Exploring the Relationship between Service Innovation and New Product Performance: The Moderating Effect of Market Linking Capability and Market Turbulence

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Abstract--**Service innovation is significant in maintaining a firm's competitive advantage in an increasingly service-centered economy. Although there is a rich body of research on the role of service innovation in value creation for firms, little attention has been devoted to its effect on new product development. This study advances research on service innovation and market fit capabilities by examining how the capability of a service-based firm's market linking and market turbulence shapes the relationship between service innovation and new product performance. This study offers a theoretical framework that integrates both the resource-based view and market orientation perspectives of service innovation to investigate innovative service practices and activities that occur in contemporary service-based firms. Using an original dataset of 170 service-based firms from a service-centered economy, this study demonstrate that the combination of high market linking capability and high market turbulence are likely to strengthen new product development performance. Finally, the empirical results find that new product performance is highest in situations with high levels of service innovation, market linking, and market turbulence; therefore, the findings could support the proposed three-way interaction. Overall, these findings contribute to a better understanding of contexts in which service innovation represents an invisible specific asset or resource for service-based firms.**

I. INTRODUCTION

Over the past two decades, the development of the global economy has gradually shifted from the traditional production of goods toward a service-centered economy era. The service sector now dominates the development of the global economy [35]. In particular, more than 70% of the gross domestic product (GDP) of the global economy contributes by the service sector, which the innovation plays a crucial role in ensuring the creating economic activities [34]. Clearly, global economic activity is significantly dominated by the service sector, as it promotes the development of new services and enhancements through service innovation (SI) efforts. Given the growing importance of the service sector, the notion of SI is of central importance in the service sector. SI is cited as the primary source of value creation [28][32], especially in areas that involve creating value for customers via innovation [32] and increasing firm performance [30][29]. These studies have provided insights into the origins of SI and have thus offered useful guidance for service management practices.

SI is becoming a crucial issue for service-based sectors research and practice for several reasons. First, the global economy is transitioning from a traditional product-oriented economy to a service-based economy [9][38]. The majority of the economic growth of developing and developed countries is derived from service products and activities that continue contribute to the global economy [33]. Thus, service-based firms have recognized the changing shape of the economy and the need to foster novel service deploying alone their service value-added chain. Nevertheless, traditional innovation measurement studies are greatly dependent on research and development (R&D). The R&D consideration may not be satisfactory for service-based sectors because the innovation process also requires a number of non-R&D activities, such as new service offerings, servicizing human capital design and investment, the training of personnel, market research and investment in new production or service capacities. Second, traditional manufacturing firms are beginning to integrate or combine both products and service as "bundled offerings" to provide complete value-added service chain and thus increase their competitive advantages. This bundled offering is based on the notion of combining products, processes, and services to design and deliver new services and create value through service for customers and firms. Arguments based on SI have required the integration of customers, employees, suppliers and partners in the innovative service process to meet their needs [8][29]. Bundled offerings for service-based firms have clearly resulted in greater interest in promoting new service development and value creation to meet market needs. Third, given the emerging servicization era, many researchers postulate that the development of more competitiveness service offerings requires consideration of SI efforts in complex service environments [36]. In addition to this already complex external environment, service-based firms must continuously engage in innovative services to manage new products or services. As a consequence of the emergence of service-based firms and the servicizing of globalization markets, firms that engage in creating innovative services may create a number of opportunities that may promote the decline of commercialization and thus increase their performance. Thus, it is necessary to identify the conditions under which particular relationships enhance or constrain SI and new product development performance by facilitating a firm's capability to explore SI opportunities and potential returns.

Despite previous studies have recognized that SI is becoming increasing crucial for the competitive advantages of service-based firms, the research and practice of SI remain

limited [17],[28],[17],[46], specifically linking service-based firms' new product performance gains. In addition, there are no theory-based frameworks of SI in service-based firms [10][28] to assist us in understanding SI consequences. Therefore, more detailed exploration and understanding are necessary for SI in service-based firms to meet the needs of theory and practice [17][36]. Specifically, a service-based firm's SI endeavors may facilitate the pursuit of new market opportunities that may enhance its performance [30]; adopting a strong SI implement is increasingly considered to be necessary albeit insufficient for new product development by service-based firms.

