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OF INTENSITY OF INTERFIRM COLLABORATION ON THE SPEED OF NEW SERVICE

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Abstract

This paper draws on a comparative case study to investigate how intensity of inter-firm collaboration influences the speed of new service development. Using empirical evidence from case studies of the development of two e-commerce services developed by competitive retail companies in Taiwan, this study finds that intensity of inter-firm collaboration has a negative effect on the speed of new service development under some circumstances (i.e. higher degree of task complexity and higher degree of project newness). A complex task has many steps to complete and a more intense inter-firm collaboration may require many or increased connections between different functions, thus increasing development time. Additionally, high collaboration intensity may be adopted to identify project requirements and problems and share the related knowledge, thus increasing time required of new service development when a project is new.

THE INFLUENCE OF INTENSITY OF INTERFIRM COLLABORATION ON THE SPEED OF NEW SERVICE DEVELOPMENT

Abstract

This paper draws on a comparative case study to investigate how intensity of inter-firm collaboration influences the speed of new service development. Using empirical evidence from case studies of the development of two e-commerce services developed by competitive retail companies in Taiwan, this study finds that intensity of inter-firm collaboration has a negative effect on the speed of new service development under some circumstances (i.e. higher degree of task complexity and higher degree of project newness). A complex task has many steps to complete and a more intense inter-firm collaboration may require many or increased connections between different functions, thus increasing development time. Additionally, high collaboration intensity may be adopted to identify project requirements and problems and share the related knowledge, thus increasing time required of new service development when a project is new.

Keywords: intensity of inter-firm collaboration, the speed of new service development (NSD)

Introduction

The questions of why and how firms should cooperate with external companies to create value have become issues of great importance. Due to short product life cycle, firms are drawing more frequently upon external sources of knowledge, and that's what has allowed them to reduce dependence on internal R&D functions and to accelerate innovation (Bartlett et al., 2008). When firms cooperate with external actors to develop new service, they may need to access different types of network and use different types of collaboration in order to acquire related resources/ knowledge for new product/service development. Previous innovation literatures have emphasized the importance of cooperation with external actors in order to acquire complementary knowledge and sources and to reduce the development cost and time. There are some forms of collaboration identified by previous research. For example, Tidd and Bessant (2009) suggest that alliances cover both horizontal and vertical relationships. The resource dependence and transaction cost theories explain the formation of these relationships. Firms collaborate with suppliers or customers in order to shorten time and

reduce cost of new product/ service development through complementary know-how/resource sharing. Although collaborative relationships with external firms can help a focal firm to acquire the knowledge they need to contribute to new product /service development. The inappropriate degree of inter-firm collaboration with external firms may influence the development time and cost. A few studies have tried to examine the relationship between collaboration intensity and the speed of new product development (Littler et al., 1998; Von Corswant and Tunälv, 2002; Fliess and Becker, 2006). But their research findings did not coincide on the relationship between collaboration intensity and the speed of new product development. Moreover, this issue is yet to be fully explored in service innovation research, especially with regards to different types and scopes of new service development. This gap in knowledge provides the justification and focus of this paper. Accordingly, two research questions arise: 1) What degrees of intensity of inter-firm collaboration do focal firms adopt with their suppliers in the process of new service development? 2) How does different intensity of inter-firm collaboration influence the speed of new service development in different types of new services?

This study aims to contribute to the existing literature on service innovation, providing insights into intensity of inter-firm collaboration in the context of retail service in Taiwanese convenience store industry. Taiwanese convenience store chains integrate multiple sources of knowledge residing within their firms or outside the firms' boundaries to develop and launch new services in a timely manner. Especially, they form different degrees of inter-firm collaboration with external companies to acquire key knowledge or resources. They then combine the newly acquired resources with their existing advantages (24 hours service, high density of store spread, strong information system, and professional distribution systems) to carry out "Clicks and Mortar" services, which in turn, help them respond quickly to market dynamics and consumers' needs.

The present study draws empirical evidence from research conducted in four dominant convenience store chains in Taiwan in order to understand the implications of the adoption of different intensity of inter-firm collaboration on new service development. In addition, this research investigates the relationship between intensity of inter-firm collaboration and the speed of new service development. Two types of e-commerce service (i.e. the online shopping with pick-up at store service and the multiple media kiosk service) in Taiwanese convenience store industry were chosen for investigation.

The rest of the paper is set out in the following way: In the next section, the background literature on new service development, intensity of inter-firm collaboration, and the relationship between intensity of inter-firm collaboration and the speed of new service development is reviewed. The method of the research is then described, followed by a discussion of the findings, conclusions and managerial implications.

Theoretical background

New service development

Service could be seen as a series of activities which involve relationships between service provider and service users. Most services are characterized by high degree of interdependency and interaction between service providers and users, as well as between service providers and their suppliers (Tether and Metcalfe, 2004). Previous research argued that innovation in the manufacturing and service sectors have some similarities in the development process, such as more formalized and structured programmes, high quality development staff and resources, aligned with their culture and system and sharing a strong commitment to innovation (Nijssen et al., 2006). Although the usual dimensions of innovation in the service sector originated from the manufacturing sector, previous research has argued that these cannot be fully applicable to a service context (Tidd and Bessant, 2009). The key difference between service innovation and product innovation is that service has the features of intangibility, simultaneity, heterogeneity and perishability (Vermeulen, 2001; De Jong et al, 2003). Previous research suggests that some of these specific characteristics influence new service development process. For instance, the intangibility of service is the most important factor; it makes the service development process more complex and demands intensive communication between people for understanding and creating a new service. And the simultaneity of service also affects the service development process by the close involvement and integration of front and back office personnel (Vermeulen and van der Aa, 2003). Additionally, there are some factors which can be used to distinguish between innovation in service and manufacturing, such as object of innovation, degree of novelty, and dimension of newness (De Jong et al, 2003). The object of traditional innovation in manufacturing industry can be divided into process and product innovation. But it is difficult to adopt this distinction to clarify innovative activities in service industries. This view is also

