6-18-2013

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INVESTIGATING THE INFLUENCE OF IT AND OTHER RESOURCES ON SERVICE INNOVATION IN BANKING

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Abstract

This paper investigates the influence of firm resources on banking service innovation performance. Drawing on the resource-based perspective, we propose a research model in which the effects of three kinds of resources i.e., employee skills, IT investment, and customer co-creation, are examined. Pilot survey data collected from 34 banks in Singapore was used as a preliminary test of the research model. The pilot test results show that while employee skills and customer co-creation influenced service innovation, IT investment did not. We intend to examine the unsupported relationship in future by investigating if it is contingent on moderators such as innovation culture or other industry specific factors. As we collect more data in future, this study is expected to contribute to the understanding of service innovation in banks and the role of resources such as IT investment in service innovation.

Keywords: Service innovation, Resource-based view, Banking services, IT investment, Customer co-creation, Employee skills.
1 INTRODUCTION

Service innovation involves the incorporation of new ideas, and the development and implementation of new services for customers (Menor et al. 2002). It is considered critical for driving economic growth and increasing firm’s competitiveness and performance (Aas & Pedersen 2010). Firms can enhance their competitiveness by utilizing service innovation to create extra value for existing customers and attract new customers (Gustafsson & Johnson 2003). As a technology leader, Citibank, for instance, reached an advantageous market position as the first bank to provide automated teller machine (ATM) services (Bessant & Davies 2007).

Among the different service sectors, financial services constitutes an important service category, which accounts for approximately 6% of employment and GDP in U.S. (U.S. Department of Commerce 2010) and about 8% of GDP, and 4% of employment in the OECD countries (OECD 2009). Within financial services, banking plays a key role in economic activities in modern society. With advances in information technology (IT) and globalization, the banking industry has undergone dramatic changes in the face of competition. Innovative models, e.g., peer-to-peer or retailer-based banking, have been adopted by banks to distinguish themselves from competitors. Service innovation in banking ranges from e-banking in the 1990s to bill payment and presentment, account aggregation, digital checking, integrated cell phone payment, radio frequency identification (RFID), and mobile banking in current times (Tallon 2010). Internet banking, as an important service innovation, has been found to reduce service costs and improve customer service (Xue et al. 2011).

While they recognize that service innovation can enhance competitive advantage, banks also face strategic and operational challenges in performing service innovation. For instance, one of the key challenges is to adopt an organizational culture that embraces innovation. The lack of experienced employees is considered another barrier for service innovation (Peters 2009). Besides, there is uncertainty about customer needs, e.g. what kinds of new services could fulfill customers’ needs (Vargo et al. 2008). Further, the role of IT in banking service innovation is unexplored. Overall, it is unclear what resources are needed for banks to develop new services efficiently and effectively (Menor & Roth 2007).

In the face of these challenges, it is worthwhile to investigate the resources needed to carry out service innovation in banks. Prior studies have investigated some aspects of service innovation in banking. For example, Oliveira and Hippel (2011) explored the role of users in retail banking services innovation and found that they play an important part in financial services development. Uzkurt et al. (2013) investigated the mediating effect of innovation on the relationship between organizational culture and firm performance in the banking sector. Lyons et al. (2007) studied service innovation in investment banks. They found that corporate culture is beneficial for service innovation. Further, Ozdemir and Trott (2009) employed an extended technology acceptance model to examine the adoption of service innovation in Internet banking. However, it can be seen that there is a lack of systematic understanding of the effects of IT and other resources in banking service innovation. Having such understanding is critical for banks’ survival and sustained success.

To address this research gap, we aim to examine the influence of IT and other resources on service innovation in banks. Specifically, drawing on the resource-based perspective, we propose a research model to explain the effect of three types of resources i.e. employee skills, IT investment, and customer co-creation, on service innovation performance i.e., the number of innovations produced and the time taken, in banks. A pilot survey with 34 banks has been conducted as a preliminary test of the research model. Further data on the above variables and moderators such as innovation culture is being collected as this research continues.