For these reasons, this study attempts to fulfill these gaps. It examines the effects of two types of external market factors (market linking capability and market turbulence) on new product performance gains. According to the resource-based view of firm [4][14], the successful of a strategy depends on the fit between the resources and the market orientation fit. Thus, the effects of market orientation likely vary across different external environmental conditions. Consequently, a better exploration of the conditions under which a SI implement enhances a firm's new product development performance gains may thus require a contingency perspective that emphasizes the importance of fit among a firm's new service development (NSD). This new service development should incorporate both the internal SI implement capability and the external market-oriented perspective to develop a SI to meet market needs.

II. SERVICE INNOVATION AS INTANGIBLE RESOURCE

SI can be regarded as the set of improvements in technology innovation, business model innovation, social-organizational innovation, and demand innovation, with the objective of improving existing services, creating new value propositions or creating new service systems [22]. A firm's SI capability is vital to its survival, because innovative services drive the transformation of new service, products, processes, and technologies into outcomes that meet market needs. Obviously, SI concerns the service offerings and processes of interdependence between new service/products/processes combinations and customer/market needs by delving more deeply into the additional value of changing the operational models of firms and their perceptions of innovation that may be relevant in both contexts.

Previous studies had generally suggested that innovative services enable firms to access market trends [8], enhance learning capabilities [12] and thus facilitate firm performance [30]. SI can result from novel combinations of existing services, people, technologies and approaches to satisfy both current and potential customers. In fact, specific service activities can serve as invisible specific assets [37] that may generate competitive advantages. Based on the seminal work of [37], distinctive service activities may constitute a specific capability that can be developed in different ways to accelerate a firm's adaption to environmental change. This capability is especially relevant in service-based firms in which turbulent market and consumer changes require them to constantly improve their SI implements, increase new product, process, or service development, and thus establish new markets and commercialized opportunities.

It is important to recognize the market orientation in SI deploying because this enables firms to identify and build the specific capabilities that are needed to embed its products or services in their service delivery processes. Firms with a market orientation employ superior skills to understand and satisfy customer needs [13][14]. Moreover, market orientation is crucial for firms in order to monitor customer preferences and gather market information for the development and provision of services [27]. As such, innovative service offering is characteristic of market orientation because the nature of service involves direct and intense interactions with customers. As demonstrated by [18], a market-oriented innovation strategy can provide a more coherent and comprehensive blueprint for firms to generate superior SI performance gains. Firms that engage in a market-oriented innovation strategy can not only maintain existing customer satisfaction and loyalty and attract potential customers but also improve market share and even enhance firm performance. In this context, a central problem in SI is a strictly marketing-oriented issue; this type of innovation can be understood as pertaining to a service that is designed, delivered, and provided according to market needs and trends that require increasing competence in improvement and innovative services offerings. Therefore, firms that engage in innovative service efforts must simultaneously consider market-oriented abilities, such as market linking capabilities in response to external market requirements. In doing so, service-based firms can deploy their service strategy and develop new operational business concepts to provide firm-specific innovative service and in turn increase their competitive advantages.

Drawing primarily on the resources-based view (RBV) of firm [37][4], resources may consist of a bundle of potential services, such as a function or activity that may emphasize and contribute to the operations of a firm, including products, technology, market expansion and managerial techniques. In this sense, SI can be viewed as an invisible asset in which it is a crucial determinant of their growth [23]. Furthermore, the accumulation of these invisible resources and SI capabilities requires ongoing, conscious, and time-consuming efforts to link internal innovative and external market trends that may create a way to capture new revenue streams and increase profitability. For this reason, a service-based firm can differentiate itself from its competitors through its invisible resources, such as SI capabilities and market linking capabilities. Thus, in this study, the theoretical framework is based on RBV [4][14] that may reflect the SI deployments and market fit capabilities of a firm. An important implication of this argument is that the resource and market fit capability of firm behavior can be explored with respect to internal SI

