The Influence of Service Channel and Customer Segment on the Relationship between Performance and Self-service Technology

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ABSTRACT

The objective of this paper is to examine how customer segment and service channel impact the contribution of SSTs in general and ATMs in particular. Our results indicate that ATMs are positively related to bank performance. The effects of ATMs on bank performance are conditional on customer segment and service channel. Empirical results suggest that when banks are considering providing services through SSTs, they should take customer characteristics into account. When there is a better fit between SSTs and customer demand, banks can draw more benefits from SSTs. Our paper provides empirical evidence for deploying appropriate SSTs in general and ATM in particular for banks with different customer segment and service channel.

Keywords: Information technology, Self-service technology, Financial performance, Banking industry, ATM

INTRODUCTION

Most recently, the changing marketplace has intensified competition within the banking industries. In order to remain competitive and increase market share, how to utilize newer technologies, especially information technology (IT) has become critical issue. The increasing labor costs in the banking industry and the great progress of IT are driving firms to examine alternative service delivery options that not only can reduce operating cost burden but also allow customers to perform services for themselves. In the past two decades, banks have begun to use a wide range of technologies to allow customers to perform services electronically without direct contact from bank employees. These kinds of technological interfaces have been called self-service technologies (SSTs) (Meuter et al., 2000).

In the banking industry, examples of SSTs include automated phone systems, automated teller machines (ATMs), telephone banking and internet banking. For banks, the branch office is the conventional service channel to deliver banking services. This conventional service delivery channel has been challenged and supplanted by SSTs progressively. Although, prior studies have examined the contributions of SSTs on firm productivity, efficiency and cost-saving (Chase, 1978; Dabholkar, 1996; Lovelock and Young, 1979; Mills and Moberg, 1982; Schneider and Bowen, 1985; Walker et al., 2002; Zeithaml and Gilly, 1987), the interactions between conventional branch service channel and SSTs on banking performance remains unknown. The first purpose of this paper is to clarify the interactions between conventional branch channels and SSTs on banking performance. Prior studies have shown that customer characteristics affect the utilization of and thus contribution of SSTs (Bateson, 1985; Dabholkar, 1992; Eastlick, 1996; Zeithaml and Gilly, 1987). We wondered whether the customer's segment has some effect on the relationship between performance and SSTs. Therefore, the second objective of this paper is to examine the impacts of customer segment on the relationship between performance and SSTs.

The Automatic Teller Machine (ATM) was first brought into use in the late 1960s. It is not only a well-known representative of IT investment but also the pioneering application of SST in the banking industry. Therefore, we examine effects of the most well recognized SSTs on banking performance in this paper.

The findings of this paper indicate the existing conventional branch service channel has a negative impact on the financial contribution of SSTs. Our results also show that banks with more customers demanding routine service have positive impacts on financial contribution of SSTs. The investment in new technology is risky and will incur large fixed costs (Dos Santos and Peffers, 1995). For financial institutions, the question of how to design strategies for developing self-service technology is crucial and urgent. Our paper provides evidences on the financial contributions of SSTs in general and ATMs in particular. Our paper also provides evidences on the differential effects SSTs conditional customer segment and service channel. The results of our paper are useful for banks to formulate or revise their investment strategy for SSTs. This paper consists of five sections. Section 2 is the literature review and hypothesis development. Section 3 presents research method. Empirical results are discussed in Section 4. Section 5 concludes the paper.

LITERATURE REVIEW AND HYPOTHESIS DEVELOPMENT

Porter and Millar (1985) suggest that information technology (IT) has affected competition in three aspects. First, IT has led to changes in industry structure and competition. Second, IT has supported the creation of new business. Third, companies using IT outperformed their corrivals. From a strategic point of view, IT could affect cost leadership, differentiation or specialization in a market niche, or efficiency in value chain activities (Porter, 1980). In addition, IT could reduce the cost of coordinating between activities and risks inherent in any transaction, and create value for the client (Bakos, 1991; Clemons and Row, 1991).

From the consumer's perspective, SSTs enable them to enjoy services they require with a more flexible choice of time and space (Meuter et al., 2000). For firms, benefits of SSTs are quite evident in terms of productivity, efficiency and cost-saving (Chase, 1978; Dabholkar, 1996; Lovelock and Young, 1979; Mills and Moberg, 1982; Schneider and Bowen, 1985; Walker et al., 2002; Zeithaml and Gilly, 1987). Several studies demonstrate that SSTs or electronic banking technologies can achieve cost saving in the banking industry (Aladwani, 2001; Premkumar and Roberts, 1999; Sriram and Stump, 2004). As a representative application of SSTs, ATMs allow bank customers to perform cash transactions and account transfers by themselves and thus reduce the need for tellers, and thus save the associated salary expense and cost of branch establishment (Dos Santos and Peffers, 1995; Hannan and McDowell, 1984; Ladernman, 1990). Anticipating, therefore, that ATMs improve the banks' performances, we offer the following hypothesis:

H1: ATMs have a positive relationship with a bank's performance.

