



THE UNIVERSITY *of* EDINBURGH

Edinburgh Research Explorer

Service Business Model and Service Innovativeness

Citation for published version:

Cheng, CCJ, Shiu, ECC & Dawson, J 2014, 'Service Business Model and Service Innovativeness', *International Journal of Innovation Management*, vol. 18, no. 2.
<https://doi.org/10.1142/S1363919614500133>

Digital Object Identifier (DOI):

[10.1142/S1363919614500133](https://doi.org/10.1142/S1363919614500133)

Link:

[Link to publication record in Edinburgh Research Explorer](#)

Document Version:

Peer reviewed version

Published In:

International Journal of Innovation Management

Publisher Rights Statement:

© Cheng, C. C. J., Shiu, E. C. C., & Dawson, J. (2014). Service Business Model and Service Innovativeness. *International Journal of Innovation Management*, 18(2). 10.1142/S1363919614500133

General rights

Copyright for the publications made accessible via the Edinburgh Research Explorer is retained by the author(s) and / or other copyright owners and it is a condition of accessing these publications that users recognise and abide by the legal requirements associated with these rights.

Take down policy

The University of Edinburgh has made every reasonable effort to ensure that Edinburgh Research Explorer content complies with UK legislation. If you believe that the public display of this file breaches copyright please contact openaccess@ed.ac.uk providing details, and we will remove access to the work immediately and investigate your claim.



Service Business Model and Service Innovativeness

Colin C.J. Cheng

Department of Marketing and Distribution Management
National Kaohsiung First University of Science and Technology
2 Jhuoyue Rd., Nanzih, Kaohsiung City, 811, Taiwan
cjcheng@nkfust.edu.tw

Eric C.C. Shiu

Birmingham Business School, University of Birmingham
Birmingham Business School, University House, Birmingham, B15 2TT UK
e.c.shiu@bham.ac.uk

John A. Dawson

Business School, University of Edinburgh
29 Buccleuch Place, Edinburgh, EH8 9JS, UK
John.Dawson@ed.ac.uk

Abstract

Service innovativeness has been hailed as a key success factor in being able to differentiate a new service from its competing offerings. In spite of a number of literatures suggesting the impact that a service business model can have on service innovativeness, no comprehensive and empirical study has examined the relationship between the distinctive design themes of a service business model and service innovativeness. This article fills the research gap by conducting a series of pilot tests and then the subsequent questionnaire survey on top service firms in Taiwan. Results based on 211 responding service firms indicate that the novelty-centred business model has a U-shaped effect on service innovativeness, while the efficiency-centred business model has an inverted U-shaped effect on service innovativeness. Theoretical and managerial implications of these key findings are discussed.

Introduction

Extant literature has indicated the important role of a business model in shaping innovativeness (e.g., Johnson, Christensen and Kagermann, 2008; Teece, 2010). While most studies consider that a service business model is an important mechanism to firms (e.g., Kindström, 2010; Sabatier, Mangematin and Rousselle, 2010; Zott and Amit, 2010) and that service innovativeness is a critical factor that can differentiate a new service from competitive offerings (Agarwal et al., 2003; Ettlíe and Kubarek, 2008), they seem to ignore the distinctive categories of a service business model and their different impacts on service innovativeness. In this article, we disaggregate a service business model into its two major design themes, namely the novelty-centred business model and the efficiency-centred business model, and examine their differential effects on service innovativeness. The novelty-centred business model is referred to as the adoption of new ways of carrying out business transactions among partners, while the efficiency-centred business model is concerned with conducting business transactions among partners in an efficient way.

This study aims at addressing three important research gaps. First, by examining a service business model from its two distinctive design themes, we can better understand how a service business model of a particular design theme impacts service innovativeness. Results of previous research into the effects of a service business model have been inconsistent. Some previous studies find that a service business model enables a firm to introduce creative services (Bask, Lipponen, Rajahonka and Tinnil, 2011; Chesbrough, 2011; Zott and Amit, 2008). Yet some other studies discover that it exerts a negative impact on new service performance (Boyer, Hallowell and Roth, 2002; Verganti, and Buganza, 2005). This inconsistency may stem from the disregard of all previous studies for the intrinsic differences between different design themes of a service business model and the differential impacts that

each of them brings to.

Second, in spite of its importance, service innovativeness has not attracted sufficient research attention in service research (Alam and Perry, 2002). Of particular concern are the contradictory findings in the literature. For example, some researchers have identified a weak association between service innovativeness and firm performance (e.g., Henard and Szymanski, 2001), while others believe that this association is not weak and should not be ignored. The latter group of researchers indicate that firms' dependence on service innovativeness as a strategy for survival and growth has been fast increasing (O'Cass and Carlson, 2011; Carbonell, Rodríguez-Escudero and Pujari, 2009).

Third, one of the main characteristics of a service business model is the continuous involvement of internal and external transaction partners. This implies that the development of a service business model is evolving and involves all-round organizational learning among transaction partners (Sinkula, 1994; Zott and Amit, 2008). Especially, besides internal learning (through inter-department learning), firms' external learning depends on the openness, frequency, and density of the firm's interactions with external partners (Cohen and Levinthal, 1990; Chesbrough, 2010). This characteristic could explain why a certain design theme of a service business model fits some firms better than others. However, previous research seems to underscore the critical function of organizational learning happening in the service business model setting plays in the respective firm's service innovativeness.

This study aims to address the above research gaps and contribute to extant literature in two ways. First, we disaggregate a service business model into the novelty-centred business model and the efficiency-centred business model, and posit that a service business model itself could either facilitate or impede service innovativeness, depending on the design theme of a service business model being

adopted. Our research thus offers insights that could resolve the inconsistency in the previous literatures regarding the role of a service business model in new service performance.

Second, building on a set of organizational learning theory and business model literatures (Cohen and Levinthal, 1990; March, 1991; Zott and Amit, 2007), we propose that a service business model does not influence service innovativeness in a straightforward way as proposed in the currently available literatures. Previous studies suggest a linear effect of a business model on service innovation outcomes (Zott and Amit, 2008; Brettel, Strese and Flatten, 2012), but our research indicates that this conclusion may oversimplify a service business model and misrepresent the true phenomenon. Rather, the effects of a service business model follow a curvilinear pattern, in which service innovativeness follows a U-shaped function for the novelty-centred business model but an inverted U-shaped function for the efficiency-centred business model. These opposing effects deepen our understanding of the effects of a service business model on service innovation.