deploying, external market fit abilities and predictions of firm performance. This study specifically develop the argument that although a service-based firm creates new service efforts to satisfy the varied needs of customers, such a firm must possess the ability to fully explore dynamic environmental changes to obtain better market strategies in the context of external market development trends. The consequences that are implied by the new product performance of a firm fostered by invisible SI resources are consistent with a high level of market linking capability, provided that the service-based firm possesses adequate external environmental response capabilities and is able to engage in SI in a highly turbulent market environment. The resource and market linking is appropriate as a framework for this study because of the generally accepted notion that invisible SI assets and market linking capabilities affect the growth of firms.

In sum, SI implement refers to a value co-creation configuration of service providers, claims, customers, technologies, and internal SI and external service systems to connect and share information. The recognition of SI may lead firms to reconsider their product, processes, service offerings, and external market development to maintain their competitiveness from an SI strategy perspective. Figure 1 presents the conceptual framework of the current study. This framework illustrates the importance of simultaneously considering market linking capabilities and market turbulence as a market orientation to identify the SI of service-based firms, particularly in rapidly changing environments.

III. HYPOTHESIS DEVELOPMENT

A. Service innovation and new product development

A growing body of research indicates that the SI implements of firms may positively influence their performance (e.g., [30],[8],[29]). Service-based firms emphasize the use of new services and combinations of various resources, knowledge and skills that represent an SI through which new service provision may create values and increase performance gains. Because service-based firm are more engaged in the provision of innovative services, firms in competitive markets have more opportunities for value creation for customers [5][28] and consequently for increasing firm performance gains [29].

As a consequence of their extensive SI activity, firms that possess distinctive capabilities are likely to develop a firm-specific SI that may positively affect their performance gains [30] and ensure a better fit with their SI strategy [39]. According to [37] and [4], a high level of firm-specific innovative assets or capabilities, which often involve tacit knowledge that may be difficult for competitors to imitate and substitute, can assist firms in generating high levels of performance. To reflect this consideration, a service-based firm must identify and develop core competences by bundling skills, technologies, routines, actions and operations that are embedded in their service chain to gain competitive advantages [45]. As such, service-based firms that possess high levels of firm-specific innovative assets or capabilities are more likely to accumulate innovative service-related knowledge, which positively affects their performance. From one perspective, a large number of firms operating in a highly change and competitive market are likely to adopt innovative services to capture and execute changes to maintain superior performance. As illustrated by [47], firms with large investments in SI may easily respond to market competition and thus be more efficient in building and deploying distinctive resources than their competitors; this advantage in turn enhances innovation performance. Indeed, innovative service activities constitute a firm's vehicle for delivering new products and services to customers, employees, suppliers and partners. External customers are important sources for innovative service information, which can assist firms in identifying and evaluating market information and needs from different sources and interactions, thus increasing firm performance [30][39].

Furthermore, firms that engage in SI can attract new customers, discover potential customers, explore new market opportunities and thus increase new product development performance. Although firms that fully explore SI may today acknowledge the transition toward the provision of competitive services, many firms continue to struggle in determining how to optimally manage innovative service activities in practice and consequently contribute to new product development. As service-based firms struggle to satisfy their customer requirements, they may gain valuable insights into new product/service development [1] and how to ensure its effectiveness [1][31]. Together, these contentions imply that firms with a greater SI may enhance their ability to identify and discover opportunities and thus strengthen their capacity for new product development. Hence, we predict that SI is likely to increase new product development performance.

