Mobile Service Co-innovation and Service Performance: A Cross Industry Study

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Abstract

With SDL (Service-Dominant Logic), we developed a conceptual framework and conducted an empirical research with medical, financial-related, software and logistics industry. The study aims to explore how companies' competence can help to develop mobile service innovation, and to what extent service co-innovation can influence innovation performance. Self-administered questionnaires were adopted to investigate IT department and sales department in each firm. The data were received from 164 sales managers from four industries. The findings suggest that a firm with the high level of mobile service co-innovation can promote innovation performance. Furthermore, the results showed that alliance management capability and IT readiness influence mobile service co-innovation. The study contribute to innovation literature by suggesting that firm should develop and gain operant resources that promote and foster mobile service co-innovation.

Keywords: Service-Dominant Logic, Mobile Service Innovation, IT readiness, Innovation performance, Alliance management capability

1. INTRODUCTION

In today's competitive business environments, companies are continuously finding new ways to upgrade customer services and create values. With wireless networks and mobile technologies, companies can develop mobile services to provide pervasive electronic services which are alongside their customers anytime and anywhere (Varnali & Toker 2010). By providing mobile customer services, companies build up customer relationships, satisfy customer needs, and ultimately increase profits.

Numerous studies have discussed the value of mobile service. For example, mobile service can provide elements of value including ubiquity, personalization, flexibility and dissemination (Siau et al. 2001). It can also deliver value-added, interactive and location-based services to customers (Wang et al. 2006). Compared with electronic commerce application which must be with fixed attribute with wired infrastructure, mobile service enables companies to create a new service delivery system for customers to provide more comprehensive products and services.

To provide new and creative mobile services, companies need to apply their specialized knowledge, skills, and collaborative competence. Service-Dominant Logic (SDL) perspective further suggests that companies focus on dynamic and intangible resources may contribute to competitive advantages and performance (Vargo & Lusch 2004; Lusch et al. 2007; Nilsson & Ballantyne 2014). We argue that mobile service innovation (MSI) be developed along with competence to deliver new services. Besides, collaborating with partners and customers to produce and sustain values has been considering a plausible approach for marketing (Lusch et al. 2007). Currently, studies on mobile service innovation are scant. More research efforts have to be made to understand where to allocate resources to boost mobile service innovation and ultimately innovation performance.

This study aims to explore how companies' competence can help to develop mobile service co-innovation, and to what extent service co-innovation can influence innovation performance. The objectives are: (1) to conceptually define mobile service co-innovation; (2) to investigate the extent to which innovation orientation, information technology (IT) readiness, and alliance management capability influence mobile service co-innovation; and (3) to explore the relationship between mobile service co-innovation and innovation performance. Service-Dominant Logic informs us that innovation orientation, IT readiness, and alliance management capability have impact towards service innovation, because they are a company's competences which associate with performance. However, these three concepts have yet been tested in cross industry contexts. We therefore proposed to test the concepts with managers from IT and sales departments.

2. LITERATURE REVIEW AND HYPTHESES

2. 1 Service-Dominant Logic

Service-Dominant Logic (SDL) postulates that the use of knowledge and mental competences are operant resources which are in the center of companies' competitive advantage and performance. SDL recognizes that collaborative competence, technology, and innovation orientation are important operant resources (Schreiner et al. 2009). With SDL, service innovation is considered one of the strategy intentions to improve competitiveness. Service innovation relies on a combination of competences, by which companies can continually create, combine, and make changes (Lusch et al. 2007; Skålén, et al. 2015).

Studies on mobile service innovation (MSI) literature are scant. Only few studies have focused on theoretical and empirical investigation in mobile service innovation (e.g., Weber et al. 2011; de Reuver & Bouwman 2012). In our research model, operant resources enhance mobile service innovation which in turn influences innovation performance. Environmental turbulence will moderate the effects in the relationship between antecedents and mobile service innovation. In the following subsections, we review the literature pertaining to our research model.

2.2 Mobile Service Co-Innovation

According to Avlonitis et al. (2001), mobile service co-innovation (MSC) is defined as follow: MSC is a new or current service modification provided by collaboration with partners. MSC refers to new services that are delivered with the support of wireless device; it requires a wide range of resources and capabilities that are not controlled by one single actor (Blazevic, Lievens, & Klein 2003). The

applications of mobile services include communication, information, transaction, and interaction (Barnes 2002; Buellingen & Woerter 2004; Varshney & Vetter 2002). MSC, in current study, is defined as customer service that is developed through collaboration with partners using telecommunication technology.

