Investigating Value Co-Creation in Innovation of IT-enabled Services: An Empirical Study of Mobile Data Services

Research in Progress

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Abstract

Service innovation is increasingly being recognized as an important strategy for firms to sustain competitive advantage. The interconnectivity and interactivity afforded through information technologies (IT) has transformed how new services are created, delivered, and experienced. With the newness of the phenomenon and the lack of understanding, information systems (IS) research examining the influence of innovativeness of IT-enabled service on its performance has been limited. Further, customers are considered as important value co-creators and increasingly included in organizational innovation efforts. However, it is unclear how customer participation affects the performance of new IT-enabled services. Also, the interaction effect of service innovativeness and customer participation on new service performance remains unexplored. Motivated thus, this paper aims to address the knowledge gap by drawing on the value co-creation perspective and service innovation literatures. We construct a model to explain the effects of service innovativeness and customer participation on new IT-enabled service performance. A preliminary test of the model was performed using initial data on mobile data service (MDS) applications obtained from the Androidzoom platform. The results reveal that both service innovativeness and customer participation positively impact new IT-enabled service performance in terms of the number of downloads of the applications. Also, customer participation is found to positively moderate the relationship between service innovativeness and new IT-enabled service performance. The potential contributions and plans for further testing and enhancing the model are described.

Keywords: Service Innovation, Value Co-Creation, Innovativeness, Customer Participation, New IT-enabled Service Performance, Mobile Data Service Application
Introduction

Service innovation is increasingly being considered as a strategic means to sustain competitive advantage in dynamic markets (Barrett and Davidson 2008; Berry et al. 2006). For example, by continuously innovating, Google has sustained its competitive advantage in the market for information delivery and retrieval services, with annual revenues of 33.3 billion dollars. Through service innovation, firms can renew the value of their assets and discover novel uses for their existing resources (Menor and Roth 2007; Ordanini and Parasuraman 2011; Vargo et al. 2008). Empirically and conceptually, service innovation has been related to organizational performance (Ordanini and Parasuraman 2011), market share (Berry et al. 2006), and competitive advantage (Chesbrough 2011; IfM and IBM 2007).

Despite the success stories, previous studies have highlighted considerable uncertainties associated with creating value through service innovations (Lepak et al. 2007; Vargo et al. 2008). On the demand side, it is uncertain what new services will be valued by customers (Vargo et al. 2008); on the supply side, uncertainty arises about competencies that would be needed for firms to deliver the new services (Menor and Roth 2007). Further, firms encounter significant challenges in capturing the value of service innovations (Lepak et al. 2007; Pederson and Nysveen 2010). Researchers have argued that the usefulness and value of innovations are socially constructed (Rindova and Petkova 2007). With the increase in novelty of the innovation, the uncertainty of capturing its value increases (Calantone et al. 2006). Especially when the innovativeness of new services is so high as to require customers to change their habits or to learn new skills to appreciate their value, customers may be reluctant to accept these services (Cho and Pucik 2005). For example, new self-service technologies such as online banking have been rejected in the past because customers were reluctant to learn new skills for this and did not perceive much value from it (Curran and Meuter 2007). Thus, it is possible that customers may not recognize the value of new services and hence refuse to pay for them.

With such failures, prior research has attempted to explain the relationship between service innovativeness and performance in terms of revenue or profitability. However, the findings on the relationship have been mixed with some studies indicating a positive effect (e.g., Ordanini and Parasuraman 2011) and others showing no effect (e.g., Cho and Pucik 2005). Further, there is little understanding of the relationship between service innovativeness and new service performance in the information systems (IS) context. Particularly, with the interconnectivity and interactivity afforded through new Internet-based technologies, services are created, delivered, and experienced in new ways (Heeks 2010). These changes may affect customers’ willingness to accept and pay for innovative IT-enabled services (Franke et al. 2010). Thus, the relationship between innovativeness of IT-enabled services and their performance requires further investigation (Ordanini and Rubera 2010; Rai and Sambamurthy 2006).