Some SST studies focus on the users' demographic characteristics (Bateson, 1985; Dabholkar, 1992; Eastlick, 1996; Zeithaml and Gilly, 1987); others explore the role of technology in improving service quality (Dabholkar, 1996) or the role of technology in performance of services delivery (Dabholkar, 1994, 1996, 2000; Meuter et al., 2000). More recent studies work on the influence of technology anxiety, technology readiness, e-trust, and cognitive and situational determinants on the intentions toward SSTs (Hwang and Kim, 2007; Lin and Hsieh, 2007; Lu et al., 2009; Meuter et al., 2003; Simon and Usunier, 2007). These papers indicate that the usage of SSTs is subject to the characteristics of each customer. Chang and Yang (2008) examine the usage of self-service check-in kiosks. They suggest that firms should take customer's needs into consideration when drawing up their SSTs investment strategy.

From customer perspective, Bigelen et al. (2006) classified the banking service into non-routine service and routine service. Non-routine service includes mortgages and loans, investment funds, stocks and insurance, while routine service includes checking accounts, savings accounts, electronic banking/telebanking, currency exchanges, credit application accounts, and travel services. Banks install more ATMs can satisfy customers who demand for more routine services. We anticipate that if customer demand for routine services is stronger, the financial contribution of ATMs will be stronger. Therefore, we test the following hypothesis:

H2: For the banks with more customers demanding routine services, ATMs have more positive influence on banks' performance.

In the banking industry, branch offices are the traditional service channels. Inspired by the great progress in IT, developing multiple channels has become the best strategy for

service companies to deliver their services effectively and efficiently (Hughes and Kaplan, 2009;Ganesh, 2004; Coelho et al., 2003).

Banks have developed alternative service channels for retaining existing customers and attracting new ones (Calisir and Gumussory, 2008). The earlier motivation for installing ATMs was to geographically cover the needs of bank customers (Kauffman and Kumar, 2008), and to expand market share or protect their market against rival banks (Hannan and McDowell, 1984). However, Osmonbekov et al. (2008) indicate that multi-channel is not always profitable due to the channel conflicts.

An ATM is designed to mimic the tellers in the branch. Its function is not necessarily to attract new customers. Rather, it is to switch the customers of a branch channel to an IT-based channel. The establishment of more branches improves access convenience and retains the loyalty of customers. The branch channel has positive impacts on improving market share (Banker et al., 2009). Wolk and Skiera (2009) have shown that companies with low branch channel power benefit more from IT-based channel. Since ATM is an alternative to traditional branch service channel, we anticipate that bank with more branches draws less benefit from ATMs and propose the following hypothesis.

H3: For the banks with more branches, ATMs have less positive influence on banks' performance.

DATA AND RESEARCH DESIGN

Banking industry has utilized SSTs for several decades. For the banking industry, the degree for depending on SSTs is higher and higher. More and more banks take SSTs into consideration when revising their competitive strategy.

In this paper, we examine the differential effects of ATMs on bank performance, the most typical SST application in the banking. The ATM related data is originally collected by the Bureau of Monetary Affairs, Financial Supervisory Commission in Taiwan. We also collected bank financial data from TEJ (Taiwan Economic Journal) database. For the period from 1995 to 2005, the total number of observations was 284.

This study mainly examines the influences of service channel and customer segment on the relationship between ATMs and performance. We focus on the profitability and take ROA (return on assets) as our performance measure (Strassman, 1990; Hitt and Brynjolfsson, 1996).

We first estimate a benchmark model to examine the association between ATM and bank performance. Hypothesis 1 suggests that ATMs can improve the banks' performance. In order to test this hypothesis, this paper employs a simple base regression model to examine the relationship between ATMs and ROA. The regression model is equation (1).

$$Y_{it} = \alpha + \beta ATM_{it} + \varepsilon_{it} \quad (1)$$

Where

Y_{it} : ROA of period t for bank i;

ATM_{it} : The log value of the number of ATMs of period t for bank i;

α : Constant term;

β : Coefficients of independent variables;

ε_{it} : Error term of period t for bank i..

Hypothesis 2 proposes that for banks with more customers demanding for routine services, the financial contribution of ATMs will be greater than those banks with less customers demanding for routine service. Since customers mainly conduct deposit-related routine services through ATMs by themselves, we use the ratio of demand deposit to total deposit (denoted as DD/TD) to measure customer demand for routine service (Ou et al., 2009). Thus, a bank with higher ratio of demand deposit to total deposit demands more routine service. We classify customer segments into two groups. The first group include banks whose DD/TD are above the median (denoted as high routine service group, HRSG), and the second group includes banks whose DD/TD are below/ equal to the median (denoted as low routine service group, LRSG). By following the logic of Hypothesis 2, we predict that β of HRSG is larger than that of LRSG.