2.3 Innovation Orientation

Innovation orientation (IR) refers to a company's openness to new ideas, practices, and extent to adopt new technologies, resources, and skills to be part of a corporate belief and culture (Hurley & Hult 1998). IR is also considered as an intentional plan (Worren et la. 2002) and strategy which guides organization toward innovation. It is a knowledge system including learning philosophy, strategy direction, and transfunctional acclimatization which is a type of company-wide shared beliefs, value and understandings to enhance innovation (Siguaw et al. 2006). Numerous studies have explored market orientation and innovation orientation for company to meet business performance to respond economy instability (Noble et al. 2002; Zhou et al. 2005). There are four types of IR: integrated innovators, internally driven preservers, proactive customer-oriented innovators, and top-down innovators; the test of the association of these four types with innovativeness and financial performance suggests that integrated innovators has higher innovativeness than the others (Gatignon & Xuereb 1997).

From SDL perspective, IR is a dynamic operant resource (organizational resource) which enables companies to fine-tune themselves to handle problems from external environment (Madhavaram & Hunt 2008). Work environment and organizational culture include many elements that enhance or inhibit innovation (Gilley et al. 2008). When culture or strategy direction of firm is prone to innovation, the firm may adopt and implement new ideas and then increase the possibilities of novelty products and services.

Previous studies have showed that IR is a key factor of organizational innovation or innovation practices (Hurley & Hult 1998; Chen et al. 2009; Stock & Zacharias 2010). When a firm adopts innovation strategy, it takes a distinct direction and focuses the effort of the whole organization on a common innovation goal (Oke 2007). Innovative organizational culture can promote a firm's competence (Menor & Roth 2007). Hence, if a firm possesses culture and strategic orientation to accept new ideas and concepts, they will be more willing to adopt and implement new technologies. We therefore infer that both organization culture toward innovation and resources which produce and create a superior capacity to innovate, contribute to service co-innovation. Accordingly, we propose the following hypothesis:

H1: The higher level of innovation orientation, the higher the tendency of mobile service co-innovation.

2.4 Information technology readiness

Technology-readiness refers to an individual's propensity to embrace and use new technologies for accomplishing goals in home life and at work (Parasuraman 2000). Numerous studies have explored the role of technology-readiness and its impact on customer-company interaction, technology-product and services at individual level (Parasuraman 2000; Jing et al. 2008). In the current study, we explore technology readiness at the firm level. Studies on small businesses suggest that organizational readiness influence a company's decision of adopting innovative technologies (Iacovou et al. 1995). A firm's information communication technologies (ICT) infrastructure and ICT skills contribute to successful e-business adoption and use (Fuchs et al. 2010) and to expand services and provide new delivery channels, such as mobile and online banking (Kumar & van Hillegersberg 2004). Therefore, we can infer that a firm must have a certain degree of technology readiness so that it can observe, realize, adopt, and implement technology related services and then ultimately enhance the firm's performance.

Firm Information technology readiness refers to readiness of both IT infrastructure and IT human resources (Zhu et al. 2006). Technology infrastructure consists of the computer and communication technologies, the shareable technical platforms, and databases (Bharadwaj 2000). Thus, it enables Internet-related businesses (Zhu & Kraemer 2005). IT human resources refer to employees who have IT expertise and use their knowledge and techniques to conduct Internet-related applications and technologies (Zhu et al. 2003; Zhu & Kraemer 2005).

IT infrastructure is crucial to companies, because it enables companies to engage in e-business (Jing et al. 2008). Companies with unique IT infrastructure provide the resources that enable feasible innovation and upgrade the current products (Bharadwaj 2000). Mobile services are part of e-business activities which are provided via mobile devices, such as phone or personal digital assistants (PDA), to conduct exchange and transaction activities. IT readiness may have impact to mobile service innovation, because its relationship with e-business innovation has been attested. Secondly, SDL recognizes technology as bundled and operant resource. Through technology, companies increase linkages and collaborations between staffs, suppliers, customers, and outside partners. As a result, technology enables collaboration and makes innovation possible (Lusch et al. 2007). We propose that companies that with a higher level of technology readiness in terms of technology infrastructure and IT human resources can adopt and implement new and state-of-the-art technologies. We therefore argue that IT readiness will influence the level of mobile service co-innovation. Thus, we propose the second hypothesis:

H2: The greater level of IT readiness, the greater the tendency of mobile service co-innovation.

2.5 Alliance management capability

According to SDL, collaborative competence is used to assist the development of two additional competence, absorptive competence and adaptive competence. Collaborative competence is crucial to gain sustained competitive advantages to survive in dynamic, unstable, and complex environment (Lusch et al. 2007). To prompt innovations and competitive advantages, companies develop network relationship that can provide specialized knowledge and capabilities to each other (Inkpen, & Tsang 2005; Sammarra & Biggiero 2008). Besides, inter-organization relationships which link diverse business partners may enable companies to gain and have access to the different range of resources and information (McFadyen & Cannella 2004; Rodan & Galunic 2004) However, cooperation between companies has some problems such as transaction costs and opportunistic behaviors. Therefore, partner relationship is an investment process that companies need to develop the capacity in administrating its network (Ritter & Gemünden 2004).