2 THEORETICAL BACKGROUND

The resource-based view (RBV) provides a perspective for researchers to investigate the relationship between resources and firm performance in different aspects. RBV posits that the heterogeneous resources owned by a firm play an important role in increasing competitive advantage and achieving
better performance (Barney 1991; Grant 1991). A firm is viewed as a bundle of resources including assets and knowledge, to implement strategies and improve effectiveness and efficiency (Barney 2001). In the innovation literature, a few studies have employed RBV to examine service innovation. Ordanini and Rubera (2010) identified two resource categories (i.e., business and IT resources) and investigated their effects on firm performance when applying an e-commerce innovation. Menor and Roth (2007) adopted RBV to understand the relationship between new service development competence (i.e., process, market, strategy, culture, and IT competence) and new service development performance (in terms of the competitive and market impact of the new services) in retail banking. However, there is a lack of studies and understanding of the effect of different types of resources on service innovation in banks.

As per RBV, Barney (1991) classified firm resources into three categories, i.e., physical, human, and organizational capital resources. Physical resources include aspects such as the facilities, technologies, and equipment of the firm. In the context of new service development, the physical resources include IT networks, knowledge management, and computer simulation tools (Froehle & Roth 2007). The application of IT can promote innovation through improving the management of innovation knowledge, enabling external innovation collaboration, and empowering better design capabilities (Kleis et al. 2012). Although prior studies have suggested the significance of IT in innovation, it remains unclear if IT input functions as a driver of service innovation in banks. We thus include IT investment as an antecedent and analyze its effect on service innovation.

Human capital resources include employees’ expertise, experience, and insights in an organization (Barney 1991). Froehle and Roth (2007) proposed intellectual resources related to new service development that include employees’ experiential knowledge and skills. The skill or expertise of employees is one of the key resources for firms to gain competitive advantage (Wright et al. 1994). Zeithaml et al. (2009) emphasized the critical role of frontline employees in successfully implementing the service innovation strategy of firms. Besides, it has been noted that lack of employees’ skills could be a constraint to the innovation activities of small firms (Hewitt-Dundas 2006). Accordingly, we include employee skills as an antecedent of banking service innovation in our model.

Organizational resources include structure, control and coordination, and relations with internal and external stakeholders such as customers. Of these resources, collaboration with customers (Blazevic & Lievens 2008) has been commonly highlighted as salient in the service innovation literature. Customers are considered as a hitherto untapped knowledge source for organizational innovation. Firms can capitalize on the knowledge, preferences, and ideas from customers to facilitate innovation. For instance, Ye et al. (2011) found that customers’ participation has a positive influence on the performance of IT-enabled mobile services by providing comments, ideas, and suggestions on service design. Gustafsson et al. (2012) showed that customer co-creation leads to market success in incremental innovation development across a sample from both manufacturing and service firms. However, a study by Foss et al. (2011) in Danish firms observed that the interaction with customers had no direct effect on innovation performance. Due to the mixed findings on customers’ role in innovation, further studies are needed to improve our understanding. Therefore, the influence of customer co-creation on service innovation is investigated in our study.

Previous studies have examined service innovation in banking from several perspectives. For instance, Menor and Roth (2008) investigated the relationship between new service development competence and their performance in retail banking. They showed that new service development competence positively affects new services’ performance, as well as business-level performance. Oliveira and Hippel (2011) explored the role of users in service innovation in commercial and retail banking. They found that it was the non-bank firms who first developed and implemented around half of the computerized commercial banking services. Moreover, individual service users rather than commercial financial service providers first developed and implemented about 44% of computerized retail banking services. Besides, Ozdemir and Trott (2009) examined the factors influencing the adoption of Internet banking service innovation in Turkey. Their study showed that in addition to perceptual factors associated with Internet banking use, perceptions related to banks in Turkey also affect the adoption. Further, Blazevic and Lievens (2004) examined the antecedents and outcomes of
project learning in the process of new financial service innovation. Their findings indicated that learning during new service innovation projects contributes to the competitive position of the innovating banks. Despite these findings, it remains unclear whether different types of resources, such as IT investment, may influence the performance of service innovation in banking. Thus, there is a need for systematic understanding of the effects of IT and other resources in banking service innovation.