supported by previous studies which suggest that it is very difficult to distinguish between process innovation and product innovation in service sectors (Gallouj and Weinstein, 1997; Hipp, et al., 2000) because services commonly lack physical existence and service context is constituted of a series of activities. In order to solve this issue, Howells and Tether (2004) suggested that it is better to distinguish between inward and outward looking innovation activities. Inward looking innovation activities focus on how service firms carry out activities for cost reduction, whereas outward looking innovation activities concentrate on how service firms interact with others, such as customers, competitors, and suppliers. Regarding the degree of novelty, De Jong et al., (2003) argued that radical innovations in manufacturing industry are usually developed with a large-scale and formalized process which can be managed by a project manager who allocates different aspects of regular tasks to different departments. In contrast, innovation in service industry is often seen as incremental innovation (less formalized process and less large-scale change) and is developed by having different actors (e.g. client, supplier) involved in new service development process. Considering the factor of the dimension of newness, it is often used to describe innovative newness within a developing firm, outside a developing firm or both. In terms of the characteristic of simultaneously, De Brentani (2001) concluded that service innovation is usually developed by an outside developing firm and within a developing firm working together, which is more often than not an innovation in manufacturing. According to the above discussion of differences between the manufacturing and service sectors, innovation in the service sector often combines external and internal resources for innovation purposes. Service innovation is usually preferred to be incremental and customer-led in character and technology and the market pull together in developing new technology.

Compared with the research on innovation in manufacturing sector, research on service innovation is still being developed. The question of how to classify different types of service innovation should be addressed. Tether (2002) found that service innovation can be determined by different sources of innovation, such as suppliers, service firms, and clients. Maffei et al. (2005) also provided a similar innovation model which classifies the source of service innovation into four categories: suppliers, company itself, customers, and competitors. Moreover, degree of novelty (Lovelock, 1984; Gallouj *et al.*, 1997; Hulshoff *et al.*, 1998) and dimension of newness (Hertog and Bilderbeek, 1999; Forfás, 2006) are also useful in classifying different types of service innovation. For instance, Hertog and Bilderbeek's (1999) put forward a four-dimension model (i.e. new service concept, new client interface, new

service delivery system, and technological options) which can be used to analyze where innovative activities occur. Similarly, Forfás (2006) identified three types of service innovation, including new service concept, new delivery system, and new customer interface.

Intensity of inter-firm collaboration

Previous research argued that the process of supplier integration was a black-box which needed to be further investigated (Petersen *et al.*, 2003; 2005). According to Fliess and Becker's research (2006), several possible types of cooperation design can be distinguished according to the different intensity of the contractual relationship. The intensity of cooperation between firms ranges from internal development, know-how exchange, which have a lower intensity of cooperation, to coordinated development, joint development and contractual joint ventures, which have a higher intensity of cooperation. The most important three forms of cooperation, including contract development, coordinated development and joint development, provide better insights into the black box of supplier integration in new product development. These different forms of inter-firm cooperation can be classified by the different levels of responsibility between customer and suppliers in developing a new product. For example, coordinated development can be divided into three forms of cooperation: asymmetrical cooperation, black-box cooperation and systems partnership on the basis of the different levels of detailed instruction or module is done by customer. In addition, Petersen *et al.* (2005) also define different levels of supplier integration, including: no supplier involvement, white box cooperation, gray box cooperation and black box cooperation. This classification provides clearer distinctions in the responsibility for specification design and the associated decision making between firms in developing new products. Nylen (2007) also argues that "intensity" is another aspect that can be examined to understand the degree of interaction among partners. The present research adopts the classification of intensity of cooperation based on Fliess and Becker's (2006) research and incorporates the classification of coordinated development from Petersen *et al.* (2005). Three forms of cooperation (i.e. including contract development, coordinated development, and joint development) are selected to investigate the intensity of inter-firm collaboration between convenience store chains and their suppliers in the process of developing new services. Contract development is based on the contract with suppliers who provide separated components/services of new service/product developments to customers. It is difficult for the customer to influence the development process, because the customer is involved only in coordination meetings. The form of inter-firm collaboration is used when the customer does not have enough

resources/knowledge to develop new services/products. Coordinated development is defined as the kind in which suppliers focus on the separate components/services of new service/product developments and some tasks are developed by the customer. In terms of who develops detailed instructions or modules, coordinated development can be further distinguished into three forms of cooperation: asymmetrical cooperation, black-box cooperation, and systems partnership (Gerpott, 1999; Tani and Wangenheim, 1998). This classification of coordinated development implies that customers and suppliers have different levels of responsibility in new product development. However, the present research argues that the above classification of coordinated development is somewhat ambiguous, because the specification of the decision-making process in a new service development has not been taken into account. Petersen et al. (2005) suggest that different levels of supplier integration are: 1) White-box cooperation, 2) Gray-box cooperation and 3) Black-box cooperation. White-box cooperation means that the buying company makes all the design and specification decisions but informally discusses the specifications with the supplier. To further clarify the concept of coordinated development between firms, the present research provides clear distinctions in the coordinated development on the basis of different levels of responsibility for specification design between the firms which are associated with the decision making process. The coordinated development can be separated into five types: asymmetrical cooperation, white-box cooperation, grey-box cooperation, black-box cooperation and systems partnership. Compared with contract development and coordinated development, joint development is based on regular cooperation, in which teams are formed by the supplier's staff and the customer's staff. These teams can work in the same place or cooperate by using a high level of information exchange and regular coordinated meetings to integrate supplier and customer from different places. The form of development could be adopted in a new service/product development if the development project cannot be divided into different modules and assigned to customer or supplier. Based on the above discussion regarding the different intensity of inter-firm collaboration, Table 1 defines the degree of different intensity of inter-firm collaboration by indicating the different responsibilities of the supplier in the specification design associated with the decision making process. This can be used to clarify the different degrees of intensity of cooperation between the convenience store chains and their suppliers in the two selected service developments.