Additionally, customers are increasingly being included in the innovation process as an important source of IT-enabled service innovation (Di Gangi et al. 2010). They are thought to be able to co-create value with service producers (Vargo et al. 2008) and help improve the acceptance of new services or products (Boudreau and Lakhani 2009). However, prior research has reported mixed findings on the relationship between customer participation and new service performance. For example, Ordanini and Parasuraman (2011) found customers’ participation to be conducive to service innovation and performance in the hotel industry. But, Chen et al. (2009) suggested no impact of customer participation (as a part of external partner collaboration) on service delivery innovation and performance in financial service firms. The mixed results have created confusion around the question of whether customers can co-create value in service innovation (Vargo et al. 2008) and more specifically for IT-enabled services, with the lack of literature examining this question. Also, it is

1 http://finance.yahoo.com/qq/ks?s=GOOG

2 We distinguish customer participation in IT-enabled service innovation from previous user participation studies which mainly focus on user involvement in IS development in organizational contexts. Here the participation is on a much larger scale through open online platforms external to the organization.
possible that customer participation may be more important to increase acceptance of highly innovative services but this interaction has not been investigated.

Overall, gaps in our knowledge exist along two aspects. First, there is limited research and understanding of the relationships between customer participation, service innovativeness, and new IT-enabled service performance. Second, there is a lack of research exploring the interaction effects between customer participation and service innovativeness on new IT-enabled service performance. Motivated thus, this paper aims to address these gaps by exploring the research question of whether service innovativeness and customer participation affect new IT-enabled service performance and whether they interact in doing so. Drawing on the value co-creation perspective, we propose a model to examine service innovativeness and customer participation as antecedents of new IT-enabled service performance. We expect that service innovativeness and customer participation will have direct and interaction effects on new IT-enabled service performance.

We aim to test the model in the context of mobile data service (MDS) innovation. MDS are IT-enabled services such as mobile banking, gaming, and data services (e.g., news, mapping and location-based information, and internet surfing) that can be accessed via mobile devices over a wide geographic area (Hong and Tam 2006). These services are among the fastest growing and are expected to generate $15.9 billion in end-user spending by 2012 (Gartner 2010). We chose MDS for our study since competition is very intense in the mobile service market and vendors compete more on the basis of creativity and innovation of applications than on price (Gartner 2010). Also, customers actively participate in giving comments to create innovative MDS applications (Kim et al. 2010) and service providers need to generate a continuous stream of new services to satisfy customers.

**Conceptual Background**

To investigate the relationship between service innovativeness, customer participation, and new IT-enabled service performance, we employ the value co-creation perspective which explains how customers may create value in service production and innovation. We now review the literature on service innovativeness followed by descriptions of the value co-creation perspective and the customer participation concept.

**Service Innovativeness**

Service innovation refers to an offering not previously available to the firm’s customers, i.e. either an addition to the current service mix or a change in existing services (Menor and Roth 2007). Service innovativeness refers to the degree of change in the new service as compared to existing services (Michel et al. 2008). While the importance of service innovation for the survival and success of organizations is well recognized (Davis et al. 2011), it is not clear if greater innovativeness leads to better outcomes. For example, Ordanini and Parasuraman (2011) found that service innovativeness (radicalness) positively affects firm performance in terms of revenue and growth, but Cho and Pucik (2005) did not observe such an effect. While the returns from more innovative services are thought to be higher (Berry et al. 2006; Davis et al. 2011), this requires further investigation particularly in the context of IT-enabled services.

Specifically, there are a few studies that have examined the influence of IT capability on service innovation (e.g., Shang and Chen 2010; Chen et al. 2009). However, the understanding of service innovation outcomes has remained relatively underdeveloped in IS research (Ordanini and Rubera 2010). This is important since new IT has transformed how services are produced, traded, and delivered (Heeks 2010; Rai and Sambamurthy 2006). One of the ways is through IT enabling greater co-creation of new services with customers (Curran and Meuter 2007). In the case of MDS, the services are offered and innovated through IT-enabled platforms (Boudreau and Lakhani 2009). Through these platforms, service producers can invite customers to contribute to MDS innovations (Boudreau and Lakhani 2009; Hong and Tam 2006). However, there is a lack of understanding of the relationship between innovativeness, customer participation, and IT-enabled service (e.g., MDS) performance, which the value co-creation perspective can elucidate.
Value Co-Creation Perspective