Hypothesis 1. *The service innovation of a firm is positively associated with new product development performance.*

B. The role of market linking capability

Market linking capability refers to the ability of a firm to capture market information, discover and monitor market trends in a timely manner in the area in which it operates and rapidly respond to market and customer requirements [24][14]. Obviously, marketing linking capability is a firm's ability to monitor and filter market information including developing and maintaining relationships with customers and partners, acting on changing conditions, and discover market development trends and potential opportunities. This capability can be used to support a firm in active seeking, absorbing, and scanning external market trends that are developing in the competitive environment. Specifically, firms that engage in innovative efforts cannot neglect the influence of external market factors, such as external customer's requirement and competitor's strategy. Previous research suggests that superior market linking capability may provide new insight into how a firm's products, processes,

and services offerings meet customer requirements and exploit marketplace opportunities [15][41]. A market linking capability enables firms to identify and predict marketplace requirements before their rivals do and to connect its other capabilities to the external environment to form distinctive competencies and develop sustainable competitive advantages. Thus, a market linking capability can produce superior market knowledge, which in turn has been identified as a key resource that is linked with the market response ability of firms to ensure profit growth.

In dynamic service economy environment, market acuity becomes a critical factor in deploying SI efforts for two reasons. First, SI processes are viewed as being driven by increasingly complex customer requirements and the need to define a capability-based view of competitive [43] advantages that enables a firm to offer superior value in comparison with its competitors. The capability-based view suggests that a firm can enhance its competitive advantages using its distinctive market-oriented capabilities [14][12]. Clearly, a well-developed capability, such as a market linking capability, can prove especially useful in dynamic operation environments in terms of strategic flexibility and competitive weapons.

Second, the focus of firms on market-oriented SI enables them to discover and link to external market to discovery customer requirements and market trends [24]. Firms that are more knowledgeable of market conditions are necessarily more in turn response with changing customers needs and are thus in a much better position to reflect market trends. Therefore, a market acuity capability provides a vehicle for learning from customers and rivals to enable firms to gain a clear focus on specific and superior customer value provision and thus transfer and apply this knowledge to commercial aims (new services/products offerings) to create value through innovative activities. As such, a market linking capability can be considered a crucial capability that must account for the engagement of firms in SI to not only allow such firms to respond rapidly changing market trends and customer needs but also assist them in acquiring timely information that can be directly utilized for new product/service development. Thus, firms that possess strong market linking capabilities can be more sensitive in assimilating complex and changing market information in the dynamic servitization market and transform the information and knowledge into internal SI strengths. Therefore, the following hypothesize is offered.

Hypothesis 2. *The relationship between service innovation and new product development performance is stronger for service-based firms with high market linking capability than for service-based firms with low market linking capability.*

C. The joint effects of market linking capability and market turbulence

Market linking capability and market turbulence may jointly influence the new product performance effect of firm engage in SI offerings. Because market linking capability and market turbulence may coexist in firms' operational environment [44][14], these two factors are likely to have interaction effects. Additionally, market turbulence arises in service orientation economies, especially in a service-based setting in which the dynamism and complexity in the consumer, competitive, social, political, legal and technological contexts encourage continuous innovation in response to changes [36]. Extending this insight to service-based sectors, studies have shown that market linking capabilities are particularly important in turbulent markets for service-based firms with a strong SI. Because these capabilities facilitate the acquisition of market timing information prior to competitors and enable firms to rapidly respond to market requirements and customer needs [16][42]. As a consequence, service-based firm who possess well-developed market linking capability are like to connect market trends with their SI strategic in order to reduce impact of uncertainty.

Market linking capabilities are crucial for service-based firms with a strong SI, as these capabilities may stimulate the discovery of highly turbulent market requirements. Therefore, a strong SI constitutes an important source of new products/services to support a variety of domains in successfully commercializing innovative services, service-based firms may also implement sustainable innovations by applying their market linking capabilities to external market trends. Consistent with this view, when faced with a high degree of market turbulence, firms require greater innovativeness to engage in innovative activities and perform well [21][20]. Indeed, in highly turbulent markets, customers are constantly changing their product preferences; thus, firms should be aware of these changes through well-developed market linking capabilities and should thus react by engaging in innovative service activities to meet customer and market needs. Thus, the combination of these perspectives suggests that only certain conjunction effects of service innovation orientation, market linking capability, and market turbulence maximize firm performance.