The term collaborative competence is yet well-defined; however, it can be conceptualized as alliance management capability including alliance communication, alliance coordination, and alliance bonding behaviors (Schreiner et al. 2009). The goal is to cooperate and co-develop with partners to achieve higher returns. Alliance communication refers to give formal and informal information to alliance partners timely and then established the reciprocal relationship, it might provide focal firm with useful information (Schreiner et al. 2009). Alliance coordination refers to the extent of routines to coordinate activities and resources with the alliance partners (Schilke & Goerzen 2010). Alliance bonding behaviors refer to a firm's ability to develop bonds with partners by consistently providing instrumental or expressive values to them (Schreiner et al. 2009).

Inter-organization collaborations enable a firm to have access to new resources and positively promote a firm's innovation activities (de Faria, Lima, & Santos 2010; Tomlinson 2010). Besides, network competence has a positive impact on company's innovation success (Ritter & Gemünden 2004). Therefore, we propose that alliance management capability will influence the level of mobile service co-innovation. Thus, the third hypothesis is:

H3: The greater level of alliance management capability, the greater the tendency of mobile service co-innovation.

2.6 Innovation performance

The firm's performance refers to how a firm improves efficiency and effectiveness. A firm's Innovation performance has two aspects: *financial performance* and *non-finical performance* (Avlonitis et al. 2001). In contrast to financial measure, non-finical measure of innovation performance stands for competitiveness and quality which are relative easy to obtain (Menor et al. 2002). Previous studies on innovation performance suggest that companies that with more innovativeness have also higher innovation performance (Oke 2007; Chen et al. 2009).

Researchers noted that a firm performance is measured by competitiveness and that product innovation positively contributed to product performance (Lau et al. 2010). It therefore can infer that the greater level of innovation results in a higher level of firm performance (Lau et al. 2010). The relationship between innovation with Internet application and firm performance was attested (Oke 2007; Chen, et al. 2009). Thus, here is the fourth hypothesis:

H4: The greater level of mobile service co-innovation, the greater is the influence of service innovation performance.

3. METHODOLOGY

3.1 Instruments

There are a total of five constructs in the proposed research model (see Figure 1): innovation orientation, technology readiness, alliance management capability, mobile service co-innovation, and innovation performance. The concept of mobile service co-innovation is new; we therefore developed scales for this construct based on literature on service innovation and mobile service application. The unit of analysis in our research is firms in service industry in Taiwan. Forty-three questions were included in the questionnaire. Five-point Likert-type scales ranging from strongly disagree (=1 point) to strongly agree (= 5 point) were employed (See Appendix A for survey instrument).

Innovation orientation is measured by using six items drawn from Siguaw et al. (2006) and Hurley & Hult (1998). These items measured the extent to which an organization is open to new ideas and propensities to change through adopting new technologies, resources, skills, and administrative systems. In addition, items measure a firm's willingness to accept innovation risks and assist employees to development new ideas.

Technology readiness is defined the degree of a firm's preparation of IT hardware and software to successfully implement and provide mobile services (Zhu et al. 2006). Technology readiness contains two parts including technology infrastructure and IT human resources. Technology infrastructure refers to computer and communication technologies and the shareable technical platforms and databases. IT human resources refer to employees who are IT professionals; they can use their knowledge and techniques to make use of Internet applications and technologies.

Alliance management capability is defined as a second-order construct formed by three factors: alliance communication, alliance coordination, and alliance bonding behaviors (Schreiner et al. 2009; Schilke & Goerzen, 2010). We measured *alliance communication* infrastructure by using four items that tested the extent of routines to coordinate activities and resource with the alliance partners. We measured *alliance coordination* with five items that refers to the extent of the formal and informal sharing of meaningful and timely information between companies. We measured *alliance bonding behaviors* with four items that refers to a firm's extensive and repeated contacts with partners and consistently providing instrumental or expressive values to them.

Mobile service co-innovation refers to new services that are delivered with the support of wireless device (Blazevic et al. 2003). By definition, mobile service co-innovation is either new mobile services or current services modified and combined with mobile service applications that include communication services, information services, transaction services and interactive services (Blazevic et al. 2003; Varshney & Vetter 2002; Coursaris et al. 2003; Buellingen & Woerter 2004). We employed scales from service innovation (Avlonitis et al. 2001) with refinement. The mobile service co-innovation is a new construct. Therefore, this study developed this construct based on current literature which addresses the concept of service innovation and mobile service application. We figured out four aspects that can be applied to mobile service co-innovation: mobile communication service, mobile transaction service, mobile information service, and mobile interactive service. Items were adopted from previous research (see Table 1 for sources of pre-validated constructs).

Innovation performance has two categories: quality and competitiveness (Menor & Roth 2007). Quality refers to service quality and experiences that are superior to those of competitors'; the service has greater reliability and is more user-friendly. Competitiveness refers to exceed market share, sales, and growth target that have been established. See Table 1 for construct definition and sources.