Theoretical background

Definition and design themes of service business model

Because previous business model literatures come from a variety of business subject disciplines, such as organizational studies, strategy studies, etc., definitions for the construct of business models have not converged (George and Bock, 2011, 2012). For example, business models have been equated to revenue models (Afuah, 2004), boundary spanning transaction structures (Amit and Zott, 2001), value creation systems (Osterwalder et al., 2005), organizational expectations (Downing, 2005), and narratives of success (Magretta, 2002). Worse still, some of the definitions of business models tend to differ extensively from each other (Teece, 2010). The underlying

problems are that previous studies are apparently not clear about the context in which business models should be analysed (Morris et al., 2005), and also not clear about what components should constitute a business model (Baden-Fuller and Morgan, 2010).

Since this paper aims to identify the relationship between a service business model and service innovativeness, the definition of a service business model for this study needs to fulfil the following requirements. First, the definition needs to enable this study to measure service innovativeness based on the value created through a service business model design. Second, the definition enables this study to empirically test hypothesized differences between novelty- and efficiency-centred business models. Finally, the definition should be valid in a broad range of service industries. Going through all the important literatures related to service business model definitions (e.g., Amit and Zott, 2001; Afuah, 2004; Teece, 2010), we define a service business model as a mechanism that processes the design, delivery, and capture of the service value creation among transaction partners.

With regard to design themes of service business model, According to Amit and Zott (2001), there are four design themes of a business model: (1) novelty-centred; (2) efficiency-centred; (3) lock-in-centred; and (4) complementarities-centred. In this study, we focus on novelty- and efficiency-centred business models. This is because first according to Zott and Amit (2012) and Kindström (2010), the novelty-centred and the efficiency-centred business models have been identified as being a fundamental characterization of service business models. Second, in terms of service innovativeness, the concepts of novelty and efficiency reflect two fundamental drivers to create new services (Johnston, 1999; Zeithaml, Parasuraman and Malhotra, 2002). And third, as for innovation performance, firms applying the novelty-centred business model are able to connect new transaction partners or reconnect existing transaction

partners in novel and explorative ways, which could lead to positive innovation performance (Chesbrough, 2010; Grant, 1996). Similarly, firms embracing the efficiency-centred business model aim to increase the efficiency of transactions among partners, which could lead them to develop their innovations in efficient and exploitative ways, and eventually result in positive innovation outcomes (Atuahene-Gima and Murray, 2007; Grant, 1996).

Service innovativeness and its different levels

Garcia and Calantone (2002, p. 113) define innovativeness as “a measure of the potential discontinuity a product (process or service) can generate in the marketing and/or technological process.” They also emphasize that a research on innovativeness can be carried out from one of its three levels, i.e. world, industry/market, or firm.

This study considers service innovativeness at the industry/market level because new service success is primarily determined by industry/market acceptance (Storey and Hull, 2010). Specifically, service firms may embrace state-of-the-art services, but advances in new services do not guarantee industry/market success. Whether service innovation can succeed in the industry/market depends mostly on whether it provides substantial benefits to customers or differentiates the firm from its competitors (Storey and Hull, 2010). Note that this differentiation occurs as long as and only when customers perceive the difference between the service innovation and its competitors (Crawford and di Benedetto, 2011). These benefits must be of sufficient appeal that it dramatically influences customers’ behaviours as well as behaviours of competing companies (Berry et al., 2006).

In contrast, a service innovation that is new-to-the-firm may not be new-to-the-industry/market, because evaluating service innovativeness from the firm level refers only to newness in firm’s specific factors induced by new service

development (Garcia and Calatone, 2002) but these factors may not be new in other firms. Meanwhile, while new-to-the-world services are new to both the industry/market and the firm, only a small percentage of all new services are new-to-the-world services (Garcia and Calantone, 2002; Storey and Hughes, 2013). In addition, not all new-to-the-industry/market services are new-to-the-world services (Sethi et al., 2012). Therefore, considering a broader range of new services, this study focuses on new-to-the-industry/market services.

An additional consideration in choosing the level of service innovativeness for this study is that previous studies that examine service innovativeness from the industry/market level have been successful in clearly differentiating its impacts (e.g., Anselmsson and Johansson, 2009; Kara, Spillan and DeShields, 2005; Magnusson, Westjohn and Boggs, 2009). Against this background, we can empirically address the impact of novelty- and efficiency-centred business models on service innovativeness.

Hypotheses development

The novelty-centred business model and service innovativeness

Based on its definition as mentioned earlier, the novelty-centred business model implies a wide range of diverse information spreading among disconnected transaction partners (Zahra and George, 2002). According to Fang (2008) and Rodan and Galunic (2004), diverse information derived from disconnected contacts avoids the problem of information redundancy, which is referred to as the sharing of similar information over or above the minimum amount. This information diversity is critical for the generation of creative solutions. Therefore, it is reasonable to assume that a wide range of information spreading among transaction partners in the novelty-centred business model contributes to the creation of diverse knowledge, which could have a positive influence on service innovativeness.

However, the organizational learning theory suggests that when the market environment changes, prior market information becomes obsolete, leading to a replacement with new information (Verganti, 2009). When the firm replaces the scope of its information gained from transaction partners through the novelty-centred business model, it could be liable to making more mistakes in information sharing, information integration, as well as information creation. This can bring a negative impact on service innovativeness. As Karim (2009) indicates, as a result of improper generalizations, which are about improperly spreading the effects of information to other transaction partners, a firm's innovation performance decreases constantly over a series of reorganization activities.

On the other hand, beyond a certain threshold, a wide range of information can be processed correctly, leading to a positive innovation outcome. This is because knowledge integration and learning from diverse information areas accelerates learning rates (Schilling et al., 2003). Drawing from the above discussion, we posit that a firm's innovation performance progresses at an increasing rate after it learns properly and more quickly from a series of trial-and-error (Karim, 2009). Therefore,

H1: The novelty-centred business model has a U-shaped influence on service innovativeness.

The efficiency-centred business model and service innovativeness

In contrast, the efficiency-centred business model implies efficiently exploiting information from its transaction partners. Because efficient communications with partners lead to a closer collaboration among the firm and its partners as well as sharing of more market information, the firm is able to more deeply understand the market trend that can lead to the creation of new service knowledge (Dougherty et al.,

2000). In addition, the efficient accumulation of market information from transaction partners through the efficiency-centred business model can assist the firm in identifying new service opportunities and therefore enriching service innovativeness.