Deriving from the marketing literature, the value co-creation perspective (VCCP) was developed to understand the phenomenon of firm value creation with customers (Gehling 2008; Prahalad and Ramaswamy 2004a, 2004b). The VCCP posits that implementing a customer co-creation strategy enables firms to strengthen the firm-customer relationship, enhance innovation, and hence obtain competitive advantage (Potts et al. 2008; Prahalad and Ramaswamy 2004a). It argues that new technologies, global connectivity, and emerging markets have changed not only many facets of the business world but also the nature of customers (Gehling 2008; Sawhney et al. 2005). Customers are increasingly becoming informed, networked, and empowered to express their fast changing needs and preferences (Needham and Zohhadi 2009; Fuller et al. 2009). Using the various means of communication that the Internet offers, firms are increasingly able to engage their customers in a conversation to solicit their inputs (Sawhney et al. 2005; Payne et al. 2008). For example, customers can co-create value with firms by comparing products, exchanging opinions with peers, and giving feedback (Sawhney et al. 2005). A key concept in the VCCP is customer participation, which firms can leverage for value creation (Cho and Pucik 2005; Di Gangi et al. 2010).

Customer Participation

The importance of customers’ participation in service innovation has been highlighted in previous literature (e.g., Vargo et al. 2008). Specifically, customers’ knowledge and effort that are input in service innovation could increase the use value of new services (Lusch et al. 2007). Further, previous literature on service innovation suggests that firms cannot deliver value by themselves in services but offer value propositions (Vargo and Lusch 2004; Lusch et al. 2007). Thus, customers may play an important role in the value creation and value capture of service innovation.

However, despite the potential benefits discussed above, prior empirical research has reported mixed findings with regard to the impact of customer participation on innovation performance. For instance, in their study of service innovation in hotels, Ordanini and Parasuraman (2011) found that customer inputs lead to more service innovations and higher firm revenue. Similarly, Leiponen (2005) reported the positive influence of customer knowledge on service innovation in financial service firms. In contrast, Chen et al. (2009) found that customer collaboration (as a part of external partner collaboration) does not impact service delivery innovation and performance in financial service firms. Considering the mixed results and the lack of studies on the relationship in the IS context, further research is needed to improve our understanding of the effects of customer participation on the outcome of IT-enabled service innovation (Ordanini and Rubera 2010).

Research Model and Hypothesis

As per previous service innovation literature, we define new IT-enabled service performance in terms of how well the new service has been sold or accepted by customers to generate revenues (e.g., Chen et al. 2009). In the context of MDS, new IT-enabled service performance can be measured by the number of times that customers download the MDS application because customers are charged based on the number of downloads for paid applications (Turel et al. 2010). Drawing on the VCCP and service innovation literatures, we propose a model to explain a new IT-enabled service performance in terms of the service innovativeness and degree of customer participation. We expect that service innovativeness and customer participation will positively affect new IT-enabled service performance. We also expect that customer participation will moderate the relationship between service innovativeness and new IT-enabled service performance. The proposed model is shown in Figure 1.

Although incremental innovations can provide a steady cash flow and reduce uncertainty (McNally et al. 2010), they are unlikely to help organizations obtain long-term competitiveness (Lau et al. 2011). On the other hand, highly innovative services which offer new-to-world functions or experiences and are difficult to quickly compete with, can gain first mover advantage and earn significant market share.