Table 1: The definition of different degrees of intensity in inter-firm collaboration

Intensity of inter-firm collaboration	Low	Contract development	Customer and supplier based, with a contract to define the objects, tasks and restrictions between them. Supplier performs development activities separately from the customer.
	Coordinated development	<i>Asymmetrical cooperation</i>	Customers directly provide detailed specification or instruction to suppliers for developing the final product/service.
		<i>White-box cooperation</i>	Customers informally discuss with suppliers the specifications and then make their own decisions about specifications.
		<i>Grey-box cooperation</i>	Customers and suppliers share relevant information/knowledge and then make decisions together about the design specifications
		<i>Black-box cooperation</i>	Suppliers take almost all responsibility for developing modules for the final product. Customers make known their requirements only and review the design specifications.
		<i>Systems partnership</i>	Suppliers develop the complex part of the final product/service and integrate the pre-suppliers in the development process.
High	Joint development	Customers and suppliers regularly form a project team involved in the development activities.	

Source: Classification integrated from Fliess and Becker (2006) and Petersen et al. (2005)

The relationship between intensity of inter-firm collaboration and the speed of NSD

The present study reviews the influence of intensity of inter-firm collaboration on new product development, which can be used to propose the relationship between intensity of inter-firm collaboration and the speed of new service development. Fliess and Becker (2006) suggest that the paralleling development procedure leads to the reduction of the development time. For instance, firms can carry out a joint investigation to identify and discuss the results and possible improvements of product or process, thus saving development time. They also put forward the view that scheduled timetables, development cost and development resources affect the development time. Cousins and Lawson (2007) argue that high levels of supplier integration can improve market share and time to market because of high levels of coordination between firms which share capital investment, development risk and reward and increase the integration of business processes between firms. However, some previous studies argue that intensive supplier involvement in product development can increase development cost and time (Littler et al., 1995; Littler et al., 1998; Von Corswant and Tunälöv, 2002). For example, Littler et al. (1995) conclude from their empirical study that closer collaboration with a supplier may increase the complexity of project management, and be time-consuming

and difficult to manage and control. Based on the above relevant literature, some studies suggest that a high degree of intensity of inter-firm collaboration has a positive relationship with the speed of new product development (Zahra and Nielsen, 2002; Fliess and Becker, 2006). A high degree of intensity of inter-firm collaboration can reduce the time needed for decisions to be taken and development problems to be identified. In contrast, some previous studies argue that there is no positive relationship between the intensity of inter-firm collaboration and the speed of new product development (Littler et al., 1998; Von Corswant and Tunälvy, 2002). However, existing evidence of the impact of intensity of inter-firm collaboration on new product development is still inconclusive. Then the relationship between intensity of inter-firm collaboration and development speed needs to be investigated in the field of new service development because of the lack of empirical evidence.

Thus, the following questions will be addressed in this paper:

1. What degrees of intensity of inter-firm collaboration do focal firms adopt with their suppliers in the process of new service development?
2. How does intensity of inter-firm collaboration influence the speed of new service development in different types of new services?

Research design and method

This paper focuses on the intensity of inter-firm collaboration between Taiwanese convenience store chains and their partners in new service development process. It aims to explore the relationship between intensity of inter-firm collaboration and the speed of new service development. For this purpose, this research uses a comparative case study design which facilitates an empirical inquiry into investigating a contemporary phenomenon within its real-life context (Yin, 2003). This research draws on empirical evidence from the four convenience store chains in Taiwan. Two e-commerce services (i.e. the online shopping with store pick-up service and the multiple media kiosk service) in the convenience store industry were selected to address the research questions.

Study Population and Unit of analysis

The study population of this research includes the Taiwanese convenience store chains and their cooperative firms involved in the selected service developments. The four dominant

convenience store chains (i.e. Company E, Company F, Company H, and Company O) which have been chosen together control 95.51% of the market in Taiwan. Their suppliers including logistic companies, IT system suppliers, service content companies, hardware manufacturing companies, and so forth, also have been chosen for investigation in this study. The unit of analysis of this research is the new service development project. Online shopping with pick-up at store service and multiple media kiosk service are selected to find out how convenience store chains use different intensity of inter-firm collaboration with suppliers to acquire related knowledge and resources for new service development.

The development of online shopping with pick-up at store service involves different actors which include convenience store chains (channel role), logistic companies (i.e. third party distribution companies and distribution companies owned by convenience store chains), IT system suppliers, and e-shops (product providers). Company E and a group of companies (Companies F, H, O) developed this service separately. Convenience store chains usually provide pick-up places for customers where they can make payments for their orders if they wish to do so. The task of IT system suppliers is to establish, maintain IT support frameworks and to solve the connection problems with actors involved in delivering services. E-shops provide products and customer services if consumers have any problems with regards to their orders. E-shops can deliver their products to either the logistic company owned by Company E or to three third party distribution companies which also provide storage and delivery services. These third party distribution companies act as agents to convenience store companies, for they involve recruiting new e-shops, managing e-shops, and providing e-shops storage and delivery services. If e-shops choose to join the group (Companies F, H, O) and do not have the capability to deliver goods to the group's self-owned distribution companies, they must sign a deal with third party distribution companies to use their delivery services. Third party distribution companies help organize and deliver products to Companies F, H, O's respective distribution system. The distribution system of each convenience store company then delivers consumers' orders to specific stores designated by consumers. However, some of the e-shops have the capability to deliver goods to the self-owned distribution companies of each convenience store company.