3 RESEARCH MODEL AND HYPOTHESIS

Drawing on the resource-based view and service innovation literature, we propose a model to investigate the effect of three types of resources on service innovation performance in banks. Subsequently, we aim to include additional constructs such as innovation culture (Lyons et al. 2007) that are expected to moderate the relationship between the resources and service innovation performance. The initial model proposed is shown in Figure 1.

![Proposed Research Model](image)

The dependent variable for the model is service innovation performance. Service innovation performance is defined in terms of the process and output of developing new services (Olson et al. 2001) in the banks under study. The average number of new services developed in the past three years and the average time needed to develop the new services (reverse measure) are used to assess the output and process of new service development, respectively (Hsueh et al. 2010). The average time needed to develop the new services is a reverse measure. The process of new service development will be more efficient if a new service takes a shorter time to enter the market.

3.1 Employee Skills

Employees play an important role in providing information and knowledge for new service development, and in the effective implementation of innovations (Santos-Vijande et al. 2013). Employee skills not only include the current knowledge possessed by employees, but also their capability to use and manage knowledge (Wade & Hulland 2004). Employees with advanced skills are able to manage complex projects, evaluate different alternatives, and come up with creative and feasible solutions to business problems (Ordanini & Rubera 2010). For example, the development of mobile banking services, such as account balances, transaction history inquiries, and funds transfers, requires employees’ knowledge of mobile technologies and domain knowledge. Besides, the relevant skills are needed to effectively respond to customers’ needs during the new services implementation (Lin 2011). Further, employees with a higher level of skills are more likely to adapt to the new innovations (Kim 2002). Thus we hypothesize,

\[ H1: \text{Employee skills is positively related to service innovation performance.} \]

3.2 IT Investment

IT is increasingly been used as a competitive instrument to implement strategic plans and support a firm’s core competencies (Aral & Weill 2007; Oh & Pinsonneault 2007). According to Kleis et al.
(2012), IT contributes to innovation through three mechanisms, i.e. knowledge management, information production, and innovation collaboration. IT plays a crucial role in sharing and reusing knowledge in an organization (Lee & Choi 2003). It connects employees to share and create knowledge for the development of new services (Nerkar & Paruchuri 2005). Moreover, it reduces their knowledge gaps by making new knowledge available through advanced search abilities and data mining techniques (Kleis et al. 2012). To develop capabilities for sustained innovation and incorporate innovation as a long-term strategy, firms have to make investments in IT as necessary resources for new service development (Bhaskaran 2006). For instance, the various online services provided by Internet banking, such as funds transfer, viewing account balance, bill payment, and investment purchase, are enabled by investments in IT (Agboola 2006). Hence we hypothesize,

**H2: IT investment is positively related to service innovation performance.**

### 3.3 Customer Co-creation

Customer co-creation is defined as customers’ involvement or participation in joint creation of value during the service production process (Gustafsson et al. 2012). Customers’ involvement in service development converts them into knowledge sources that can be used to foster innovation and gain competitiveness (Ordanini & Parasuraman 2011; Vargo & Lusch 2004). A study by Oliveira and Hippel (2011) showed that individual service users, instead of commercial financial service providers, developed 44% of computerized retail banking services. An example of customer co-creation is the “RBC Next Great Innovator Challenge” of the Royal Bank of Canada (RBC), which is a competition aimed at involving college students in helping the bank create products, processes, and concepts for customers (Gardner 2011). According to Alam (2002), customers’ participation in developing new services contributes to a better alignment between customers’ needs and firm’s service innovation. Further, customers’ involvement in service innovation can reduce the overall time for new service development and facilitate the rapid diffusion of new services (Alam 2002). Thus we hypothesize,

**H3: Customer co-creation is positively related to service innovation performance.**

In addition to the independent variables, we included controls for firm age, firm type (multinational or local bank), and firm size that may influence service innovation.