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3 Free MDS applications are excluded from our study due to the inability to judge their performance in such terms
New IT-enabled Service Performance

Customer participation refers to the degree of customer involvement in providing information and feedback on specific issues related to the new service (Ordanini and Parasuraman 2011). Through providing their diverse ideas and firsthand information of their needs, customers can contribute to the innovation process (Boudreau and Lakhani 2009). The distinct knowledge of customers’ needs and preferences should substantially improve new service offerings (Berry et al. 2006; Ordanini and Parasuraman 2011). Further, customers who participate in the service innovation process tend to exert effort in making sense of the new services and in understanding their issues and value (Alam 2002). They are more likely to share the experience of the new services with their friends, facilitating rapid diffusion and acceptance of the service innovations (Alam 2002). In the context of our study, customers are able to participate in the service innovation process by providing comments, suggestions, and ideas on how the new MDS should be designed. These comments can help service producers to improve the quality of MDS and its acceptance. Thus, we hypothesize:

**H2: Customer participation is positively related to the new IT-enabled service performance**

As per the VCCP, customers will co-create the value of innovations and help firms capture their value (Prahalad and Ramaswamy 2004a). This suggests an interaction effect between customer participation and service innovativeness on new service performance. In the context of MDS, without customer participation, service producers may not be able to capture the value of highly innovative services (Boudreau and Lakhani 2009). If customers do not participate in the innovation process, they may perceive the new innovations as too novel and different and will be less likely to adopt them (Rindova and Petkova 2007). In contrast, with high customer participation, highly innovative services are more likely to satisfy customer needs and preferences and be accepted by them. Thus, we expect that service innovativeness will have a strong relationship with new IT-enabled service performance when customer participation is high but not when it is low. Therefore, we hypothesize:

**H3: The relationship between service innovativeness and the new IT-enabled service performance will be stronger when customer participation is high.**
Methodology

Research Setting

As discussed before, our study context was the mobile data service industry; in particular, the MDS applications on the Android platform. We chose the Android platform because Android not only allows customers to provide comments on applications but also allows service producers to update their applications through the platform. Moreover, the data for the Android market can be publicly accessed on the Android platform, allowing us to preliminarily validate the proposed model.

Data Collection and Operationalization

The sampling frame consisted of all 24 categories of 129870 applications on the Android platform (as of April 1, 2011). For our initial validation, we randomly selected 200 applications from each category, resulting in 4800 applications in total. After removing those applications that are no longer available for download, 4213 applications remained. Since we are interested in those applications that charge fees for downloads, we excluded the free-of-charge applications and were left with a cross-sectional dataset of 2190 applications.

We operationalized service innovativeness as the number of versions that a mobile data service application has updated. The underlying assumption for this measure is that each new version of an application represents a degree of innovativeness and change. Within a fixed time, the more versions a MDS application has, the more innovative it is. For example, for game applications, service producers may generate a new version of the application by adding more levels to the game or changing the substantive game-play. We operationalized customer participation as the number of comments that customers have posted to the application developers. More comments indicate a higher degree of customer participation in the innovation process as measured previously (e.g., Fang 2008).

For the dependent variable i.e., new IT-enabled service performance, we coded the number of times that the application had been downloaded. This measure is appropriate because MDS applications charge customers based on the number of downloads (Turel et al. 2010) and the revenue of each application is thus proportional to this number. Thus, the number of downloads of each new MDS application can serve as a proxy of its financial performance (Turel et al. 2010). Since the Android platform displayed the number of downloads of each application in an ordinal way (column 1 of Table 1), we coded the number of downloads according to the levels shown in Table 1 (column 2).

<table>
<thead>
<tr>
<th>Table 1. New IT-enabled Service Performance Coding</th>
</tr>
</thead>
<tbody>
<tr>
<td>The Number of Downloads</td>
</tr>
<tr>
<td>&lt;50</td>
</tr>
<tr>
<td>50-100</td>
</tr>
<tr>
<td>100-500</td>
</tr>
<tr>
<td>500-1000</td>
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<tr>
<td>1000-5000</td>
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<tr>
<td>5000-10000</td>
</tr>
<tr>
<td>10000-50000</td>
</tr>
<tr>
<td>50000-250000</td>
</tr>
<tr>
<td>&gt;250000</td>
</tr>
</tbody>
</table>

Control Variables

We also included control variables that may affect the number of downloads of an MDS application, i.e., price of the application, size of the application, the duration of application availability, application category, and past experience of the developer. Price of application refers to the cost per download for a customer. Size of application is the digital space that the application will take up in the customer’s handphone, measured in kilobytes. The duration of application availability is the interval between the date of an application’s first launch and the date when the data was collected, measured by the number of days elapsed. Application category refers to the category that an application belongs to. We used dummy variables to represent the 24 application categories. Past experience of the developer is measured by the number of applications that the developer has created before.