On the other hand, deeply embedded market information through the efficiency-centred business model could constrain the continuous generation of service innovativeness. This is because when a firm exploits its core competence to a fuller and fuller extent, it inadvertently turns this core competence into core rigidity that impedes innovation (Christensen, 2006; Leonard-Barton, 1992). Following the same line of thought, when creatively new service knowledge via the efficiency-centred business model increases above a threshold, it can cause rigidity that unfortunately exerts a negative impact on service innovativeness. Therefore,

H2: The efficiency-centred business model has an inverted U-shaped influence on service innovativeness.

Research method

Questionnaire development

The questionnaire was developed in several stages. First, based on a considerable foundation of literature (Chesbrough, 2010; Teece, 2010; Zott and Amit, 2007), initial items were developed. However, while previous studies identified and validated scales of business model variables (e.g., Zott and Amit, 2007), none of the scales were specifically developed for the service business model. To ensure the validity of this study, we developed new scales following the suggestions of Churchill (1979), Gerbing and Anderson (1988), and Adams et al. (2006).

Second, based on the relevant literature (Chesbrough, 2010; Teece, 2010; Zott and Amit, 2007) and field studies, the domain of a service business model was created

and an initial list of items was generated. The field studies included interviews with two academics and 24 senior managers with more than five years' experience dealing with service business models. As a result, 14 items were initially generated, including 9 items measuring the novelty-centred business model and five items measuring the efficiency-centred business model.

Third, since some items were originally written in English, a double-translation method was applied to translate them into Chinese to ensure conceptual equivalence (Cheng and Shiu, 2008; Song and Parry, 1996). One of the authors translated the items into Chinese, and then two other academics translated the Chinese version back into English. The original items and the back translated items were compared by two academics to check for translation consistency. The translation was confirmed by a third academic.

Finally, to assess content validity, the items were evaluated by two other academics and three general managers. From these efforts, two items measuring the novelty-centred business model were deleted due to the inappropriateness and inability to convey their meanings to respondents.

Pretests

As recommended by Churchill (1979), two samples were collected in order to allow for the purification process of the scale and obtain preliminary estimates of reliability and validity. A two-step method of pretesting was then performed (Venkatraman and Ramanujam, 1986). The scale was first pretested on a convenience sample of 42 senior managers with experience dealing with new services and business models. Respondents were encouraged to evaluate the constructs and items contained in the questionnaire, and to voice any feedback or concerns. Accordingly a few items were revised in terms of wording or formatting.

We then moved on to the second pretest, in which we conducted a pencil-and-paper pilot survey on another convenience sample of 103 senior managers in order to refine the measures. The second pretest sample consisted of different respondents than those in the first step, but they also passed the same eligibility criteria as the first pretest sample in terms of work experience and job nature. The second sample respondents were asked to complete a questionnaire, to indicate any ambiguity or difficulty they experienced when responding to the items, and to offer any suggestions they might have. This step is important because it can help in removing any invalid items before the questionnaire is finalized.

As a result of the second pretest, no item was eliminated in the exploratory factor analysis (EFA). We then performed a confirmatory factor analysis (CFA), and results showed that all factor loadings were significant. Thus, convergent validity was demonstrated (Bagozzi and Yi, 1988). Details of these scales are shown in the Appendix.

Measures

We adapt the measure with six items for service innovativeness from Avlonitis, Papastathopoulou and Gounaris (2001) and Ettlíe and Kubarek (2008). Consistent with our conceptualization, the scale assesses the extent to which the new service provides new benefits and features to the customer and the market.

We control for sources of heterogeneity in service firm characteristics, including firm size, age, and capital. Larger firms tend to have more resources, such as financial, personnel, and social capital, available to undertake a greater number of innovation projects. Therefore, firm size is used as a control due to its potential impact on innovation activity (Meyer and Goes, 1988; Yeoh and Roth, 1999), and measures on a logarithmic scale using the number of employees (Dean and Snell, 1991).

In addition, firm age is measured as the number of years the firm has been in operation to control for the impact of a firm's age and experience in service innovation. Firm capital, the measure of the financial resources available to a firm, is included as a control variable, because firms with greater access to financial resources are more inclined to be innovative (Tellis, Prabhu and Chandy, 2009).

Finally, market turbulence (Han, Kim and Srivastava, 1998) and competitive intensity (Zhou et al., 2005) are used as control variables because their effects on innovation-related outcomes are well documented (Chandy and Tellis, 1998; Zhou et al., 2005).

Sampling and data collection

A list of the top 1,000 service firms in terms of sales volume operating in Taiwan was traced through the China Credit Information Service 2009. We selected Taiwan as our empirical setting because Taiwan's service industry has been growing at a very fast rate compared to other industries in recent years. For example, the percentage of service sectors in GDP changed dramatically from 52.8 % in 1989 to 63.9 % in 1995 and to 69.2 % in 2009 (IMF, 2010). This 69.2 % is comparable to those of developed countries, such as 72.3 % in Germany, 76.5 % in Japan, 76.9% in the US, and 75 % in the UK (IMF, 2010). The complex and dynamic nature of the Taiwan's service market makes it a rich context to test our study.

Senior managers were selected as key informants because they take responsibility for the development of business models and make decisions regarding service innovation (Kindström, 2010). In addition, following Phillips' (1981) suggestions, we selected respondents based on two criteria: (1) the informant's knowledge of the research topic and (2) the informant's ability and willingness to communicate with the researcher. Based on these criteria, each firm was requested to

provide a senior manager who was responsible for service business model design and service innovation. Accordingly, the names of 802 senior managers were given.

Questionnaires were then mailed using Dillman's (2000) total design method, along with a cover letter explaining the purpose of the study. Reminder letters were sent after three weeks. This data collection process yielded 211 usable questionnaires and resulted in a response rate of 26.3 %. This response rate is within the acceptable range for top management survey response rates (Homburg et al., 1999; Menon et al., 1996). The responses covered a wide range of service industries, including information technologies (16%), financial services (21%), tourism and travel (21%), transportation (15%), entertainment and recreation (21.5%), and others (5.5%). The annual sales figures ranged from \$10.3 million to \$8.2 billion US dollars and the number of fulltime employees ranged from 304 to 8,269, with 79.3% of firms reporting more than 1,000 employees.