Firm size, firm age, and firm capitals are control variables by which we infer they have effect on innovation performance. Larger companies may have more resources and capabilities to create diverse and the state-of-the-art services. Firm size could affect the firm's performance by offering a higher potential for synergy creation (Menor & Roth 2007). We then controlled the firm size by factoring into account the number of employees of companies. Firm age may influence firm's performance as well (Baum et al. 2000). New companies are more likely to adopt innovation while older may be less likely to be innovative (Huergo & Jaumandreu 2004).). Older companies tend to be constrained by organization inertia so they may follow the past successful experiences and employees may resist changes of new processes and services. So, we controlled the firm age by measuring its number of

years of establishment. Moreover, a firm with more capitals has a positive effect on sales growths (Florin et al. 2003); it refers to a firm with more financial resources that can employ them and lead to superior performance. We therefore control the effect of firm capitals with the data analysis.

3.2 Data Collection

There are many empirical studies investigate the service innovation in manufacturing and service companies (e.g., Gilley et al. 2008; Xu et al. 2014; Rusanen et al. 2014), but few have discussed companies that provide mobile services. Among mobile services providers; we choose industries that specifically provide B2C mobile services. The samples were drew from a journal, published by China Credit Information Service, entitled "the largest corporations in Taiwan—Top 5000 (2008)", from LTD, and from the Google search results. Initially, 596 mobile service providers from four industries, software, medicine, financial service, and logistics industries, were collected. Few companies were excluded from the list because of merging, bankrupt, and address changed.

Five hundred ninety-six paper-based questionnaires were mailed to sales and IT managers of selected companies. Sales departments are likely to respond the questionnaires because they have direct contact with customers. Also, they know about customer experiences, mobile services, and the effect of customer experiences on service performance. To increase the response rate, a note explains that one hundred New Taiwanese dollars (NTD) will be donated to a charity association, World Vision, for supporting children attending school when each questionnaire is replied. One month after mailing the questionnaires, only 43 responses were received. We then followed up the companies through Skype telephone calls, fax, e-mails, and mails to encourage responses. With the follow-ups, a note that explains to respondents that one hundred NTD donation to Genesis Social Welfare Foundation will be made for each of the responses. Three months later, the numbers of valid samples increased to 164 and the response rate is 26.62%. We used only responses from sales managers for data analysis, because the response rate of the IT managers is low.

To measure non-response bias, the responses were divided into two groups based on the date which they were received. Using the independent t-test to examined the non-response bias. The first mailing was classed as early response (n=43); the follow-ups were named as late responses (n=121). There are no significant differences between early and follow-up groups in: years established in Taiwan (p=.820); firm capitals (p=.120), number of employees (p=.058), industry type (p=.115), tenures with their companies (p=.604). The result of independent t-test shows in Table 2.

4. DATA ANALYSIS

Smart PLS 2.0 and Social Science (SPSS 19.0) were used to analyze the data. PLS is a technique to develop theoretical model at early stage of theory development (Chin et al. 1996). It does not require large sample size and our data set is relatively small (n= 164), so our sample size fits PLS requirements.

4.1 Demographics

The demographic of the firm surveyed shows that one-third of companies have been established over 20 years (36.59%) at the time of his survey. More than half of the companies have approximately capitals in the range between 100 millions and one billions NTD (70.73%); 33.54% had more than 1000 employees; 32.31% of these respondents have worked for over 15 years with the current companies, only 14.63% of these respondents have only worked for less than 3 years with the current company. As for the category of mobile service industry that respondents owned, 39.63% of the companies come from finance-related industry, 21.95% comes from medical industry, 23.78% come from logistics industry and 14.63% come from software industry.

4.2 The measurement model

The estimate of measurement model suggests that items have acceptable reliability and validity. Cronbach's alpha values of the eight constructs range from 0.833 to 0.958, demonstrating a high internal consistency of measuring reliability (Nunnaly 1978). The values exceed the 0.7 acceptable value of the internal composite reliability (CR) (Fornell & Larcker 1981). All CR values were above the suggested threshold values, ranging from 0.898 to 0.963. Factor loadings of each constructs, range from 0.761 to 0.931, so all the items were retained for analysis.

The average variance extracted values (AVEs), ranging from .688 to .856, were all above recommended threshold of .50 (Barclay et al. 1995). Table 3 presented the mean score, standard deviation, AVE and the correlation coefficient of each variable. All square roots of AVE were higher than the correlations among the measures; they were shown off-diagonal of Table 3. In summary, the measurement model shows that reliability, convergent and discriminant validities all met the heuristics. Thus, it shows that the model has good fit to the data.

4.3 The structural model

Hypotheses testing shows that the relationship between innovation orientation and mobile service co-innovation is not significant (β=0.009, t=0.129, p>0.05), so H1 was not supported. The relationship between technology readiness and mobile service co-innovation is significant (β=0.352, t=4.348, p<0.001) so H2 was supported. The relationship between alliance management capability and mobile service co-innovation is significant (β=0.483, t=5.529, p<0.001) so H3 was supported. Finally, the relationship between mobile service co-innovation and innovation performance is significant (β=0.761, t=18.788, p<0.001), so H4 was supported.