### 4 METHODOLOGY

#### 4.1 Sample and Data Collection

The data for the pilot test of the proposed model was collected via an online survey of banks in Singapore. Singapore has become a well-known international financial hub with 6 local banks, 148 foreign banks, 40 wholesale banks, and 42 offshore banks (Statistics Singapore 2010). It is considered a favorable location in the Asia-Pacific region due to robust economic and financial fundamentals with a socio-politically stable environment.

The pilot survey was based on a convenience sample. A sample of 41 banks was obtained by contacting banking firms in which the researchers had acquaintances or contacts. An email was sent to the HR contacts in the banks with a cover letter that introduced the purpose and scope of the study. They were asked to contact others such as the CFO and R&D executive in case they did not know the answers to any questions asked in the survey. When the CFOs and R&D executives agreed to participate, an email with a brief introduction of the purpose of the study as well as a link to the online questionnaire was sent. The online questionnaire allowed them to stop, save, and resume the survey at their convenience. CFOs or R&D executives from 34 banks participated in this study, signaling a response rate of 83%. Thirty-two of the banks were multinational banks and 2 were local banks. Banks in the sample had been established for an average of 65.2 yrs and had an average of 2095 employees. The average number of innovations developed in the past 3 years was 19.75 and the average time taken to develop an innovation was 29.04 months. The descriptive statistics of the sample is presented in Table 1.
Table 1. Descriptive Statistics of Sample

4.2 Measurements and Operationalization

The dependent variable *service innovation performance* was operationalized in terms of the output and process (Olson et al. 2001) of new services development. The average number of new services developed in the past three years was used to measure the output of new service development. The average time needed to develop new services was used to assess the process of new service development as a reverse measure (Hsueh et al. 2010).

<table>
<thead>
<tr>
<th>Construct</th>
<th>Items</th>
</tr>
</thead>
</table>
| Employee Skills (ESK) | Employees in my organization are highly skilled in their own and other related job tasks  
                           | Employees in my organization are very well qualified for their jobs  
                           | Employees in my organization are very capable of performing their job tasks |
| IT Investment (ITI)  | My organization has allocated an adequate budget for purchasing IT hardware  
                           | My organization has allocated an adequate budget for implementing IT services  
                           | My organization has allocated an adequate budget for purchasing IT software |
| Customer Co-creation (CCC) | My organization co-defines value with our customers  
                                | In my organization, customers are viewed as potential sources of new ideas and offerings  
                                | In my organization, customers actively give feedback and suggestions about new services |
| Service Innovation Performance | What is the number of new services developed in the past three years?  
                                      | Output (SIO)  
                                      | What is the average time it takes to develop a new service in your organization?  
                                      | Process (SIP - reverse) |

Table 2. Constructs and Items
For the independent variables, three items adapted from Hennig-Thurau (2004) and Wade and Parent (2001) were used to measure employee skills. The three measurement items for IT investment were adapted from Dibrell et al. (2008). Three items adapted from Auh et al. (2007) were used to measure customer co-creation. Table 2 shows the measures used in the survey instrument. A seven-point Likert scale anchored from Strongly Disagree to Strongly Agree was used for the independent variables. For the controls, firm age was assessed in terms of the number of years since the bank was founded, firm size was measured by the number of employees, and firm type was a dummy variable coded as 0 for local and 1 for multinational banks.