Non-response bias

Non-response bias is assessed by comparing early and late respondents (38.8%) those who replied after a reminder mail (Armstrong and Overton, 1977). Using a t-test, there is no significant difference at the .05 alpha level between early and late respondents across firm age, size, capital, and study variables, indicating no systematic differences between early and late respondents.

Common method bias

We then employ the procedure suggested by Podsakoff et al. (2003) to assess the common method variance. The measurement model for the one-factor test shows that common method variance do not fit the data well (CFI = .64, IFI = .61, TLI = .52). In addition, we also conduct Harman's one-factor test where all the variables in this

study are simultaneously entered into EFA with no rotation. The results show that the first factor explains only 25.13% of the total variance. No single factor that could account for the majority of the covariance in the measures emerged, thus suggesting no common method bias is present.

Data analysis and results

Purification of measures

We first examine the univariate skewness and kurtosis of the variables and find that the figures within acceptable levels. Next, we perform Kaiser-Meyer-Olkin (KMO) and Bartlett's tests because both methods have been widely used in previous studies to ensure data have sufficient inherent correlations to perform EFA. The results show the KMO index is 0.91, and Bartlett's test of sphericity is significant ($p < 0.001$), both of which justify the use of EFA.

To understand the factor structure and measurement quality, we conduct a principal component analysis with varimax rotation and an evaluation of the eigenvalues is used to identify the number of factors to retain. Following the suggestions of Hair et al. (2010), an item is removed if (1) the factor loading is lower than 0.5, (2) an item loads on two different factors at the same time, and (3) the item do not load on a group to which it belongs.

Throughout this process, five factors (novelty-centred business model, efficiency-centred business model, service innovativeness, market turbulence, and competitive intensity) with separate solutions load as expected. Thus, these results indicate the unidimensionality of the various constructs. Reliability is then measured and the results indicate the Cronbach's alpha coefficients are well above the threshold value of 0.7 that Nunnally (1978) recommended (see Appendix).

Measurement models

This study further evaluates measurement properties by running CFA. We divide the variables into related groups (Cheng and Shiu, 2008). Each item is set to load only on its respective latent construct, and the latent constructs are allowed to be correlated. The results indicate that the measurement model of service business model measures ($X^2 / \text{d.f.} = 2.04$, RMSEA = 0.08, CFI = 0.90, NNFI = 0.90, PNFI = 0.71), environmental uncertainty measures ($X^2 / \text{d.f.} = 2.46$, RMSEA = 0.09, CFI = 0.91, NNFI = 0.92, PNFI = 0.77) and the service innovativeness measures ($X^2 / \text{d.f.} = 1.36$, RMSEA = 0.03, CFI = 0.96, NNFI = 0.97, PNFI = 0.88) are represented satisfactorily. The factor loading of indicators is significant ($p < .01$) and well above the recommended level of 0.50 (Hair et al., 2010).

Convergent and discriminant validity

We proceed to examine construct convergent and discriminant validity. Composite reliability is an indicator of shared variance among the set of observed variables used as indicators of a latent construct (Fornell and Larcker, 1981; Kandemir et al., 2006). As shown in the Appendix, the composite reliabilities of all constructs exceed the usual 0.70 benchmark (Bagozzi and Yi, 1988). The results show the necessary evidence that all constructs exhibit convergent validity.

Table 1 The descriptive statistics, correlation matrix, and AVE

Variables	Mean	S.D.	1	2	3	4	5
1 Novelty-centred model	5.73	.31	.59				
2 Efficiency-centred model	5.51	.36	.09	.67			
3 Service innovativeness	5.21	.58	.22*	.21*	.67		
4 Market turbulence	4.52	.65	.10	.09	.03	.68	
5 Competitive intensity	4.49	.82	.05	.08	-.02	.01	.61

** $p < 0.01$; * $p < 0.05$; S.D.= standard deviation

Bold figures on the diagonal are the square roots of the AVEs for the measures

We then examine discriminant validity using two approaches. First, using a procedure suggested by Fornell and Larcker (1981), we compute the average variance extracted (AVE) by the indicators and then compare it with the variance that each factor shares with the other factors in the model. As shown in Table 1, the value of the square root of each AVE is greater than the values of the inter-construct correlations, indicating the constructs are more strongly correlated with their own items.

Second, we also use chi-square difference tests to examine discriminant validity as recommended by Anderson and Gerbing (1988). To ascertain discriminant validity, the chi-square values for the unconstrained models, which allow each pair of constructs to co-vary freely, should always be significantly lower than those of the constrained models, which constrain the estimated correlation for each pair of estimated constructs to one. In the present study, the value of the unconstrained model is significantly lower than that of the constrained model in all cases. Because both approaches' criteria are satisfied, an inference error of multicollinearity is unlikely (Grewal et al., 2004). To this end, the measurement model fits the data satisfactorily and exhibits unidimensionality, as well as convergent and discriminant validity. Table 1 reports the summary of scale statistics.

Hypotheses testing

The hierarchical regression method is used for the hypotheses testing (Aiken and West, 1991). With the largest variance inflation factor in the regression is 1.34 (below 10), multicollinearity is not a concern. Table 2 presents the regression estimates of the three models. Model 1 contains the control variables, model 2 adds the variables of the novelty-centred business model and the efficiency-centred business model, and model 3 adds the squared terms of the two main variables. The R^2 value increases significantly for models 2 and 3.

In model 3, the novelty-centred business model ($\beta=0.27, p<.01$) and its quadratic term ($\beta=0.23, p<.01$) positively influence service innovativeness. The efficiency-centred business model relates positively to service innovativeness ($\beta=0.20, p<.01$), while its quadratic term has a negative effect ($\beta=-0.17, p<.01$).

In addition, the Sasabuchi *t* test shows that the slope of the mean centred novelty-centred business model at the left extreme point is significantly negative (slope=-0.75, $p<.01$), while the slope at the right extreme point is significantly positive (slope=0.93, $p<.01$). The slope of the mean centred efficiency-centred business model at the left extreme point is significantly positive (slope = 1.07, $p<.01$), while the slope at the right extreme point is significantly negative (slope = -0.82, $p<.01$).