The results of the PLS analysis shows in Figure 2. The R^2 values indicated that the amount of variance dependant variable was explained by independent variables (Barclay et al. 1995). The R^2 value of mobile service co-innovation is 0.568 which indicates that operant resources (i.e., technology readiness and alliance management capability) explain over 50 percent of variance in mobile service co-innovation. The R^2 value of innovation performance is 0.601, suggesting that mobile service co-innovation explain more than 60 percent of variance in innovation performance. The effect of three control variables (i.e., firm capital, number of employees and firm's established time) were found not significant; they do not affect the outcome of innovation performance. The results of cross industry analysis is shown in Appendix B, suggesting that all the hypothesis testing consist with total sample (N=164), except for the relationship between technology readiness and mobile service co-innovation in logistics industry (β=0.225, t=1.630, n.s.).

5. DISCUSSION

5.1 Discussion of Key Findings

This study contributes service innovation literature and focus on firm's operant resources that are focal assets to develop and create new electronic services. By presenting mobile service construct, we explore the elements of mobile service co-innovation under the conceptualization of SDL. We use SDL concept to verify whether operant resources contribute to the extent of innovation and performance. This study gives service providers a direction to rethink developing and sustaining the right resources and competences to create new and differential services which may promote firm performance. Our model suggests that firm should develop and gain operant resources which will promote and foster mobile service co-innovation. Based on research finding, firms can enhance their innovation performance.

Innovation orientation for mobile service co-innovation. Innovation orientation is not significant predictor on mobile service innovation; this suggests that technology readiness and alliance management capability are more significant and important than innovation orientation. In other word, a firm may put more effort and focus on technology development capability and networking capability to promote mobile service innovation.

The innovation orientation has significant positive effect on mobile service co-innovation through single regression analysis (β=.409, t=5.417, p<0.001), but has no significant effect with PLS analysis. It should be noted that there is a high correlation between innovation orientation and mobile service co-innovation. When technology readiness and alliance management capability were together in model estimation, it weakens the effect between innovation orientation and mobile service innovation. Therefore, if we remove the technology readiness and alliance management capability from the proposed model, the effect of innovation orientation would be stronger in influencing mobile service co-innovation.

Technology readiness and alliance management capability for mobile service co-innovation. Alliance management capability is the crucial driver influencing mobile service co-innovation. Its path coefficient is 0.506, higher than technology readiness (β=0.335). As previous studies suggested that networking capability is important factor to promote and drive company's innovation success (Ritter

& Gemünden 2004). A firm can gain complementary resources through relational competence to create and promote product innovation success and process innovation success.

Mobile service co-innovation for innovation performance. Mobile service co-innovation have the strong positive effect on innovation performance (β=0.777, t=20.776, p<0.001). Further, the R^2 value of mobile service innovation and firm performance are 0.568 and 0.601 respectively, so we can infer that mobile service have a higher predictive power for innovation performance. The result shows that mobile service applications that include information service, transaction service, interactive service, and communication service, are value-added services to provide convenience. Besides, mobile technology can provide more personalized service because it keeps records of customer preference. A firm can provide mobile service to deliver diverse services and promotions for different segment customers and then build long-term relationship with them. Firm can develop mobile service not only to increase interaction channel with customers but also to develop new applications in the future. In this dynamic and unstable environment, a firm must to find way to provide value-added service to increase customer stickiness to contribute firm performance and competitive advantage. Managers must pay more attention to develop operant resources to create mobile service co-innovation to obtain superior firm performance.

5.2 Managerial Implications

The research findings suggest that the provision of mobile service is crucial for upgrading innovation performance. A firm's operant resources are key factors to contribute to mobile service co-innovation especially in networking capability. This study provides the insights relating service innovation especially in the Internet context.

Currently, mobile service is moving toward fourth generation (4G) technology and cloud computing; it provides diversified application opportunities (Armbrust, et al. 2009). Customers are more willing to accept and adopt new technology-based services because the interfaces are relatively handy and user-friendly. Technology-enabled services provide crucial ways for firms not only to provide valued-added services but also to compete through differentiated services. In this study, four industries are service-based and the services need to be instantly available and data storable. Opportunities of mobile services that create values to companies are promising.

Secondly, firms should re-orient the strategy directions toward enforcing the role of operant resources which are dynamic so that they can reconfigure firm resources and produce effects to match environment fluctuations instead of focusing on operant resources (statics resources). Besides, we investigate alliance management capability because the mobile service industry was built upon many other industries (Barnes 2002). A firm that wants to provide more comprehensive mobile service would cooperate with partners that can provide the complementary resources and capability. Previous research suggests that the most important element in alliance success is previous alliance experiences (Anand & Khanna 2000). Therefore, networking activities are intangible resource and require skills and knowledge that are not grounded on routine activities. As a result, a firm's openness to accelerate the networking experience is important. Once a firm can absorb knowledge and skills from past cooperative experiences and then learn from experiences; that may contribute to their networking capacities.