5 PILOT TEST RESULTS

Table 3 shows the descriptive statistics, correlations, and validities for the model constructs and controls. The composite reliability and Cronbach’s alpha of all multi-item constructs exceeds the threshold of 0.7 (Hair et al. 2009). The convergent validity of the constructs was assessed using the average variance extracted (AVEs), which are above the required value of 0.50. In addition, none of the correlations among constructs exceed the corresponding square root of AVE (diagonal values). The factor analysis results indicate acceptable convergent and discriminant validities but are not shown here due to lack of space.

<table>
<thead>
<tr>
<th>Constructs and Controls</th>
<th>Mean</th>
<th>S.D.</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
</tr>
</thead>
<tbody>
<tr>
<td>Firm Age in yrs (1)</td>
<td>65.2</td>
<td>25.5</td>
<td>N.A.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Firm Size # employees (2)</td>
<td>2095</td>
<td>810</td>
<td>-0.002</td>
<td>N.A.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Employee Skills (3)</td>
<td>4.94</td>
<td>1.06</td>
<td>-0.310</td>
<td>-0.097</td>
<td>0.830</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>IT Investment (4)</td>
<td>5.26</td>
<td>1.28</td>
<td>0.347</td>
<td>-0.218</td>
<td>0.279</td>
<td>0.940</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Customer Co-creation (5)</td>
<td>5.24</td>
<td>1.07</td>
<td>-0.108</td>
<td>-0.028</td>
<td>-0.017</td>
<td>0.246</td>
<td>0.550</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Service Innovation SIO (6)</td>
<td>19.75</td>
<td>8.80</td>
<td>0.150</td>
<td>-0.044</td>
<td>-0.398</td>
<td>-0.058</td>
<td>0.271</td>
<td>N.A.</td>
<td></td>
</tr>
<tr>
<td>Service Innovation SIP (7)</td>
<td>29.04</td>
<td>11.40</td>
<td>-0.153</td>
<td>0.106</td>
<td>-0.333</td>
<td>-0.080</td>
<td>-0.219</td>
<td>0.563</td>
<td>N.A.</td>
</tr>
</tbody>
</table>

Table 3. Descriptive statistics and correlations of variables

<table>
<thead>
<tr>
<th>Constructs and Controls</th>
<th>Model 1 (Controls)</th>
<th>Model 2 (Controls and IVs)</th>
<th>Hypotheses</th>
</tr>
</thead>
<tbody>
<tr>
<td>Firm age</td>
<td>0.15 (0.08)</td>
<td>0.55* (0.09)</td>
<td>NA</td>
</tr>
<tr>
<td>Firm size</td>
<td>-0.10 (0.10)</td>
<td>-0.13 (0.08)</td>
<td>NA</td>
</tr>
<tr>
<td>Firm type</td>
<td>0.03 (0.10)</td>
<td>-0.14 (0.07)</td>
<td>NA</td>
</tr>
<tr>
<td>Employee skills (ESK)</td>
<td>-</td>
<td>0.65** (0.12)</td>
<td>H1 supported</td>
</tr>
<tr>
<td>IT investment (ITI)</td>
<td>-</td>
<td>-0.39 (0.11)</td>
<td>H2 not supported</td>
</tr>
<tr>
<td>Customer co-creation (CCC)</td>
<td>-</td>
<td>0.36* (0.14)</td>
<td>H3 supported</td>
</tr>
<tr>
<td>R square</td>
<td>0.04</td>
<td>0.36</td>
<td></td>
</tr>
<tr>
<td>Change in R square</td>
<td>0.32</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 4. Pilot Test Results

In order to test for any bias due to single source of data collection, we performed Harman’s one-factor test (Podsakoff et al. 2003) to check for common method bias. All the items were entered into an unrotated exploratory factor analysis (EFA) to see whether a single factor accounts for the majority of the variance. However, the largest factor accounted for 28% of the variance. Besides, a common method test given in Pavlou et al. (2007) also indicated lack of common method bias. The construct
correlations are also shown in Table 3. The absence of high correlations (larger than 0.6) indicates multi-collinearity among constructs is not an issue.

