 1, pp. 3-4.

Fitzsimmons, J. A. and M. J. Fitzsimmons. 2010. Service Management: Operations, Strategy, and Information Technology(7th edition). New York: McGraw-Hill.

Frenz, M., Girardoneb, C. and G. Ietto-Gillies. 2005. "Multinationality Matters

in Innovation: The Case of the UK Financial Services," *Industry and Innovation*, vol. 12, no. 1, pp. 65-92.
Gallouj, F. and O. Weinstein. 1997. "Innovation in Services," *Research Policy*, vol. 26, no. 4/5, pp. 537-556.
Goerzen, A. and S. Makino, 2007. "Multinational Corporation Internationalization in the Service Sector: A Study of Japanese Trading Companies," *Journal of International Business Studies*, vol. 38, no. 7, pp. 1149-1169 .
Grant, R. 1996. "Prospering in Dynamically-Competitive Environments: Organizational Capability as Knowledge Integration," *Organization Science*, vol. 7, no. 4, pp. 375-387.
Grossman, G. M. and E. Helpman. 1991. "Trade, Knowledge Spillovers, and Growth," NBER Working Paper No. 3485.
Grossman, G. M. and E. Helpman. 1993. Innovation and Growth in the Global Economy. Cambridge, MA: MIT Press.
Hardin, J. and J. Hilbe. 2003. Generalized Estimating Equations. Boca Raton, FL: Chapman and Hall.
Hitt, M. A., Hoskisson, R. E. and H. Kim. 1997. "International Diversification: Effects on Innovation and Firm Performance in Product-Diversified Firms," *Academy of Management Journal*, vol. 40, no. 4, pp. 767-798.
Ietto-Gillies, G. 2002. "Internationalization and the Demarcation between Services and Manufactures: A Theoretical and Empirical Analysis," In Miozzo, M. and I. Miles. (eds.) Internationalization, Technology and Services. Cheltenham, UK: Edward Elgar. pp. 33-56.
Knight, G. A. and S. T. Cavusgil. 2004. "Innovation, Organizational Capabilities, and the Born-global Firm," *Journal of International Business Studies*, vol. 35, no. 2, pp. 124-141.
Lancaster, K. J. 1966. "A New Approach to Consumer Theory," *Journal of Political Economy*, vol. 74, no. 2, pp. 132-157.
Liang, K. and S. Zeger. 1986. "Longitudinal Data Analysis Using Generalized Linear Models," *Biometrika*, vol. 73, no. 1, pp. 13-22.
Lopez, R. A. 2005. "Trade and Growth: Reconciling the macroeconomic and microeconomic evidence," *Journal of Economic Surveys*, vol. 19, no. 4, pp. 623-648.
Melitz, M. J. 2003. "The Impact of Trade on Intra-Industry Reallocations and Aggregate Industry Productivity," *Econometrica*, vol. 71, no. 6, pp. 1695-1725.
Miles, I. 1999. "Foresight and Services: Closing the Gap?," *Service Industries Journal*, vol. 19, no. 2, pp. 1-27.
Miozzo, M. and I. Miles. 2002. "The Relation between the Internationalization

of Services and the Process of Innovation: A Research Agenda," In Miozzo, M. and I. Miles. (eds.) Internationalization, Technology and Services. Cheltenham, UK: Edward Elgar. pp. 15-32.

Miozzo, M. and L. Soete. 2001. "Internationalization of Services: A Technological Perspective," *Technological Forecasting and Social Change*, vol. 67, no. 2-3, pp. 159-185.

Moon, S. 2011. "What Determines the Openness of a Firm to External Knowledge? Evidence from the Korean Service Sector," *Asian Journal of Technology Innovation*, vol. 19, no. 2, pp. 185-200.

Nakata, C. and K. Sivakumar. 1996. "National Culture and New Product Development: An Integrative Review," *Journal of Marketing*, vol. 60, no. 1, pp. 61-72.

OECD (Organization for Economic Co-operation and Development). 2005. Oslo Manual: Guidelines for Collecting and Interpreting Innovation Data (3rd Edition).

Päällysaho, S. and J. Kuusisto. 2011. "Informal Ways to Protect Intellectual Property (IP) In KIBS Businesses," *Innovation: Management, Policy & Practice*, vol. 13, no. 1, pp. 62-76.

Park, T. and D. Shin. 1999. "On the Use of Working Correlation Matrices in the GEE Approach for Longitudinal Data," *Communications in Statistics - Simulation and Computation*, vol. 28, no. 4, pp. 1011-1029.

Patterson, P. G. 2004. "A Study of Perceptions Regarding Service Firms' Attitudes towards Exporting," *Australian Marketing Journal*, vol. 12, no. 2, pp. 19-38.