We extended service innovation to the electronically context; concepts were derived from Avlonitis et al. (2001). In our assumption, mobile service co-innovation plays a crucial role for promoting and stimulating firm non-financial performance. Firms with more value-added mobile service may have more opportunities to interact and contact with customers. Besides, mobile technology can record customer preference so that the firm can segment customer groups based on statistic data collected by customer consumption and then to provide more customized service for them. Besides, convenience of mobile service can contribute to customer satisfaction and then promote firm's reputation and image.

Innovation orientation is not directly significant on mobile service co-innovation. It is worth of noting that innovation orientation plays an important role when a firm innovate services. By committing to a more open work environment, such as encouraging employees to find new efficient way to work, willingness to make innovation under risk, and encouraging employees to accept new ideas from outside, a firm can easily innovate products and services.

5.3 Limitations and Future Research

This study has some inherit limitations. First, this study was conducted with some industries in one country. Due to small sample size, we are not able to perform cross industry comparison in greater depth. This limits that potential of the results being generalized to various industries. We therefore suggest future research to make cross industry comparison with various analytical approaches so more insights on mobile service and performance can be understood. Secondly, mobile service is a type of digital service so a survey with sale departments may create bias on technology readiness construct. We assume that IT department staff will have a better sense in responding to technology readiness questions. Thirdly, few studies have discussed mobile service innovation so our research model is considered an exploratory study that still has to be continuously refined. Additional research effort directs toward a more complete development should be made to improve our proposed model. For instance, some other variables such as service transformation (Townsend & Calantone 2014) and external knowledge (Chatterji & Fabrizio 2014), yet been discussed in our research because of time and financial constraints; they can be investigated in future study. Fourthly, we include only conducted non-financial performance measure; both financial and non-financial performance should be collectively discussed in the future study. Finally, through innovation orientation is not significant predictor on mobile service co-innovation; future research can explore how the effect of innovation orientation is mediated by organizational resources and capabilities and then contributes to mobile service co-innovation.

6. Conclusion

This study investigates factor influence mobile service co-innovation. The theoretical model was developed with the concept of Service-Dominant Logic (SDL) in mind and with intends to test relationships between constructs which have yet fully studies. Mobile service co-innovation (MSC) is new concept; MSC is mobile service and service modification which combines with mobile applications such as communication, information, transaction and interaction. Exploring this new concept enables us to have more understanding on MSC and its contribution to organization performance.

We focus on companies' operant resources are crucial assets to develop and create new electronic services. Using SDL concept, we verify whether operant resources contribute to the extent of innovation and performance. This study gives service providers a direction to rethink how to develop and sustain resources and competences to create new and differential services and then increase firm performance. Furthermore, we not only factor internal aspect of organization context into account, but also consider outside aspect of organization context. That is, we propose that technology and market is changing dramatically, so firm's resources and competences may be influenced by the dynamic environment. Our model suggests that firm should develop and gain operant resources which will promote and foster mobile service co-innovation.