Finally, the 95% confidence interval for the estimated minimum point of the novelty-centred business model (-0.54) in the U-shaped curve is (-1.91, -0.14), and that for the estimated maximum point of the efficiency-centred business model (0.47) in the inverted U-shaped curve is (-0.21, 1.97).

All in all, these results show the U-shaped and inverted U-shaped relationships (Lind and Mehlum, 2010), and support Hypothesis 1 and Hypothesis 2.

Table 2 Standardized regression estimates of service innovativeness

Service innovativeness	Model 1	Model 2	Model 3
Interdependent variables			
Novelty-centred business model		.29**	.27**
Efficiency-centred business model		.22**	.20**
Novelty-centred business model square			.23**
Efficiency-centred business model square			-.17**
Control variables			
Market turbulence	.09	.12*	.04
Competitive intensity	-.18*	-.15*	-.14*
Firm size	.15*	.36***	.35***
Firm age	-.02	-.03	-.03
Firm capital	.25**	.24**	.28**
R²	.07	.18	.23

R² change	.07	.11**	.05**
	* $p < .05$; ** $p < .01$; *** $p < .001$		

Discussions

Theoretical implications

The primary purpose of this study is to examine the relationship between two design themes of a service business model (novelty-centred and efficiency-centred) and service innovativeness. A theoretical model is empirically tested and it offers important implications to academic research. First, the effect of the novelty-centred business model on service innovativeness is a U-shaped relationship, suggesting that it does not have a positive effect until it exceeds a threshold. This result appears to contradict the established view in business model studies that novelty-centred business model is linearly and positively related to innovation performance (Zott and Amit, 2008; Brettel, Strese and Flatten, 2012). We explicate that firms could make mistakes in the earlier stage of learning process because the firm and its transaction partners have not yet been experienced in processing a wide range of information properly when running the novelty-centred business model. This results in a decline in service innovativeness of the firm involved. After that, information diversity benefits service innovativeness because transaction partners within the novelty-centred business model gain proficiency in the learning process. This result enriches the business model and service literature by revealing the true, more complicated than expected, relationship between the novelty-centred business model and service innovativeness.

Second, the effect of the efficiency-centred business model follows an inverted U-shaped relationship, indicating that the efficiency-centred business model starts to cause an adverse effect on service innovativeness after it crosses a threshold. Deeply processing information from transaction partners within the efficiency-centred

business model may help a service firm make transaction efficiency, but it also can make it difficult to adapt to changes in business model routines. Apparently, previous studies (Zott and Amit, 2008; Brettel, Strese and Flatten, 2012) that draw conclusions about the positive effects of the efficiency-centred business model on firm performance seem to ignore the absorb capacity that is associated with firms' service innovativeness. As Tripsas and Gavetti (2000) indicate, the firm initially develops increasingly efficient routines but then enters the stage of organizational inertia in exploiting potential information. We extend this notion that intensely efficient service transactions with partners in the efficiency-centred business model could enhance service innovation rigidity.

Third, another interesting implication comes from what might characterize the thresholds of novelty-centred and efficiency-centred business models? According to Amit and Zott (2012), the essential point to turn to a new business model from an existing business model is when a firm is able to provide existing service value in a new way or create new value to existing services. As such, a firm with the novelty-centred business model does not add new value (or add very little new value) to a service before the threshold due to the inexperience in managing diverse information that comes from dealings with transaction partners. Then after the threshold, the firm is able to add new value to its service because of its proficiency in dealing with the diverse information. In contrast, thanks to efficient communications with transaction partners, a firm with the efficiency-centred business model can create new value to its service. After the threshold, the ability of the firm to add value is impaired because organizational activities in the efficiency-centred business model become routine and rigid that eventually impede the firm's service innovativeness. Therefore, this study believes that new value creation is the key character of the threshold in the novelty- and efficiency-centred business models.

Fourth, as implied in the above paragraph, managing a threshold in a service business model well can help the firm to add new value to its service and earn a portion of this in revenues. However, to develop a successful business model does not assure competitive advantage because it is transparent and easy to imitate (Amit and Zott, 2012; Teece, 2010). Thus, an extended theoretical implication of this study points to the marked differences between a business model and a business strategy. Specifically, in what respects do the novelty- and efficiency-centred business models differ from innovation-oriented and efficiency-oriented strategies, respectively? Drawing from both business model literatures and strategy literatures (e.g., Amit and Zott, 2012; Teece, 2010), when comparing strategy analysis to service business model design, we have found that a service firm needs to follow a sequence of steps in order to prevent its service business model from being challenged through imitation by competitors. These steps include developing an appropriate strategy, segmenting the market, creating a service value proposition for each segment, setting up the device to deliver that service value, and finally figuring out various unique models that can be used. The setting up of a strategy, which can be novelty-oriented or efficiency-oriented, is the first but critical step in the course of designing a novelty-centred or efficiency-centred business model that can protect itself against imitation by competitors.

Finally, according to Zott and Amit (2007), business models are not mutually exclusive and can occur simultaneously or in combination with each other in a single firm. Our empirical findings extend this notion specifically into two major service business models: novelty-centred and efficiency-centred. As discussed throughout this paper, both novelty- and efficiency-centred business models possess their intrinsic advantages and disadvantages. It is therefore tempting for a firm to have both the novelty- and efficiency-centred business models in place. While firms adopting both

novelty- and efficiency-centred business models will face dilemma, ambidexterity can be used to balance between conflicting business models and thus resolve these dilemmas (Raisch and Birkinshaw, 2008). As indicated by Tushman and O'Reilly (1996), if firms manage to balance between contradictory objectives, they can create an optimal setting for a sustainable business development. Atuahene-Gima (2005) and Gupta et al. (2006) further indicate that balancing ambidexterity does not mean finding a punctual equilibrium, but rather excelling at both ends of the continuum. Therefore, a dilemma can be resolved by applying the concept of ambidexterity to manage both novelty- and efficiency-centred business models in a single firm.

The other approach is that service firms can follow the configuration theory (Miles and Snow, 1978; Miller, 1986) to decide on the adoption of different business models in different times. For example, the novelty-centred business model tends to perform well in relatively uncertain environments such as in times of rapidly changing market needs. On the other hand, running the efficiency-centred business model tends to be appropriate in more stable environments. In short, a service firm does not necessarily confine itself to one service business model all the time.