Furthermore, we specifically argue that although well SI deploying service-based firms may provide business opportunities, the impact on SI of having a market linking capability also depends on market turbulence to enhance their responses. As noted above, in service-based sectors within a high turbulent market, a firm's SI lies in its ability to rapidly respond to market changes with respect to customers and competitors. That is, in a service-based setting, firms encounter rapid, complex changes in their operational areas, including uncertainty regarding customer needs, escalating competitive pressures, and market growth uncertainty. To confront this turbulence, firms tend to prefer continual innovation; because of increasing uncertainty, they must align their operand and operant resources with market need to ensure their market success [36]. Likewise, empirical studies have suggested that a better understanding of product development and ultimately new product performance effects

can be obtained by examining the market turbulence that shapes these effects [40][6]. Accordingly, firms in highly turbulent markets are more likely to engage in high levels of SI to develop new products/services that satisfy their existing customers, depending on the extent to which the interaction between market linking capabilities and SI can be expected. In view of the above considerations, high levels of SI, market linking capability, and market turbulence represent the optimal combination of internal resources and external market factors to predict firm performance. Thus, this study predicts that market turbulence will simultaneously enhance SI and market linking capabilities to encourage new product development. These arguments suggest the following hypothesis.

Hypothesis 3. *At high levels of market linking capability, the relationship between service innovation and new product development performance is stronger for service-based firms with high market turbulence than for service-based firms with low market turbulence.*

IV. METHODOLOGY

A. Data Collection and Sampling

The sampling frame of the current study consisted of independent firms in servitization and service-based sectors that engage in SI offering activities. The sample frame was drawn from the members of over-the-counter (OTC) firms that are listed in the Taiwan Stock Exchange Corporation (TSEC) database, the Top 5,000 – the largest firms in Taiwan published by the China credit information service (CCIS) company, and the annual report on industrial production (MOEA, 2010). A multiple database sample frame was used to design the sample frame to reduce firms with missing data. The service-based firms were selected because of their engagement in SI offering activities with respect to new products, services, processes and technologies to activate their interest and those of the value chain to promote competitive advantages and to enhance performance gains. The study excluded firms that did not meet these requirements. A stratified random sample of 850 service-based firms from various service industries was obtained for the sample frame.

The data were collected primary through a mail survey. The primary reason for this collection method is that no obvious proxies of three focal constructs (e.g., SI, market linking capability, and market turbulence) were available from secondary sources. To collect research data, I mailed a telephone contract and letter to senior executives at all 850 service-based firms requesting their participation in this study. Out of a total of 850 service-based firms, 796 firms agreed to participate in the study. A copy of the questionnaire, a cover letter and a return envelope were mailed to the participants. The cover letter was used to explain the purpose of the study. Three weeks after the initial mailing, a reminder letter and e-mail were sent to those who had not responded. Another reminder letter and e-mail was sent with questionnaires after the first reminders. Finally, this survey generated a total of 170 firms as a usable and valid sample size, after 12 firms were excluded because of missing data. The response rate was 21.4 % for the participants. The responding firms included the areas of software services, electronic equipment, consumer products, business logistics, pharmaceuticals, retail banking, mobile services, financial and insurance services, vehicles, and information and communication.

B. Measures

Dependent variable

The dependent variable is new product development performance. A firm's new product development performance is measured using the percentage of the total sales accounted by new products in 2012. The primary reason is that new product sales indicate the realized market value of the product innovation efforts [48].

Independent variables

Service innovation. The focus of the service-based firms on SI offerings activities was measured by two studies of validity. The original SI research conducted by [3] indicated a focus on the innovative service development activities of firms in the service industry; the second study was conducted by [11], who extended the research of [3] research to reflect a focus on SI in service-based firms. By integrating the definitions of SI provided by [11] and [3], this study argues that service-based firms that engage in product, process, organizational, and marketing innovations, new technology applications, service line extensions, and new delivery service provision may be regarded as firms with a SI. Following [3] and [11], this study used five-item scales to measure SI.

Market linking capability. Based on previous research [14][41], market linking capability was measured using five items associated with market sensing capabilities, customer linking capabilities, the ability to retain customers, channel bonding capabilities, and the ability to create durable relationships with suppliers. The respondents were asked to evaluate their market linking capabilities.