4 www.androidzoom.com
Model Specification

Since the distributions of all variables were skewed, we performed natural log-transformations on them. As one of the hypotheses, i.e., H3, predicts a moderation effect, we tested the hypotheses with two regression models (Yang et al. 2009). In model 1, we tested for main effects. In model 2, we included the interaction term. For testing the moderating effect, Ln (Versions) and Ln (Comments+1) were standardized by subtracting the mean and dividing by the standard deviation (Jaccard 2001). Since the dependent variable (the number of downloads) is ordinal, we used the ordered logistic regression method to test our model (Jaccard 2001).

Model 1: \[ \text{Downloads} = \beta_1 \ln(\text{Size}) + \beta_2 \ln(\text{Past experience}) + \beta_3 \ln(\text{Price}) + \beta_4 \ln(\text{Duration}) + \beta_5 \text{Application category} + \beta_6 \ln(\text{Versions}) + \beta_7 \ln(\text{Comments}+1) + \xi \]

Model 2: \[ \text{ Downloads} = \beta_1 \ln(\text{Size}) + \beta_2 \ln(\text{Past experience}) + \beta_3 \ln(\text{Price}) + \beta_4 \ln(\text{Duration}) + \beta_5 \text{Application category} + \beta_6 \ln(\text{Versions}) + \beta_7 \ln(\text{Comments}+1) + \beta_8 \ln(\text{Versions}) \times \ln(\text{Comments}+1) + \xi \]

Where Downloads is the number of times that an application has been downloaded; Size is the size of applications measured in kilobytes; Past experience is the total number of applications that the developer has developed; Price is the cost per download of an application in USD; Duration is the time interval in days between the date of data collection and the publication date; Application category is a dummy variable to indicate the type of each application; Versions is the number of versions that an application has; Comments is the number of comments that an application received from customers. \( \xi \) is the random error term.

Analysis and Results

We used the software SAS 9.2 to perform the ordered logistic regression analysis. The descriptive statistics and correlation values of the variables are shown in Table 2. With the preliminary data collected from Androidzoom, the two models were tested with the results summarized in Table 3. The application category dummy variables were found to be significant in the regression results but are not shown in Table 3 due to space constraints.

<table>
<thead>
<tr>
<th>Variables</th>
<th>( \beta )</th>
<th>Base model</th>
<th>Ordered Logistic Regression</th>
<th>OLS Model 1</th>
<th>OLS Model 2</th>
<th>OLS Model 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>( \ln(\text{Size}) )</td>
<td>( \beta_1 )</td>
<td>0.134***</td>
<td>0.086**</td>
<td>0.087**</td>
<td>0.039**</td>
<td></td>
</tr>
<tr>
<td>( \ln(\text{Past experience}) )</td>
<td>( \beta_2 )</td>
<td>-0.280***</td>
<td>0.004</td>
<td>0.141</td>
<td>-0.056**</td>
<td></td>
</tr>
<tr>
<td>( \ln(\text{Price}) )</td>
<td>( \beta_3 )</td>
<td>0.040</td>
<td>-0.124*</td>
<td>-0.217***</td>
<td>-0.095**</td>
<td></td>
</tr>
<tr>
<td>( \ln(\text{Duration}) )</td>
<td>( \beta_4 )</td>
<td>0.946***</td>
<td>0.456***</td>
<td>0.646***</td>
<td>0.307***</td>
<td></td>
</tr>
<tr>
<td>( \ln(\text{Versions}) )</td>
<td>( \beta_5 )</td>
<td>( \text{0.123***} )</td>
<td>0.038**</td>
<td>0.033***</td>
<td></td>
<td></td>
</tr>
<tr>
<td>( \ln(\text{Comments}+1) )</td>
<td>( \beta_7 )</td>
<td>0.073***</td>
<td>0.086**</td>
<td>0.028***</td>
<td></td>
<td></td>
</tr>
<tr>
<td>( \ln(\text{Versions}) \times \ln(\text{Comments}+1) )</td>
<td>( \beta_8 )</td>
<td>( \text{0.427***} )</td>
<td>( \text{0.005***} )</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note: Application category dummies (\( \beta_c \)) have been included in the analysis but not shown in the table.