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Figures

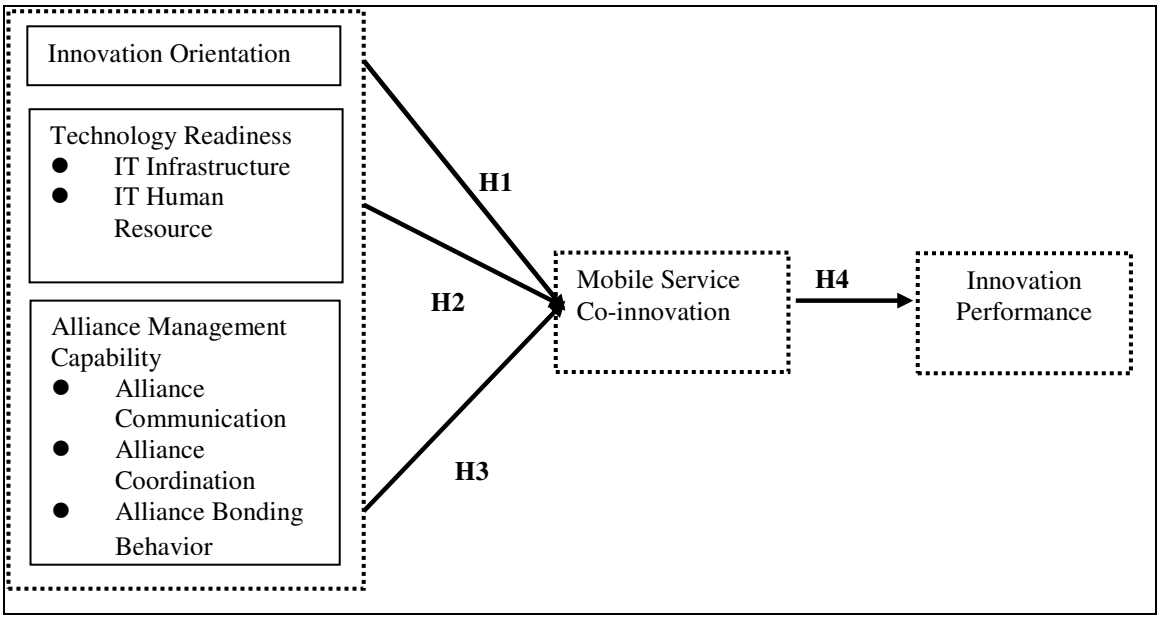

Figure 1. Theoretical model

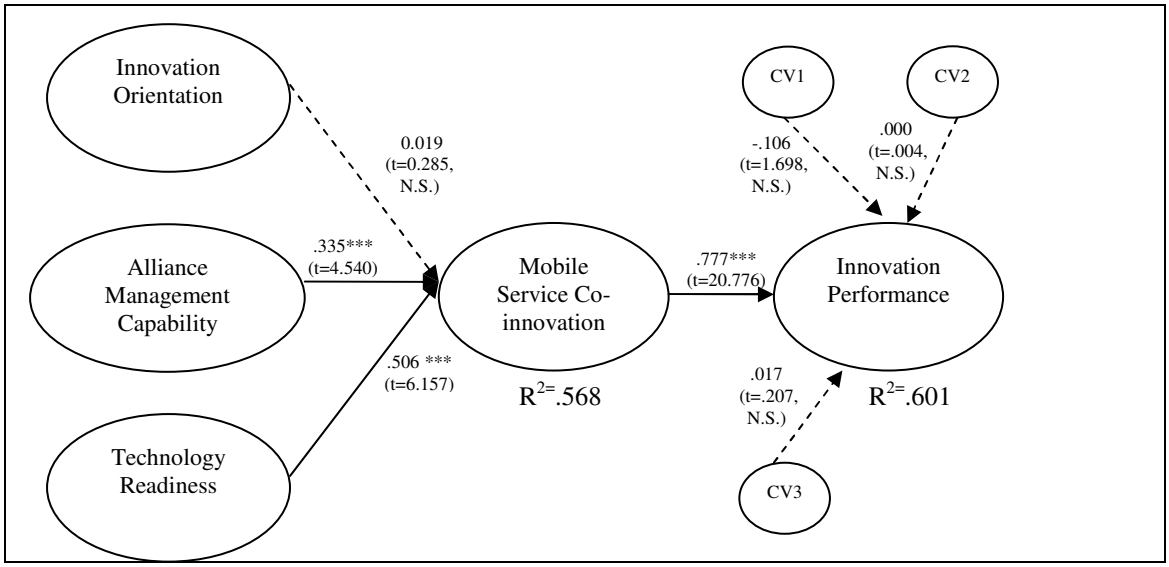

Figure 2. PLS results, Note: *P＜.05, ** P＜.01, ***P＜.001

Tables

Table 1. Operational Definitions of Constructs

Construct	Operational Definition	Sources
Innovation Orientation (IO)	The extent to which an organization is openness to new idea and propensity to change through adopting new technologies, resources, skills and administrative systems.	Siguaw (2006) Hurley & Hult (1998)
Technology Readiness (TR)	Technology Infrastructure IT Human resource	Zhu et al.(2006)

Alliance Management Capability (AMC)	Coordination: The extent of routines to coordinate activities and resource with the alliance partner.	Schilke & Goerzen (2010) Schreiner et al. (2009)
	Communication: The extent of the formal and informal sharing of meaningful and timely information between firms.	
	Bonding behavior: Extensive and repeated contact with partners and consistently providing instrumental or expressive value to them.	
Mobile Service Co-Innovation (MSC)	The extent to which an organization expert mobile service application	Varshney et al. (2002), Buellingen et al. (2004), Coursaris et al. (2003), Kuo et al. (2006)
Innovation Performance (IP)	Competitiveness: Exceeding the originally established market share, sales, growth target, giving competitive advantages to our company and upgrade our image and reputation.	Menor et al.(2002)
	Quality: Service quality and experience superior than those of competitors, greater reliability, and more user-friendly.	

Table 2. Results in Independent T-test in Basic Information of Company

Construct	Mean		Levene's Test	T-test for the equality of Means		
	Early Response (N=43)	Late Response (N=121)	Sig.	Mean Difference	t	p-value (2-tailed)
YE	4.651	4.593	.523	.058	.228	.820
FC	3.98	4.442	.111	-.466	-1.565	.120
NE	3.21	3.885	.204	-.676	-1.909	.058
Type	2.53	2.248	.056	.287	1.583	.115
TW	3.65	3.496	.426	.164	.520	.604
Note: a. The meaning of each variable as below: YE: Years Established in Taiwan; FC: Firm Capital; NE: Number of Employee; Type: Industry Type; TW: Tenures with their firm						