Market turbulence. I measured market turbulence with five items based on the work of [24]. The items for the market turbulence scale measured the extent to which the composition and preferences of a firm's customers tended to change over time [24].

Control variables. In this study, several variables were controlled for when testing the hypotheses. First, this study controlled for firm size using a log transformation of the number of employees in each firm. Large firms have more abundant resources for investing in innovation activities and are thus more likely to achieve superior performance. Second, firm age was controlled by calculating the number of years since the firms was founded. Third, service quality was controlled because it is one of the most important factors affecting new product development performance. Previous studies have shown that service quality may assist in

improving new product development [2]. Following [7], ten items were used to measure service quality. Fifth, the prior innovation experiences of firms may exhibit differences in skills and knowledge that could contribute to certain advantages related to new product performance. Fourth, market share was controlled, which is often difficult to measure; thus, the respondents were asked to report their market share during the past two years. This information is important because the market share variable may affect new product development. Finally, given that the sample includes firms from different industries, this study created firm type dummy variables to control for sector effects.

V. ANALYSES AND RESULTS

Table 1 displays the descriptive statistics, the correlation matrix and the main variables. In Table 1, market linking capability and SI were highly positively correlated. In addition, service quality and SI were also positively correlated. Consistent with my expectations, three main measures (i.e., SI, market linking capability, and market turbulence) were positively correlated with new product performance.

Based on a hierarchical regression estimation strategy, Table 2 shows the empirical results. To estimate the potential threat of collinearity, we estimated the variance inflation factors (VIFs) and found that the highest VIF is not greater than 1.812, which is below the recommended ceiling of 10 [26]; thus, this finding indicates that no potential multicollinearity exists in this study. Model 1 includes only the control variables as an estimate of the baseline mode.

Hypothesis 1 investigates the effect of a firm's SI on its new product performance. The empirical estimation is significant ($p < 0.001$) and positively associated with a firm's new product performance (Model 2 of Table 2). Therefore, the results indicate that firms with greater engagement in SI offerings experience increased performance for new products. Thus, Hypothesis 1 is supported. Hypothesis 2 requires an examination of whether the interaction of SI and market linking capability has a positive influence on new product performance. As shown in Model 3 of Table 2, the coefficient for the interaction of SI and market linking capability is significant and positive ($\beta = 0.07$; $p < 0.05$). Hence, hypothesis 2 is supported. Hypothesis 3 predicts a three-way interaction of SI, market linking capability, and market turbulence wherein new product performance is highest when all three variables are high. The results in model 3 of Table 2 show that the coefficient for the three-way interaction is significant and positive ($\beta = 0.005$; $p < 0.1$) and thus provide support for Hypothesis 3.

VI. DISCUSSION

This study has adopted an extended RBV of the firms and examined the new product performance consequences of a firm's SI while considering its fit with firm capability, market linking capability and market turbulence. The primary purpose of this study is to introduce the concept of SI offerings to the research on new product performance and to analyze how SI offerings interacts with market linking capability and market turbulence. Specifically, this study address an important but unsolved question regarding the moderating effects of market linking capability and market turbulence on the relationship between SI and new product performance. Thus study argues that the effect of SI on new product performance is contingent upon market linking capability and market turbulence. This study contends that a firm's focus on SI offerings in new product performance may provide new insights into the conditions under which firms may increase their new product development performance.