Multiple media kiosk (MMK) service provides a platform for various service providers to sell their service contents (e.g. bill payment service, online game credits and ticket sales for public transportation, concerts and musicals). Consumers can also use this platform to pick

and purchase service products. Multiple media kiosk service has been developed individually by each convenience store chain, with the involvements of service content companies, hardware manufacturing company, and software system supplier. The hardware company supplied self-service kiosks. The IT system supplier developed an IT platform in which different actors can access and connect to this service. Service content companies can then provide their existing service contents via MMK service. And they have to develop content pages for consumer use.

With regard to the classification of the two selected services, the present research found that both belong to the dimension of new service delivery /customer interface, which stems from Forfáss' (2006) non-technological classification of service innovations. The online shopping with pick-up at store service provides consumers with a new service delivery system. The multiple media kiosk service provides consumers with a new client interface from which to purchase service contents. The development of these two services also involves the technological dimension of service innovation, such as providing an interface which integrates different IT systems and installs the new hardware. Additionally, the present study further found that both involve different degrees of complexity and novelty in the process of developing new services development. The online shopping with pick-up at store service mainly uses the existing distribution system and IT systems of convenience store chains and integrates from external firms a different IT system, which transfers information. The degree of complexity is higher. Unlike the development of the online shopping with pick-up at store service, the process of developing the MMK service involved the convenience store chains in developing an IT platform and hardware and connecting it with an existing IT system (e.g. the POS system). This service development mainly focuses on connecting convenience store chains and service content companies by an IT system for transferring information. In order to enrich the service content of the kiosk, convenience store chains have to invite different service content companies (e.g. web-based and catalogue shopping service content companies) to join this service and connect the two IT systems. This service also integrates existing services (e.g. for bill payments and ticket sales) and transforms them in the kiosk. The degree of novelty is higher in this development.

Data collection and analysis

Two methods of data collection were used in this research: documentation and interviews. Secondary data were gathered from periodicals, books, magazines, newspapers, research

reports published by research institutes, corporate websites, and annual reports published by case companies and their partners. Semi-structured interviews were also adopted as they allow for two-way communication and the flexibility to probe for details as well as gaining a range of insights on research issues. In total, there were 42 interviewees from the four chain convenience store companies and their partner firms participating in this study. Interviewees include managers and section staff of convenience store chains and the staff of partner firms who were involved in the selected service development projects. Some informants were interviewed twice. All together, 52 interviews were conducted. Before data analysis, interviews were fully transcribed. Relevant interview extracts were translated from Chinese to English by one of the authors, who is bilingual.

The performance of new service development can be seen as a multidimensional construct to reflect a project's or a firm's operational effectiveness and market competitiveness (Tatikonda and Montoya-Weiss, 2001). According to Voss *et al.* (1992) research, both process measures (i.e. criterion cost, effectiveness, and speed) and outcome measures (i.e. financial measures, competitiveness measures, and quality measures) have been developed and applied to evaluate the performance of new service development. In terms of the highly competitive environment of the Taiwanese convenience store industry, it is difficult to access the financial reports, development cost records and the number of new successful developments annually in the two services under review (i.e. the online shopping with pick-up at store service and the multiple media kiosk service) because of confidential issues. This may bring research up against the difficulty of using financial measures of criterion cost and effectiveness to assess the performance of each service development. The market competitiveness reports are also difficult to approach, due to their containing less statistical data to rank and measure the current competitive conditions in each of the services offered by research organizations. This consequence may in turn show up the difficulty of adopting competitiveness measures to assess the performance of each service development. As a result of this, process measure in terms of the speed of new service development is adopted in this study to evaluate innovation performance. The measure of concept to service launch time provides a basis for cross-case comparisons of the speed of new service development.

The interviews were analyzed using the thematic framework approach (Gibbs, 2008). In developing a thematic framework which represents the patterns and relationships in the interview data, we drew on the existing literature and research questions to create codes and

to identify key thematic ideas. These themes include resources of new service development, dimension of service innovation, intensity of inter-firm collaboration, responsibility of supplier, and speed of new service development. The thematic framework was then applied to guide initial data analysis in order to understand how Taiwanese convenience store chains use different types of collaboration with partner firms in order to acquire and use external resources/ knowledge in new service development. Moreover, cross-case synthesis (Yin, 2003) was chosen as the analytical technique to summarize the findings from the individual cases. This technique is also useful in identifying the similarities and the differences between the two service development projects. The findings of this present study are presented next.

Research Findings

Intensity of inter-firm collaboration between convenience store chains and suppliers

This section examines the two selected services by discussing the intensity of inter-firm collaboration between convenience store chains and their suppliers in the two new service developments (i.e. the online shopping with pick-up at store service and the multiple media kiosk service).

Online shopping with pick-up at store service

The four convenience store chains played different roles in developing the online shopping with pick-up at store service. In the first stage, Company E originally used joint development with its affiliated companies (a logistic company and an IT system supplier) and formed a project team. Due to concerns over service capacity and the security of the goods, Company E finally authorized its group company – Company P – to continue to develop it in the second stage and provided marketing support after this service was temporarily closed. Company E played a key role in coordinating the cooperation between the group companies (Company P, the IT service provider and the logistic company) and in controlling the quality and progress of the service development in the second stage. Unlike Company E, the other convenience store chains (Companies F, H, O and N) used joint development to establish a new company – Company C – to develop this service for them. They also used Company C to buy some goods on their behalf in order to reduce purchasing costs (joint purchasing).