*p <0.05; **p <0.01; ***p <0.001.

In the empirical validation, we added 1 to the values of the comments variable because there are 0s in it.
As per Table 3, the ordered logistic regression results of Model 1 show that service innovativeness (measured with the number of versions) and customer participation (measured with the number of comments) positively affect new IT-enabled service performance (measured with the number of downloads of each application). Thus, H1 and H2 are both supported. The regression results of Model 2 show that customer participation positively moderates the relationship between service innovativeness and new IT-enabled service performance. Thus, H3 is also supported. All control variables other than past experience were found to be significant.

To test the fitness of our model, we also compared the values of log likelihood, AIC, and BIC of the two models as suggested by Joshi et al. (2010). The model with the smaller values of AIC and BIC and larger value of log likelihood is considered to be a better fit (Joshi et al. 2010). The log likelihood, AIC, and BIC values indicate that Model 2 better explains the data than Model 1, which in turn is superior to the base model (with control variables). To test the robustness of our model, we also conducted OLS regression in Model 3 (see Table 3). The results are mainly consistent with those of Model 2, which indicates that they are robust to both linear and ordered specifications.

**Discussion and Future Plan**

Capturing the value of IT-enabled service innovations is important for firms to sustain competitive advantage in the market. At the same time, by taking advantage of the Internet and other information technologies, IT-enabled service innovations can be co-created with customers. Thus, during recent years, IT-enabled service innovation and customer value co-creation are increasingly being adopted by firms with differing degrees of success (Di Gangi et al. 2010). To explore the role of customers in IT-enabled service innovation, we studied an online mobile application platform (i.e. Androidzoom) and examined the separate and joint impacts of customer participation and innovativeness on new IT-enabled service performance with field data. We found that service innovativeness and customer participation both have positive impacts on new IT-enabled service performance. Also, it was observed that customer participation positively moderates the relationship between service innovativeness and new IT-enabled service performance.

As a research in progress, this study model and findings need further validation. First, since there could be sampling bias, we will attempt to use the complete set of MDS applications data instead of sampling from each category as is done now. Second, since there could be an endogeneity problem between the independent variables and dependent variable, we will collect longitudinal data using the entire MDS data on the platform to improve the prediction of the model tested in this study. We will use the data of service innovativeness and customer participation collected at the current time and the data of new IT-enabled service performance at a future time period to perform our data analysis. Also, the possibility of a non-linear relationship between innovativeness, customer participation, and service performance could be explored further. Last, the measurement of service innovativeness could be improved by not only counting the number of versions but also coding the degree of innovativeness of the application.

Although service innovation is considered an important strategy for firms to sustain competitive advantage in dynamic markets, little IS research has targeted this phenomenon (Ordanini and Rubera 2010). This paper contributes by exploring the relationship between innovativeness of IT-enabled service innovation, customer participation, and new IT-enabled service performance. Theoretically, the study aims to extend and empirically test the value co-creation perspective in the context of IT-enabled service innovations e.g., MDS applications. Further, it attempts to enrich our understanding of IT-enabled service innovation and its performance through using objective data. Also, this paper aims to contribute to the service innovation literature by examining the effects of customer participation in creating and capturing value from new IT-enabled services. Practically, this study intends to provide guidelines to management on how to derive value from innovative IT-enabled services. Specifically, it suggests the importance of innovativeness of IT-enabled services and customer participation in jointly influencing new IT-enabled service performance. Thus, firms should engage in practices that improve the innovativeness of new IT-enabled services and include customers in the innovation process in order to increase acceptance and revenues from the services.
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