After the measurement validity tests were satisfied, we used regression using SPSS to pilot test the research model. We ran 2 separate regressions, one with the average number of new services (SIO) and the other with the average time taken to develop new services (SIP) as the dependent variable. Table 4 presents the results of the pilot test for SIP. As shown in Table 4, among the three hypotheses, H1 and H3 were supported i.e., employee skills and customer co-creation positively affected SIP, reverse i.e., reverse of the time taken to develop new services. However, H2 was not supported i.e., IT investment had no relationship with SIP. For SIO, none of the relationships were significant. The model explained 36% of the variance in SIP and 25% of the variance in SIO. Among the control variables, firm age had a positive relationship with reverse of the time taken to develop new services.

6 DISCUSSION AND FUTURE WORK

6.1 Implications and Contributions

This study aims to enrich the understanding of resources that influence service innovation performance in banking by empirically validating a theory-based model. Drawing on the resource-based view and innovation literature, we derived three types of resources i.e., employee skills, IT investment, and customer co-creation, that may impact service innovation in banks. Pilot survey data collected from 34 banks in Singapore was used for a preliminary test of the proposed model. Our findings show that employee skills and customer co-creation positively affect service innovation performance in terms of the time taken for the process.

In contrast, the effect of IT investment is not found significant in our study. On discussion of our findings with practitioners in this area, it appears that IT investment would have a contingent effect on service innovation performance. If investments in IT are not catered towards enhancing knowledge sharing and collaboration, with the supporting organizational culture, they may not be able to promote service innovation. This explanation will be tested as we continue this study. Further, the resources measured did not influence the number of service innovations developed by the banks in the sample. On further deliberation, we found that the number of service innovations, though used in previous studies, may not be a suitable indicator of service innovation performance as it may not capture the quality, magnitude, and effort expended in service innovation. In the follow-up phase, we intend to use/code measures that assess the quality and magnitude of innovation.

Based on the preliminary results, several implications can be derived. First, this study expects to extend existing work and enrich the understanding of the influence of resources (including IT investment) on banking service innovation. Besides, the study sheds light on the internal and external resources that contribute to service innovation in the banking sector.

In addition to the theoretical contributions, this study also expects to offer implications for banking practitioners. First, recruiting employees with advanced skills or enhancing the skills of existing employees through various organizational interventions is crucial for banks’ service innovation. Further, as customer co-creation is salient for service innovation, mechanisms need to be provided to engage them on a regular basis. While customer innovation platforms are becoming increasingly prevalent for consumer products e.g., Starbucks coffee, banks may also consider providing such avenues for soliciting customer inputs.

6.2 Limitations and Future Work

The findings of the study should be viewed in light of its limitations. First, the sample size for the pilot test of the research model was 34. Results obtained in this study reflect this small sample and may not generalize to the overall population. More data will be collected and a larger sample size will be used as we continue this work. Second, we will consider enhancements to the measures of variables such as employee skills, IT investment, and service innovation performance in our future work. For instance, specific types of employee skills such as generic skills and IT skills will be
identified. The items used to measure employee skills will also focus on the skills and knowledge that are more related to service innovation activities in banks. Objective data such as the actual IT budget of the bank will be used to complement the subjective assessment of IT investment in the model. The possibility of formative measure of IT investment will also be explored. Further, in addition to the number of new services and the average development time, to better capture the performance of service innovation activities in banks the quality of service innovation will be taken into account. Third, this study models three types of resources i.e., employee skills, IT investment, and customer co-creation, without taking into account other potential antecedents and moderators such as innovation culture and strategy. We intend to examine their effects in future work. Fourth, different types of banks such as small and large banks, local and multinational banks will be compared, and the differences in service innovation performance will be examined in the follow-up work. Last, comparative studies with other service industries could help to elucidate industry-specific antecedents of service innovation.

References