As regards the IT system supplier, Company E used coordinated development (systems

partnership) with its group companies in the first stage and then in the second stage involved the applied IT system suppliers by using contract development to develop some functional systems. This was because the IT system of the service was split into a main IT system (the convenience store's internal system, for example a POS system) and functional systems, since Company E had to ensure that the main IT system operated normally. Unlike Company E, the actors of the other group (i.e. the convenience store chains, third party distribution company, e-shops) who were involved in the first stage in this service development connected individually with the IT systems of the other actors. Next, the requirements and format of the information transfer were decided and integrated by Company F's IT department and its third party distribution company (grey-box cooperation) in the second stage. Finally, this group used coordinated development (systems partnership) with an external firm to develop the IT system for integrating the information flow between the different actors.

The development of the logistic function can be separated into two routines. The third party distribution companies provided storage, packing and delivery services for the e-shops and delivered consumers' orders to the distribution companies owned by the convenience store chains if the e-shops themselves could not deliver the goods to the distribution company of each chain. The distribution companies owned by convenience store chains delivered the consumers' orders to the various convenience stores. In the first stage Company E began by using joint development with its own logistics to deliver the goods to each store. When Company E authorized Company P to develop this service, it used coordinated development (systems partnership) with its own logistics in developing the logistical function. It also engaged in contract development with a third-party distribution company. The other group in the first stage used contract development with a third-party distribution company. The third-party distribution company delivered the goods direct to the stores of Companies F, H, O and N. Given the service capacity of the third-party distribution company, this group invited a new third-party distribution company in the second stage using contract development and delivering consumers' orders either direct to the distribution company owned by Company H or to the stores of Companies F and O. In the third stage, the third party distribution company no longer provided a delivery service from the e-shops to the distribution companies owned by Company H. This group invited another third party distribution company (by contract development) to provide a delivery service and to transport goods from the e-shops to the distribution company of each chain. However, the previous third party distribution company (in the second stage) still delivered goods to Company F,

which finally acquired it, and it became a self-owned distribution company. Third party distribution companies cooperated with this group by using contract development. Both of them (Company E and Companies F, H and O) developed by contracts with e-shops. Table 2 summarizes the findings of intensity of inter-firm collaboration adopted by Companies E, F, H, O in Online shopping with pick-up at store service development.

Table 2: Different intensity of inter-firm collaboration between each group and its suppliers in the development of online shopping with pick-up at store service

	Company E	Companies F, H and O
Service developer	<ol style="list-style-type: none"> 1. Company E formed a project team with affiliated companies in the first stage. 2. Company P was authorized to develop this service in the second stage (systems partnership). 	<ol style="list-style-type: none"> 1. Convenience store chains used joint development with Company C in decision-making in the first stage. 2. This new company (Company C) grew in prominence as it developed this service in the second stage.
IT system supplier	<ol style="list-style-type: none"> 1. Joint development with an IT system supplier in the first stage. 2. Coordinated development with affiliated companies (systems partnership) in the second stage. 3. Involving applied IT system suppliers to develop different functional systems by using contract development. 	<ol style="list-style-type: none"> 1. The IT specification was initially developed by Company F and its cooperative distribution company (grey-box cooperation) in the second stage. 2. Coordinated development (systems partnership) with an external company to set up an integrated IT system in the third stage.
Logistics	<ol style="list-style-type: none"> 1. Joint development with a self-owned distribution company in the first stage. 2. Coordinated development (systems partnership) with a self-owned distribution company in the second stage. 3. Contract development with third party distribution companies. 	<ol style="list-style-type: none"> 1. Coordinated development (systems partnership) with self-owned distribution companies. Companies F and O strengthened the intensity of the inter-firm collaboration from contract development to coordinated development (systems partnership) in different stages of the development. 2. Contract development with third party distribution companies.
E-shop	Contract development	Contract development

Source: Summarized by the authors

Multiple Media Kiosk (MMK) service

Company E used coordinated development (systems partnership) with its group company – Company Q – to develop and manage this service development. Company E played a key role in coordinating the different affiliated companies, providing marketing support and controlling the service quality in the development of this service. Companies F and H used cross-functional teams within their companies to develop this service. Company O provided only some space in a convenience store where the hardware could stand and payment could be collected. To consider the development of the IT system, Company E cooperated with its group companies (in a systems partnership) which took responsibility for different domains of the IT system. Company F basically used coordinated development (black-box cooperation) with the existing IT system supplier and provided what the existing IT system supplier required (e.g. the service requirements and a checklist). The existing IT system supplier also informally provided the relevant knowledge and suggestions to Company F in developing its IT system. Company H developed the IT system within its company. Company O used coordinated development (grey-box cooperation) with its suppliers to develop the IT system.

As regards hardware manufacturing, Company Q signed a manufacturing contract with a hardware design and manufacturing company and became involved in the specification and design of its own hardware. This can be seen as an example of coordinated development (grey-box cooperation). Company F also used coordinated development (grey-box cooperation) with its hardware supplier, which came up with a feasible specification and developed a prototype for Company F. Company H used coordinated development (asymmetrical cooperation) with a hardware manufacturing company and presented its requirements to this company.