Managerial implications

The findings offer some implications for managers to design an appropriate service business model. First, to introduce innovative new services, firms may have to go through a trial-and-error period to develop expertise in integrating diverse information among transaction partners. Although the novelty-centred business model provides sufficient opportunities, it also adds complexity to information processing. Not every piece of information is applicable. Firms must learn to screen appropriate information and discard misleading data. On the other hand, firms should not devote excessive attention to enhancing their transaction efficiency. Although the efficiency-centred

business model helps a service firm to better serve existing customers, it may narrow the vision for potential market opportunities.

Second, managers in service industries must be aware of the intrinsic limitations of their existing business models for the sake of developing service innovation. For example, a firm adopting the efficiency-centred business model should understand that although its business model increasingly enhance its service innovation, the business model may cause the firm to focus too much on existing customers and prevent it from exploring opportunities for more advanced innovations. To overcome this problem, a firm with the efficiency-centred business model can put some effort to coordinate or share its new information with transaction partners as what the novelty-centred business model does. Such activities can stimulate the firm in embarking upon projects for more advanced innovations, thereby helping the firm to bypass the aforesaid problem.

Limitations and future research

Our results should be interpreted in light of some of the limitations that open up opportunities for future research. First, our primary focus is to examine the independent effects of the novelty-centred business model and the efficiency-centred business model. However, a service business model also can be distinguished into different focuses, such as open business model (Chesbrough, 2010) or e-business model (Dubosson-Torbay, Osterwalder and Pigneur, 2002). It would be interesting for research to determine a good balance among other service business models. Second, prior literature conceptualizes service innovativeness on multiple dimensions, such as new-to-the-firm, new-to-the-industry/market, new-to-the-world (Garcia and Calatone, 2002). This study focuses mainly on the dimension of new-to-the-industry/market. This limitation reduces the generalizability of the research findings. Finally, the

results are based on the perspectives of senior managers. A potential limitation of this is possible bias from collecting data from a single key informant. Although measures were taken to reduce such bias, the use of multiple respondents would have been preferable. Future research could examine similar characteristics using data provided by other level managers.

Appendix

All items use 7-point Likert scales (1=strongly disagree; 7=strongly agree)	Standardized factor loading	t-value
Novelty-centred business model ($\alpha = .87$; CR = .91; AVE = .59)		
Our business model offers new combinations of services	.82	12.6
Our business model brings together new participants	.74	10.5
Transactions running among participants in our business model are novel	.79	11.9
Our business model links participants to transactions in novel ways	.71	10.0
Our business model is a pioneer, compared to competitors	.78	10.28
Our firm has continuously introduced innovations in the business model	.79	10.61
Overall, our business model is novel	.76	10.07
The quality of some of the links between participants is novel*		
Our business model gives access to an unprecedented variety and number of participants and goods*		
Efficiency-centred business model ($\alpha = .90$; CR = .91; AVE = .67)		
Our business model enables a low number of errors in transactions	.79	9.17
Efficient transactions in our business model are transparent	.86	9.62
Our business model enables fast transactions	.82	11.25
Costs for transactions in our business model are reduced	.80	10.88
Overall, our business model offers high transaction efficiency	.83	11.64
Service innovativeness ($\alpha = .89$; CR = .91; AVE = .67)		
Customers perceive the service feature as novel.	.79	11.21
The benefits the service offers are new to the customers.	.78	10.91
The service introduced many completely new features to the market.	.81	11.22
The service shows an unconventional way of solving problems.	.89	13.58
The service is brand new, never seen in the market before.	.83	12.41
Market turbulence ($\alpha = .90$, CR = .89, AVE = .68)		
Extent of market turbulence in the market	.72	9.62
Frequent changes in customer preferences	.81	11.22
Ability to reduce market uncertainty	.89	13.58
Ability to respond to market opportunities	.86	12.54
Competitive intensity ($\alpha = .89$, CR = .82, AVE = .61)		
There are too many similar services in the market	.72	8.27
It is very difficult to differentiate your service	.79	8.97
This market is too competitive	.82	9.17

α = Cronbach's alpha, CR = composite reliability, AVE = average variance extracted

*items eliminated during purification

References

- Adams, R, Bessant, J and Phelps, R (2006). Innovation management measurement: A review. *International Journal of Management Review*, 81, 21–47.
- Afuah, A (2004). *Business Models: A Strategic Management Approach*. New York, NY: McGraw-Hill.
- Agarwal, S, Erramilli, MK and Dev, CS (2003). Market orientation and performance in service firms: The role of innovation. *Journal of Services Marketing*, 17(1), 68–82.
- Aiken, LS and West, SG (1991). *Multiple Regression: Testing and Interpreting Interactions*. Newbury Park: Sage Publications.
- Atuahene-Gima, K (2005). Resolving the capability-rigidity paradox in new product innovation. *Journal of Marketing*, 69, 61–83.
- Atuahene-Gima, K and Murray, J (2007). Exploratory and Exploitative Learning in New Product Development: A Social Capital Perspective on New Technology Ventures in China. *Journal of International Marketing*, 15(2), 1–29.
- Alam, I and Perry, C (2002). A customer-oriented new services development process. *Journal of Services Management*, 16, 515–534.
- Amit, R and Zott, C (2001). Value creation in e-business. *Strategic Management Journal*, 22, 493–520.
- Amit R and Zott, C (2012). Creating value through business model innovation. *Sloan Management Review*, 53: 41–49.
- Anderson, JC and Gerbing, D (1988). Structural equation modeling in practice: A review and recommended two-step approach. *Psychological Bulletin*, 103(3), 411–423.
- Anselmsson, J and Johansson, U (2009). Retailer brands and the impact on innovativeness in the grocery market. *Journal of Marketing Management*, 25(1–2), 75–95.
- Armstrong, S and Overton, T (1977). Estimating non-response in mailed surveys. *Journal of Marketing Research*, 14(3), 396–402.
- Avlonitis, GJ, Papastathopoulou, PG and Gounaris, SP (2001). An empirically-based typology of product for financial services: Success and failure scenarios. *Journal of Product Innovation Management*, 18(5), 324–342.
- Baden-Fuller, C and Morgan, MS (2010). Business models as models. *Long Range Planning*, 43(2–3), 156–171.
- Bagozzi, R and Yi, Y (1988). On the evaluation of structural equation models. *Journal of the Academy of Marketing Science*, 14(3), 74–94.
- Bask, A, Lipponen, M, Rajahonka, M and Tinnilä, M (2011). Framework for modularity and customization: Service perspective. *Journal of Business & Industrial Marketing*, 26(5), 306–319.
- Berry, LL, Shankar, V, Parish, JT, Cadwallader, S and Dotzel, T (2006). Creating new markets through service innovation. *MIT Sloan Management Review*, 42(2), 56–63.
- Boyer, KK, Hallowell, R and Roth, AV (2002). E-services: Operating strategy—a case study and a method for analyzing operational benefits. *Journal of Operations Management*, 20(2), 175–188.
- Brettel, M, Strese, S and Flatten, T (2012). Improving the performance of business models with relationship marketing efforts—An entrepreneurial perspective. *European Management Journal*, 30, 85–98.
- Carbonell, P, Rodriguez-Escudero, AI and Pujari, D (2009). Customer involvement in new service development: An examination of antecedents and outcomes. *Journal of Product Innovation Management*, 26(5), 536–550.