TABLE 1. CORRELATION MATRIX (*N*=170)

Variables	Mean	S.D.	1	2	3	4	5	6	7	8	9
1. Firm age	34.56	41.60									
2. Firm size	363.25	350.23	.00								
3. Industry types	6.37	3.32	-.01	.04							
4. Firm's prior experience	0.71	0.45	.04	-.01	-.08						
5. Market share	0.14	0.06	-.06	.01*	-.22**	.16*					
6. Service quality	5.43	0.75	-.03	-.01	-.01	.08	-.01				
7. Service innovation	5.23	0.95	-.11	.03	-.07	.19*	.25	.43**			
8. Market linking capability	5.02	0.81	-.11	.00	-.01	.11	.07	.70**	.62**		
9. Market turbulence	5.00	0.75	-.03	.01	.03	-.06	-.06	.18*	.10	.16*	
10. New product performance	0.082	0.063	-.06	.12	.01	-.14	.28**	.11	.20**	.20**	.29**

Note: *$p < 0.1$; **$p < 0.05$

TABLE 2. RESULTS OF THE HIERARCHICAL ZERO-INFLATED POISSON REGRESSION ON NEW PRODUCT PERFORMANCE

Models	Model 1	Model 2	Model 3
Hypotheses	Controls	H1	H2; H3s
Intercept	0.942***	0.757***	3.358***
	(0.272)	(0.275)	(0.868)
Firm age	-0.001	-0.000	-0.000
	(0.001)	(0.000)	(0.000)
Firm size[a]	0.001	-0.006	-0.020
	(0.021)	(0.020)	(0.021)
Firm type	0.009	0.007	0.007
	(0.008)	(0.008)	(0.008)
Prior innovation experience	-0.323	-0.366	-0.335
	(0.057)	(0.058)	(0.058)
Market share	3.908***	3.300***	3.333***
	(0.476)	(0.491)	(0.496)
Service quality	0.151***	0.071*	-0.034
	(0.037)	(0.042)	(0.053)
Service innovation (SI)		0.149***	-0.395***
		(0.035)	(0.127)
Market linking capability (ML)			-0.411**
			(0.150)
Market turbulence (MT)			0.053
			(0.106)
SI×ML			0.070**
			(0.031)
SI×ML×MT			0.005*
			(0.003)
Log likelihood	-615.276	-605.816	-572.434
Degree of freedom (*df*)	6	7	11
LR χ^2 (*df*)	112.91	131.83	198.59
Prob. >0.000	0.000	0.000	0.000

Note: [a]Logarithms. N=170,*$p<0.1$; **$p<0.05$; ***$p<0.001$. The standard deviations are indicated in parentheses.

A number of researchers have argued that SI offerings are crucial for attaining competitive advantages and performance [39][28],[17],[46],[30],[29]. In a similar vein, SI plays a fundamental role in the development of new products/services because such innovations constitute a primary means of promoting new product/service development to potential customers/suppliers, which is in turn related to performance outcomes [3]. Similarly, such a SI has been considered to play a catalytic role in attracting customer demands and creating new business opportunities for new product development [25][34]. On the basis of these arguments, the current study attempts to develop an empirically based approach to new product performance for service-based firms that may contribute to more fully understanding and exploring managerial decisions regarding new product development. That is, the empirical results indicate that a SI offerings and market linking capability can improve new product development and performance in a high turbulent market. A positive relationship between SI and new product performance appears to reflect that the implementation of a SI will readily result in improvements in new product performance. Especially, this study demonstrated a significant moderating role of market linking capability and market turbulence in the influence of the SI offerings of a firm on new product performance.

An expected result related to the support for an independent moderating effect of market linking capability. One primary reason for this result is that the nature of market linking capability may reflect the ability of a firm to acquire market timing information, respond to market changes before rivals, develop and maintain relationship with partners and customers, and enhance internal SI strengths to fit the external market environment [16][42]. As such, firms with high market linking capabilities may enhance their SI because they possess the skills, abilities and processes that are necessary to enhance innovative services and thus lead to the fulfillment of rapid changing market and customer requirements. That is, market linking capability is crucial to connecting internal resources, such as SI offerings and external market environments. Furthermore, as expected, highly dynamic and turbulent environments stimulate service-based firms to increase their engagement in SI offerings and market linking capabilities because such environments stimulate firms to invest in innovative services to attract customers, thus greatly strengthening the positive effects of SI on new product performance. Specifically, the inclusion of market linking capability not only bridges the gap between SI and new product development but also proves to be a crucial capability affecting new product performance in dynamic and competitive servitization environmental contexts.

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