To consider the cooperation between the service content providers and Companies E, F and H, the companies developed and signed a selling contract with some of the service content providers on the basis of their existing IT system or business module. The service contract provided suppliers with the specifications for developing a user-interface in the kiosk and connecting the IT systems, the operation procedure and the financial regulations. This is an example of contract development. The companies also used coordinated development (grey-box cooperation) with some service content providers when they mutually adjusted the IT requirements with their IT system supplier or developed a new business module in the

kiosk. Table 3 shows different intensity of inter-firm collaboration between four convenience stores and their related partners in the development of multiple media kiosk (MMK) service.

Table 3: Cross-case comparison in intensity of inter-firm collaboration between four convenience stores in the development of MMK service

	Company E	Company F	Company H	Company O
Service developer	Coordinated development (systems partnership)	Internal development	Internal development	Coordinated development (grey-box cooperation)
IT system supplier	Coordinated development (systems partnership)	Coordinated development (black-box cooperation)	Internal development	Coordinated development (grey-box cooperation)
Hardware manufacturing	Coordinated development (grey-box cooperation)	Coordinated development (grey-box cooperation)	Coordinated development (asymmetrical cooperation)	Coordinated development (grey-box cooperation)
Service content company	Contract development or Coordinated development (grey-box cooperation)	Contract development or Coordinated development (grey-box cooperation)	Contract development or Coordinated development (grey-box cooperation)	None

Source: Summarized by the authors.

The above discussion indicates that, it appears that the companies under review tended to use a high degree of intensity in their inter-firm collaboration (coordination development-systems partnership) with suppliers in developing fundamental functions (e.g. IT function and logistics) when they developed the two selected services. This is because the task of these functions of integrating different actors or pre-suppliers to contribute to the development of new services is very complicated. In terms of the task, which is complicated because of the relationship between the companies under review and these suppliers (e.g. of the IT system and the logistics), the companies separated these important functions in order to cooperate with suppliers intensively for the sake of identify possible problems and solutions, share related information/knowledge and control the progress and quality of the service as it developed. The case companies also adopted a lower degree of intensity (e.g. contract development) in their inter-firm collaboration with some suppliers, such as e-shops and some of the service content companies. This is because the task of these suppliers can have been simply to define their object, provision and restrictions and separate them from the case

companies' development activities. Accordingly, this present study can claim empirical evidence that the intensity of inter-firm collaboration with suppliers in the process of developing new services depends on the degree of task complexity in different functional developments. Previous study has initially identified the relationship between intensity and task complexity in inter-firm collaboration has been initially identified: the intensity of inter-firm collaboration is high when a task is more complex (Nylen, 2007). This present study further used different forms of inter-firm collaboration to identify the intensity between cooperative firms. Different forms of inter-firm collaboration can help to distinguish more clearly the different firms' responsibilities and decision making in inter-firm collaboration.

Moreover, this present study further found that the degree of newness may also influence the adoption of intense inter-firm collaboration when the case companies cooperate with the service content companies in the development of the MMK service. Case companies adopt a lower degree of intensity of inter-firm collaboration with the supplier when the degree of project newness is relatively low (e.g. based on the existing operation of the focal firm). Additionally, case companies may use more intense inter-firm collaboration with the first entrant to identify potential problems and reduce its technological uncertainty to contribute to a new business module. A lower degree of inter-firm collaboration appears between the focal firm and the second entrant because of the lower technological uncertainty of the existing business module. Previous studies suggested that focal firms can seek a closer relationship with the supplier and pool their technological information in developing a new product (Auster, 1992; Hagedoorn and Narula, 1996). This present study provides insight in identifying the relationship between collaboration intensity and project newness when focal firms develop non-fundamental functions of a new service and quickly expand the scope of the existing business module.

The relationship between intensity of inter-firm collaboration and the speed of NSD

This section explores the relationship between intensity of inter-firm collaboration and speed of new service development. A common issue concerned the time spent on the IT system connections. This problem, in turn, influenced the relationship between the intensity of inter-firm collaboration and the speed of new service development. This is because these two services belong to the electronic commerce service. The development of an IT system plays an important part in integrating the information exchanged between the actors involved in the process of these two service developments. In developing these services, this present study

found that the intensity of inter-firm collaboration has a negative influence on the speed of new service development (in particular, the development of the IT system), which is consistent with the arguments of previous studies in new product development (e.g. Littler et al., 1995; Littler et al., 1998; Von Corswant and Tunälv, 2002). If the focal firm cooperates with suppliers intensively, it may increase the time spent on new service development. This may also increase the cost, complexity and difficulty of managing and controlling the project in inter-firm collaborations.

Moreover, there were also differences between selected service developments in the relationship between the intensity of the inter-firm collaboration and the speed of new service development. In developing the online shopping with pick-up at store service, this present study found empirical evidence that the relationship between the intensity of inter-firm collaboration and the speed of new service development generally depended on different degrees of task complexity, in particular, the IT system development. The different information flows between the actors concerned were integrated in the IT system function. The IT staff from different actors had to spend time on integrating the IT systems with the other actors, examining the connections and solving unexpected problems. Accordingly, the case companies often used coordinated development with a strategic supplier to develop the main IT system and took a long time to integrate the IT requirements and restrictions from the actors across the different functions, in order to transfer information between them. The task is more complex across different functions and closely related to the focal firm's development activities. Previous studies argue that greater project complexity increases development time (Meyer and Utterback, 1995; Griffin, 1997). This is because complex tasks have many steps and require many connections between different functions, which all take time. The present study found that focal firms use intensive collaboration with fundamental suppliers to accomplish the many steps of their complex tasks and integrate information across different functions, leading to increased development time. In contrast, case companies also use contract development with some suppliers to develop non-fundamental functions because these functional tasks are simpler and independent of the focal firm's development activities. Case companies developed and signed only their service contract with a supplier and this clearly identified the requirements and restrictions. In this task, the suppliers directly followed the terms of the contract. Neither side spent much time on adjusting and fitting the IT systems. This empirical finding provides a better insight into the level of intensity adopted in inter-firm collaboration and the association of this issue with the speed of new service

development under different degrees of task complexity. When tasks are more complex, focal firms adopt a higher degree of intensity of inter-firm collaboration and this may increase development time.