- Chandy, RK and Tellis, GJ (1998). Organizing for radical product innovation: The overlooked role of willingness to cannibalize. *Journal of Marketing Research*, 35(4), 474–487.
- Cheng, C and Shiu, EC (2008). Re-innovation: The construct, measurement, and validation. *Technovation*, 28(10), 658–666.
- Chesbrough, H (2011). Bringing open innovation to services. *MIT Sloan Management Review*, Winter, 52(2), 85–90.
- Chesbrough, H (2010). Business model innovation: Opportunities and barriers. *Long Range Planning*, 43(2–3), 354–363.
- Christensen, S (2006). Measuring consumer reactions to sponsoring partnerships based upon emotional and attitudinal responses. *International Journal of Market Research*, 48(1), 61–80.
- Churchill, GA (1979). A paradigm for developing better measures of marketing constructs. *Journal of Marketing Research*, 16(1), 64–73.
- Cohen, WM and Levinthal, DA (1990). Absorptive capacity: A new perspective on learning and innovation. *Administrative Science Quarterly*, 35(1), 128–152.
- Crawford, C and Di Benedetto, A (2011). *New products management*. 10thed. New York: McGraw Hill.
- Dean, JW Jr and Snell, SA (1991). Integrated manufacturing and job design. *Academy of Management Journal*, 34(4), 776–804.
- Dillman, DA (2000). *Mail and Internet Surveys: The Tailored Design Method*. New York, NY: Wiley.
- Dougherty, D, Borrelli, L, Munir, K and O’Sullivan, A (2000). Systems of organizational sensemaking for sustained product innovation. *Journal of Engineering and Technology Management*, 17(3–4), 321–355.
- Downing, S (2005). The social construction of entrepreneurship: Narrative and dramatic processes in the coproduction of organizations and identities. *Entrepreneurship: Theory & Practice*, 29, 185–204.
- Dubosson-Torbay, M, Osterwalder, A and Pigneur, Y (2002). E-business model design, classification, and measurements. *Thunderbird International Business Review*, 44(1), 5–23.
- Ettlie, JE and Kubarek M. (2008). Design reuse in manufacturing and services. *Journal of Product Innovation Management*, 25(9), 457–472.
- Fang, E (2008). Customer participation and the trade-off between new product innovativeness and speed to market. *Journal of Marketing*, 72(4), 90–104.
- Fornell, C and Larcker, F (1981). Evaluating structural equation models with unobservable variables and measurement errors. *Journal of Marketing Research*, 18(1), 39–50.
- Garcia, R. and Calantone, R (2002). A critical look at technological innovation typology and innovativeness terminology: A literature review. *Journal of Product Innovation Management*, 19, 110–132.
- George, G and Bock, AJ (2011). The business model in practice and its implications for entrepreneurship research. *Entrepreneurship Theory and Practice*, 35, 83–111.
- George, G and Bock, AJ (2012). *Models of Opportunity: How Entrepreneurs Design Firms to Achieve the Unexpected*. Cambridge: Cambridge University Press.
- Gerbing, D and Anderson, J (1988). An updated paradigm for scale development incorporating unidimensionality and its assessment. *Journal of Marketing Research*, 25, 186–192.

- Grant, R (1996). Prospering in dynamically-competitive environments: organizational capability and knowledge integration. *Organization Science*, 7, 375–387.
- Grewal, R, Cote, J and Hans, B (2004). Multicollinearity and measurement error in structural equation models: Implications for theory testing. *Marketing Science*, 23 (4), 519–529.
- Gupta, AK, Smith, KG and Shalley, CE (2006). The interplay between exploration and exploitation. *The Academy of Management Journal*, 49, 693-706.
- Hair, J, Tatham, R, Anderson, R and Black, W (2010). *Multivariate Data Analysis* (5th ed.). Upper Saddle River, NJ: Prentice-Hall.
- Han, J, Kim, N and Srivastava R (1998). Market orientation and organizational performance: Is innovation a missing link? *Journal of Marketing*, 62(4), 30–45.
- Henard, D and Szymanski, D (2001). Why some new products are more successful than others. *Journal of Marketing Research*, 38(3), 362–375.
- Homburg, C, Workman, J and Krohmer, H (1999). Marketing's influence within the firm. *Journal of Marketing*, 63(4), 1–17.
- IMF (2010). International Monetary Fund, World Economic Outlook Database, Nominal GDP list of countries.
- Johnson, MW, Christensen, CM and Kagermann, H (2008). Reinventing your business model. *Harvard Business Review*, 86, 50–9.
- Johnston, R (1999). Service transaction analysis: Assessing and improving the customers experience. *Managing Service Quality*, 9(2), 102–109.
- Kandemir, D, Yaprak, A and Cavusgil, S (2006). Alliance orientation: Conceptualization, measurement, and impact on market performance. *Journal of the Academy of Marketing Science*, 34, 324–341.
- Kara, A, Spillan, JE and DeShields, OWJ (2005). The effect of a market orientation on business performance: A study of small-sized retailers using MARKOR scale. *Journal of Small Business Management*, 43(2), 105–118.
- Karim, S (2009). Business unit reorganization and innovation in new product markets. *Management Science*, 55(7), 1237–1254.
- Kindström, D (2010). Towards a service-based business model—key aspects for future competitive advantage. *European Management Journal*, 28(6), 479–490.
- Leonard-Barton, D (1992). Core capabilities and core rigidities: A paradox in managing new product development. *Strategic Management Journal*, 13(3), 111–125.
- Lind, JT and Mehlum, H (2010). With or without U? The appropriate test for a U-shaped relationship. *Oxford Bulletin of Economics and Statistics*, 72(1), 109–118.
- Magnusson, P, Westjohn, SA, and Boggs, DJ (2009). Order of entry effects for service firms in developing markets: An examination of multinational advertising agencies. *Journal of International Marketing*, 17(2), 23–41.
- Magretta, J (2002). Why business models matter. *Harvard Business Review*, 80, 86–92.
- March, JG (1991). Exploration and exploitation in organizational learning. *Organization Science*, 2(1), 71–87.
- Menon, A, Bharadwaj, S and Howell, R (1996). The quality and effectiveness of marketing strategy: Effects of functional and dysfunctional conflict in intraorganizational relationships. *Journal of the Academy of Marketing Science*, 24(4), 299–313.
- Meyer, AD and Goes, JB (1988). Organizational assimilation of innovations: A multi-level contextual analysis. *Academy of Management Review*, 31, 897–923.