Table 3. Mean, Correlation, and Average Variance Extracted (N=164)

		M	SD	AVE	(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)
IO	(a)	3.939	.880	0.752	**.867**							
ITI	(b)	3.934	.888	0.739	.385**	**.860**						
ITH	(c)	3.732	.968	0.856	.371**	.742**	**.925**					
AC	(d)	4.042	.724	0.718	. .433**	.518**	.497**	**.847**				
ACR	(e)	4.046	.719	0.708	. 421**	.435**	.476**	.593**	**.841**			
ABB	(f)	3.900	.746	0.688	.427**	.362**	.378**	.553**	.589**	**.829**		
MSC	(g)	3.874	.806	0.686	.414**	.617**	.614**	.638**	.622**	.524**	**.828**	
IP	(h)	3.598	.921	0.755	.472**	.518**	.517**	.552**	.483**	.518**	.740**	**.869**
Note: 1. N=164 2. IO=innovation orientation; ITI=IT infrastructure; ITH= IT human resource; AC=Alliance communication; ACR=Alliance coordination; ABB=Alliance bonding behavior; MSC=Mobile												

service co-innovation; IP=Innovation Performance

Appendix A: Survey Instructment

1. Innovation Orientation (IO)

IO1	Our company pays close attention to innovation.
IO2	Our company accepts new ideas.
IO3	Our company promotes the need for development and utilization of new resources.
IO4	Our firms encourage employees promotes collaboration among function area to develop new service.
IO5	Our company recognizes the risk of innovation is acceptable.
IO6	Our firms help employees to develop new ideas.

2. Technology readiness

TR1	Our firm has adequate hardware for operating mobile service.
TR2	Our firm is mature in using the Internet and related technology.
TR3	Our firm has necessary software for implementing mobile applications.
TR4	Our firm has the sufficient computer equipment.
TR5	Our firm's project leader has prior experience in mobile applications.
TR6	Our firm has a great deal of professional information technology people.

3. Alliance management capability

AC1	On any given occasion, we can explain the win-win situation of the cooperation to partner.
AC 2	We try to inform our partner customer needs in a timely manner.
AC 3	We make an effort to let partner know exactly our market positioning.
AC 4	We always make an effort to make partner understand our services and product offerings.
ACR 1	For coordinating partner-related activities, we have established internal processes (e.g., for marketing, project coordination) within our company.
ACR 2	For the cooperation with partner, we have established cross-company processes, meaning reaching across company boundaries.
ACR3	Within our company, we meet regularly to adapt our working procedures to partner.
ACR4	Our activities with partners are well coordinated.
ACR 5	There is a great deal of interaction with our partners on most decisions.
ABB1	We stand by partner partner's side even in difficult situations.
ABB2	We listen attentively when partner report problems to us.
ABB3	We care about the concerns of partner even if we do not expect any advantages would arise for us in the short term.
ABB4	During conversations we feel intuitively what partner actually want.

4. Mobile service co-innovation

In recent years, our company collaborates with partners

MSI1	to provide new mobile service for customers.
MSI2	to improve current service for customers.
MSI3	to provide new service process for customers.
MSI4	to improve service process for customers.
MSI5	to provide new communication channel for customers.
MSI6	to improve current communication channel for customers.
MSI7	to provide more diverse information contents for customers.
MSI8	to improve current information contents for customers.
MSI9	to provide new transaction platform for customers.
MSI10	to improve current transaction platform for customers.
MSI11	to provide new interaction surface for customers.
MSI12	to improve current interaction surface for customers.

5. Innovation performance

IP1	Through new mobile services, our company exceeding the originally established sales.
IP2	Through new mobile services, our company exceeding the originally established growth targets.

IP3 Through new mobile services, giving competitive advantages important to our company.
IP4 Our new mobile services quality is superior to that of competitors.
IP5 Our new mobile services experience is superior to that of competitors.
IP6 Our new mobile services have greater reliability.

Appendix B: Cross Industry Analysis

Cross-industries	Financial-related industry(N=64)			Medical industry(N=36)			Logistics industry(N=40)		
Path/Hypotheses Hypothesized Relationships	Path Coefficient	t-value	Results	Path Coefficient	t-value	Results	Path Coefficient	t-value	Results
Innovation orientation → Mobile service co-innovation	-0.017	0.152	Unsupported	0.225	1.630	Unsupported	-0.040	0.318	Unsupported
Technology readiness→ Mobile service co-innovation	0.367	3.722***	Supported	0.358	1.965*	Supported	0.225	1.585	Unsupported
Alliance management capability → Mobile service co-innovation	0.484	4.606***	Supported	0.433	2.352*	Supported	0.663	4.375***	Supported
Mobile service co-innovation → Innovation performance	0.721	12.397***	Supported	0.839	12.988***	Supported	0.823	12.592***	Supported
Note: *P＜.05, ** P＜.01, ***P＜.001									

* Note: Software industry was drop from the analysis due to the small sample size.