Furthermore, in the MMK service development, the development of business modules mainly required information to be transferred between the case companies and the service content companies. In order to enrich the service content in the kiosks and to increase the profit turnover, the MMK service has to accumulate different business modules. Case companies often use contract development with service content companies on the basis of an existing IT system or business module. This new project development was probably quicker because they did not spend too much time on fitting the two IT systems together. If the business module is totally new, case companies often use a high degree of intensity in collaboration (e.g. in coordinated development) with the service content companies in developing a new business module in order to acquire different domain knowledge and strategic resources and identify the IT requirements and restrictions of the new business module. Developing a new project is slower because they may need to spend some time on fitting the two IT systems together and on solving unexpected problems. Previous study argued that effective supplier integration can reduce the development time when the product line is mature and the development goals are well-designed (Eisenhardt and Tabrizi, 1995). This implies that the project's newness may influence the speed of new product development. A very new project makes it difficult to reduce technological uncertainty and may lead to inefficient development (Moenaert et al., 1995). The present study found that focal firms adopt more intense inter-firm collaboration with suppliers to discuss potential problems, reduce technological uncertainty and further identify the IT requirements for connecting the two IT systems when the business module is relatively new. This empirical finding provides a better understanding of the degree of intensity adopted in inter-firm collaboration and the way in which this issue is associated with the speed of new service development under different degrees of project newness. Very intense inter-firm collaboration may reduce the speed of new service development when a project is very new. When a project is less new, less intense inter-firm collaboration may speed up the new service development.

Conclusions and managerial implications

The main focus of this study was to identify how the intensity of inter-firm collaboration

varies across four cases and two selected service developments. In more detail, it enquired how the intensity of inter-firm collaboration influenced the speed of new service development and compared examples across two selected service developments. The present research found that the adoption of intensity in inter-firm collaboration is influenced by the degree of task complexity and of project newness. When the task is complex and is associated with case companies' development activities, case companies often collaborate more intensely with suppliers. Case companies also adopt less intense inter-firm collaboration with some suppliers when the development task is simpler and can be separated from the case companies' development activities. In addition, when case companies developed different business modules for the MMK service, they also collaborate with suppliers on the basis of different degrees of project newness. Case companies collaborate less intensely with suppliers when the development task is based on existing business modules or an existing IT system.

Moreover, the present research found that there is a negative relationship between the intensity of inter-firm collaboration and the speed of new service development, which is consistent with the arguments of previous studies that case companies adopting more intense inter-firm collaboration may increase the time required to develop new services (e.g. Littler et al., 1998; Von Corswant and Tunälv, 2002). Additionally, the present study further provided a better insight into the relationship between the intensity of inter-firm collaboration and the speed of new service development depending on different degrees of task complexity, for example, when case companies developed the online shopping with pick-up at store service. A higher intensity of inter-firm collaboration may slow down the speed of new service development when tasks are more complex. Furthermore, the present research also found empirical evidence that, when case companies developed different business modules with service content companies, the relationship between the intensity of inter-firm collaboration and the speed of new service development depends on the degree of project newness and this quickly expands the scope of different business modules for the kiosks. When projects are less new, focal firm using less intense inter-firm collaboration may reduce the time required.

This research offers some managerial insights. The degree of task complexity and project newness influence the relationship between intensity of inter-firm collaboration and development speed in the development of new services. Firms should cooperate more intensively with fundamental suppliers (e.g. IT system supplier and logistics) to lay the foundation of a new service. This close collaboration allows a focal firm to identify

functional requirements and integration problem with its suppliers to contribute fundamental functions of a new service. However, the present research indicates that in some circumstances (e.g. a higher degree of project complexity) the cost of communication can result in a negative relationship between the intensity of inter-firm collaboration and development speed, in which increased intensity results in increased cost and a longer development time for the new service. Then it may be more appropriate for firms to cooperate less intensively with non-fundamental suppliers when a project is not relatively new, as these suppliers have fewer essential resources and some market alternatives to contribute to the new service development. Firms should modulate the development activities of non-fundamental suppliers and keep many alternatives, to improve external sourcing. A lower level of interaction between firms may reduce the time and cost to administer arrangements with these suppliers.

Prior research suggested that the intensity of collaboration may have a positive or negative relationship on the speed of new product development. The relationship between the intensity of inter-firm collaboration and development speed did not coincide in new product development. However, our research indicates that the intensity of collaboration has a negative influence on the speed of new service development under some circumstances (i.e. different degree of task complexity and project newness), in terms of the different functions which are effected, for example, IT, logistics and marketing.

References

- Auster, E. (1992). The relationship of industry evolution to patterns of technological linkages, joint ventures, and direct investment between U.S. and Japan. *Management Science*, 38 (6), 778-792.
- Bartlett, C, SB Ghoshal and P Beamish (2008). *Transnational Management: Text, Cases and Readings in Cross-Border Management*, 5th Edition, McGraw Hill.
- Cousins, P. D. and B Lawson (2007). The effect of socialization mechanisms and performance measurement on supplier integration in new product development. *British Journal of Management*, 18 (3), 311-326.
- Den Hertog, P. and R Bilderbeek (1999). Conceptualising service innovation and service innovation patterns, Thematic essay within the framework of the Research

Programme Strategic Information Provision on Innovation and Service (SIID) for the Ministry of Economic Affairs, Directorate for General Technology Policy (Dialogic).