Prashantham, S. 2005. "Toward A Knowledge-Based Conceptualization of Internationalization," *Journal of International Entrepreneurship*, vol. 3, no. 1, pp. 37-52.

Salomon, R. M. 2006. "Spillovers to Foreign Market Participants: Assessing the Impact of Export Strategies on Innovative Productivity," *Strategic Organization*, vol. 4, no. 2, pp. 135-164.

Salomon, R. M and B. Jin. 2008. "Does Knowledge Spill to Leaders Or Laggards? Exploring Industry Heterogeneity in Learning by Exporting," *Journal of International Business Studies*, vol. 39, no. 1, pp. 132-150.

Salomon, R. M. and J. M. Shaver. 2005. "Learning by Exporting: New Insights from Examining Firm Innovation," *Journal of Economics and Management Strategy*, vol. 14, no. 2, pp. 431-460.

Sasser, W. E., Olsen, R. P. and D. D. Wyckoff. 1978. Management of Service Operations: Text, Cases and Readings. Boston, MA: Allyn and Bacon.

Shaver, J. M. 2006. "Interpreting Empirical Findings," *Journal of International*

Business Studies, vol. 37, no. 4, pp. 451-452.
STEPI (Science and Technology Policy Institute). 2006. Korean Innovation Survey.
Sung, T. K. 2010. "Comparison of Determinants for Standards Activities of Korean Firms in Manufacturing and Service Sectors," *Asian Journal of Technology Innovation*, vol. 18, no. 2, pp. 69-87.
Toivonen, M. and T. Tuominen. 2009. "Emergence of Innovations in Services," *Service Industries Journal*, vol. 29, no. 7, pp. 887-902.
Trofimenko, N. 2008. "Learning by Exporting: Does It Matter Where One Learns? Evidence from Colombian Manufacturing Firms," *Economic Development and Cultural Change*, vol. 56, no. 4, pp. 871-885.
UNCTAD (United Nations Conference on Trade and Development). 2008. World Investment Report: Transnational Corporations, and the Infrastructure Challenge.
Vernon, R. 1966. "International Investment and International Trade in the Product Cycle," *Quarterly Journal of Economics*, vol. 80, no. 2, pp. 190-207.
Vernon, R. 1979. "The Product Cycle Hypothesis in a New International Environment," *Oxford Bulletin of Economics and Statistics*, vol. 41, no. 4, pp. 255-268.
Vila, N. and I. Kuster. 2007. "The Importance of Innovation in International Textile Firms," *European Journal of Marketing*, vol. 41, no. 1/2, pp. 17-36.
Wang, C. L. and P. K. Ahmed. 2007. "Dynamic Capabilities: A Review and Research Agenda," *International Journal of Management Reviews*, vol. 9, no. 1, pp. 31-51.
Westhead, P., Wright, M. and D. Ucbasaran. 2001. "The Internationalization of New and Small Firms: A Resource-Based View," *Journal of Business Venturing*, vol. 16, no. 4, pp. 333-358.
Zahra, S. A. and G. George. 2002. "Absorptive Capacity: A Review, Reconceptualization, and Extension," *Academy of Management Review*, vol. 27, no. 2, pp. 185-203.
Zahra, S. A., Ireland, R. D. and M. A. Hitt. 2000. "International Expansion by New Venture Firms: International Diversity, Mode of Market Entry, Technological Learning, and Performance," *Academy of Management Journal*, vol. 43, no. 5, pp. 925-950.
Ziegler, A. 2011. Generalized Estimating Estimations. New York: Springer.
Zorn, C. 2001. "Generalized Estimating Equation Models for Correlated Data: A Review with Applications," *American Journal of Political Science*, vol. 45, no. 2, pp. 470-490.

About the Author

Jaeho Lee is Associate Professor at Department of International Business and Trade, Kyung Hee University, Korea. He holds a bachelor degree in economics from Seoul National University, an MSc in international accounting and finance from the London School of Economics, and a PhD in management from University of Cambridge. He has published in the *Journal of International Management, Pacific-Basin Finance Journal, and The Oxford Handbook of Venture Capital*. His current research include diverse topics in the areas of global business and venture capital investment.

Ji-Hwan Lee is an Associate Professor of strategic and international management at the College of Business, Korea Advanced Institute of Science and Technology (KAIST). He obtained his Ph.D. from London Business School and published articles in widely-known international business journals including Journal of World Business, International Business Review, and Corporate Governance: An International Review.

Baeho Choi, CFA is Assistant Manager at venture capital department, Korea Development Bank. He is an MS in management of technology and was educated in graduate school of industrial engineering, POSTECH. Korea. His main area of interest includes professional business service, service innovation and high-tech financing theory.

First version received on 4 November 2014
Peer-reviewed version received on 18 December 2014
Final version accepted on 26 December 2014