- Miles, R and Snow, C (1978). *Organizational strategy, structure and process*. New York: McGraw-Hill.
- Miller, D (1986). Configurations of strategy and structure: Towards a synthesis. *Strategic Management Journal*, 7: 233–249.
- Morris, M, Schindehutte, M and Allen J (2005). The entrepreneur's business model: toward a unified perspective. *Journal of Business Research*, 58, 726–735.
- Nunnally, JC (1978). *Psychometric Theory*. New York, NY: McGraw-Hill.
- O' Cass, A and Carlson, J (2011). An e-retailing assessment of perceived website-service innovativeness: Implications for website quality evaluations, trust, loyalty and word of mouth. *Australasian Marketing Journal (AMJ)*, 20(1), 28–36.
- Osterwalder, A, Pigneur, Y and Tucci, CL (2005). Clarifying business models: Origins, present and future of the concept. *Communications of the Association for Information Science (CAIS)*, 16, 1–25.
- Phillips, L (1981). Assessing measurement error in key informant reports: A methodological note on organizational analysis in marketing. *Journal of Marketing Research*, 18(4), 395–415.
- Podsakoff, P, MacKenzie, S, Lee, J and Podsakoff, N (2003). Common method biases in behavioral research: A critical review of the literature and recommended remedies. *Journal of Applied Psychology*, 88, 879–903.
- Raisch, S and Birkinshaw, J (2008). Organizational ambidexterity: antecedents, outcomes, and moderators. *Journal of Management*, 34: 375–409.
- Rodan, S and Galunic, C (2004). More than network structure: How knowledge heterogeneity influences managerial performance and innovativeness. *Strategic Management Journal*, 25(6), 541–562.
- Sabatier V, Mangematin V and Rousselle T (2010). From recipe to dinner: Portfolios in the european biopharmaceutical industry. *Long Range Planning*, 43(2–3), 431–447.
- Schilling, MA, Vidal, P, Ployhart, RE and Marangoni, A (2003). Learning by doing something else: Variation, relatedness, and the learning curve. *Management Science*, 49(1), 39–56.
- Sethi, R, Iqbal, A and Sethi, A (2012). Developing New-to-the-Firm Products: The Role of Micropolitical Strategies. *Journal of Marketing*, 76, 99–115.
- Sinkula, JM (1994). Market information processing and organizational learning. *Journal of Marketing*, 58(1), 35–45.
- Song, SM and Parry, ME (1996). What separates Japanese new product winners from losers. *Journal of Product Innovation Management*, 13(5), 422–439.
- Storey, C and Hull, FM (2010). Service development success: A contingent approach by knowledge strategy. *Journal of Service Management*, 21, 140–161.
- Storey, C and Hughes, M (2013) The relative impact of culture, strategic orientation and capability on new service development performance, *European Journal of Marketing*, 47, 833–856
- Teece, DJ (2010). Business models, business strategy and innovation. *Long Range Planning*, 43(2–3), 172–194.
- Tellis, GJ, Prabhu, JC and Chandy, RK (2009). Radical innovation across nations: The preeminence of corporate culture. *Journal of Marketing*, 73(1), 3–23.
- Tripsas, M and Gavetti, G (2000). Capabilities, cognition, and inertia: Evidence from digital imaging. *Strategic Management Journal*, 21(10/11), 1147–61.
- Tushman, ML and O'Reilly, CA (1996). Ambidextrous organizations: Managing evolutionary and revolutionary change. *California Management Review*, 38, 8–30.

- Venkatraman, N and Ramanujam, V (1986). Measurement of business performance in strategy research: A comparison of approaches. *Academy of Management Review*, 11(4), 801–814.
- Verganti, R and Buganza, T (2005). Design inertia: Designing for life-cycle flexibility in internet- based services. *Journal of Product Innovation Management*, 22(3), 223–237.
- Verganti, R (2009). *Design-driven Innovation: Creating the Rules of Competition by Radically Innovating What Things Mean*. Boston: Harvard Business Press.
- Yeoh, PL and Roth, K (1999). An empirical analysis of sustained advantage in the US pharmaceutical industry: Impact of firm resources and capabilities. *Strategic Management Journal*, 20, 637–653.
- Zahra, SA and George, G (2002). Absorptive capacity: A review reconceptualization, and extension. *Academy of Management Review*, 27(2), 185–204.
- Zeithaml, VA, Parasuraman, A and Malhotra, A (2002). Service quality delivery through Web sites: A critical review of extant knowledge. *Journal of the Academy of Marketing Science*, 30(4), 362–375.
- Zhou, K, Yim, B and Tse, D (2005). The effects of strategic orientations on technology- and market-based breakthrough innovations. *Journal of Marketing*, 69(2), 42–60.
- Zott, C and Amit, R (2007). Business model design and the performance of entrepreneurial firms. *Organization Science*, 18(2), 181–199.
- Zott, C and Amit, R (2008). The fit between product market strategy and business model: Implications for firm performance. *Strategic Management Journal*, 29(1), 1–26.
- Zott, C and Amit, R (2010). Business model design: An activity system perspective. *Long Range Planning*, 43(2–3), 216–226.