De Jong, JP, A Bruins, W Dolfma, and J Meijaard (2003). Innovation in Service Firms Explored: What How and Why? *EIM Business Policy Research, Netherlands*.

Eisenhardt, KM. and BN Tabrizi (1995). Accelerating adaptive processes: product innovation in the global computer industry. *Administrative Science Quarterly*, 40 (1), 84-110.

Fliess, S and U Becker (2006). Supplier integration—Controlling of co-development processes. *Industrial Marketing Management*, 35(1), 28-44.

Forfás (2006) *Services Innovation in Ireland- Options for innovation policy, Forfás report*, Dublin, Ireland.

Gallouj, F and O Weinstein (1997). Innovation in services. *Research Policy*, 26 (4-5), 537-556.

Gerpott, TJ (1999). *Strategisches technologie-und innovationsmanagement [Strategic technology and innovation management]*. Schäffer-poeschel, Stuttgart.

Gibbs, G (2008) *Analyzing qualitative data*, Sage, London, UK.

Griffin, A. (1997). Modeling and measuring product development cycle time across industries. *Journal of Engineering and Technology Management*, 14 (1), 1-24.

Hagedoorn, J. and R Narula (1996). Choosing organizational modes of strategic technology partnering: international sectoral differences. *Journal of International Business Studies*, 27 (2), 265-284.

Hipp, C, B Tether and I Miles (2000). The incidence and effect of innovation in services: evidence from Germany. *International Journal of Innovation Management*, 4 (4), 417-453.

Howells, J and B Tether (2004). Innovation in services: Issues at stake and trends, *Studies on innovation matters related to the implementation of the Community 'Innovation and SMEs programme'*, ESRC Centre for Research on Innovation and Competition, Institute of Innovation Research, University of Manchester and Commission of the European Communities, Brussels – Luxembourg, Final report.

Hulshoff, HE, FMJ Westhof, JJ Kirchhoff, BA Kirchhoff and ST Walsh (1998). New services: strategic exploratory survey of a dynamic phenomenon, EIM, Zoetermeer.

Littler, D, F Leverick, and M Bruce (1995). Factors affecting the process of collaborative product development: A study of UK manufacturers of information and communications technology products. *Journal of Product Innovation Management*,

12 (1), 16-32.

- Littler, D, F Leverick, and D Wilson (1998). Collaboration in new technology based markets. *International Journal of Technology Management*, 15 (1-2), 139-159.
- Lovelock, CH (1984). Developing and implementing new services. in *Developing New Services*, George WR and CE Marshall (eds.), Chicago: American Marketing Association.
- Maffei, S, B Mager and D Sangiorgi (2005). Innovation through service design: from research and theory to a network of practice, a users' driven perspective, in *Joining Forces, International Conference on Design Research*.
- Meyer, MH and JM Utterback (1995). Product development cycle time and commercial success. *IEEE Transactions on Engineering Management*, 42 (4), 297-304.
- Moenaert, RK, A De Meyer, WE Souder and D Deschoolmeester (1995). R&D /Marketing communication during the fuzzy front-end. *IEEE Transactions on Engineering Management*, 42 (3), 243-258.
- NYLÉN, U. (2007) Interagency collaboration in human service: impact of formalization and intensity on effectiveness. *Public Administration*, 85 (1), 143-166.
- Petersen, KJ, RB Handfield and GL Ragatz (2003). A Model of supplier integration into new product development. *Journal of Product Innovation Management*, 20 (4), 284-299.
- Petersen, KJ, RB Handfield and GL Ragatz (2005). Supplier integration into new product development: coordinating product, process and supply chain design. *Journal of Operation Management*, 23(3-4), 371-388.
- Tani, T and von Wangenheim, S (1998). Vergleichende empirische Analyse des Serienanlaufs bei Automobilzulieferern in Deutschland und Japan. In *Integrationsmanagement für neue Produkte*, Horvath P and G Fleig (eds.), Stuttgart: Schäffer-Poeschel.
- Tatikonda, MV and MM Montoya-Weiss (2001). Integrating operations and marketing perspectives of product innovation: the influence of organizational process factors and capabilities on development performance. *Management Science*, 47(1), 151-172.
- Tether, BS (2002). The sources and aims of innovation in services: variety between and within Sectors, CRIC Discussion Paper No. 55, University of Manchester, Manchester, U.K.
- Tether, B and JS Metcalfe (2004), Services and Systems of Innovation, in *Sectoral Systems of Innovation*, Malerba, F (eds.), Cambridge University Press.
- Tidd, J and J Bessant (2009). *Managing Innovation – integration technological market and*

organizational change, 4th ed., Wiley.

Vermeulen, P (2001), *Organizing Product Innovation in Financial Services*, Nijmegen University Press.

Vermeulen, PAM and van der Aa, W (2003) Organizing Innovation in Services, in *Service Innovation. Organizational Responses to Technological Opportunities & Market Imperatives*, Tidd, J and F Hull (eds.), London: Imperial College Press, 35-53.

Von Corswant, F. and C Tunälv (2002). Coordinating customers and proactive suppliers- A case study of supplier collaboration in product development. *Journal of Engineering and Technology Management*, 19 (3-4), 249-261.

Voss, C, R Johnston, R Silvestro, L Fitzgerald and T Brignall (1992). Measurement of innovation and design performance in services. *Design Management Journal*, 3(1)Winter, 40-46.

Yin, RK (2003) *Case study research: Design and methods*, 3rd ed., Thousand Oaks, CA: Sage.

Zahra, AS and AP Nielsen (2002). Sources of capabilities, integration and technology commercialization. *Strategic Management Journal*, 23 (5), 377-398.