Hypothesis 3 proposes that a bank with more branches realize less benefit from ATMs. We classify the banks by their number of branches (denoted as NB) into two groups. The first group is composed of banks whose number of branches is above the median (denoted as branch oriented group; BOG), and the second group is made up of banks whose number of branches are below/ equal to the median (denoted as non-branch oriented group; NBOG). By following the logic of Hypothesis 3, we predict that β of BOG is smaller than that of NGOG.

EMPIRICAL RESULTS

Table 1 shows the descriptive statistics. The minimum value of the number of is 24, and the maximum value of number of ATMs is 3635. The mean value of number of ATMs is about 253. Sample banks employ ATMs diverge greatly. Additionally, the deviation of the number of branches (NB) is also large. The maximum value of NB is 181 and its minimum value is 12. The mean of NB is about 62. The number of branches for the largest bank is 15 times of that of the smallest bank. In addition, the mean value of ROA is 0.134, the minimum value of ROA is -8.250. It represents the fact that some banks suffered a financial loss.

Table 1 Descriptive Statistics of Variables

Variables	Mean	Std. Dev.	Min.	Max.
Number of ATM	253.361	410.347	24	3635
ROA	0.134	1.175	-8.250	2.350
DD/TD	0.140	0.070	0.019	0.329
NB	62.599	40.891	12.000	181.000

Table 2 summarizes the empirical results. In the base model, we used all the samples in the regression model. The estimated coefficient is positive (0.193) and the t-value is 3.202. These results show that ATMs are positively associated with bank performance. Hence, Hypothesis 1 is supported. Hypothesis 2 proposes that if more customers demand for routine services, ATMs will have more positive influence on the bank's performance. We classify banks into high routine service group (HRSG) and low routine service group (LRSG). The coefficients of ATM are 0.318 and 0.098 respectively for HRSG and LRSG, respectively. Their corresponding t values are 3.525 and 1.446. However, only the coefficient of HRSG is significantly different from zero. The coefficient of HRSG is larger than that of LRSG. The difference of these two coefficients is 0.220. The difference of these two coefficients is significant with t value being 3.098. These empirical results support Hypothesis 2 that for banks with more customers demanding routine services, ATMs have more positive influence on the banks' performance.

Hypothesis 3 proposes that a bank with more branches draws less benefit from ATMs. We classify banks into branch oriented group (BOG) and non-branch oriented group (NBOG). The coefficients of the ATM are 0.147 and 0.449 respectively for the two groups. Their corresponding t values are 1.853 and 2.505, both significantly different from zero. The coefficient of BOG is smaller than that of NBOG. The difference between these two coefficients is 0.302 and the corresponding t value is -20.428. Consistent with Hypothesis3, the results show that banks with more branches realize less benefit from ATMs.

Table 2: The Main Empirical Results

	Constant	ATM	Adj- R^2	P-value of F test
Hypothesis 1				
All samples	-0.746 (-2.273) **	0.193 (3.020) ***	0.023	0.003
Hypothesis 2				
High routine service group (HRSG)	-1.587 (-3.078) ***	0.318 (3.252) ***	0.048	0.001
Low routine service group (LRSG)	-0.047 (-0.139)	0.098 (1.446)	0.007	0.15.
t-test: HRSG=LRSG		0.220 (3.098) ***		
Hypothesis 3				
Branch oriented group (BOG)	-0.525 (-1.162)	0.147 (1.853) *	0.014	0.066
Non-branch oriented group (NBOG)	-1.842 (-2.297) **	0.449 (2.505) **	0.030	0.013
t-test: BOG=NBOG		-0.302 (-20.428)***		

ps: the values in parentheses are the t-values; *, ** and *** represent the significant level 0.1, 0.05 and 0.01 respectively.

The above empirical results indicate that both service channel and customer segments have some impacts on the relations between ATMs and bank performance. Banks with more customers demanding routine services draw more benefit from ATMs; banks with more branches realize less benefit from ATMs. In order to examine whether banks which are non-branch oriented with high routine service (NBOG*HRSG) can draw the most benefit from ATMs. We classified the original sample into 4 groups. Subgroup 1 consists of sample being branch oriented with high routine service (BOG * HRSG), subgroup 2 consists of sample being branch oriented with low routine service (BOG * LRSG), subgroup 3 consists of sample being non-branch oriented with high routine service (NBOG * HRSG), and subgroup 4 consists of sample being non-branch oriented with low routine service (NBOG * LRSG).

Table 3 summarizes the empirical results. The ATM coefficients of the four subgroups are 0.032, 0.358, 0.579, and -0.001 respectively. This results indicate that the coefficient of subgroup 3 (nonbranch oriented with high routine service (NBOG * HRSG)) is the largest, consistent with the expectation that banks that are nonbranch oriented with high routine service (NBOG * HRSG) can draw most benefits out of ATMs.

For the banks which are branch oriented, the coefficients of the high routine service group and low routine service group are 0.032 and 0.358 respectively. The results are contrary to hypothesis 2 which proposes that banks with high routine services can draw more benefits from ATMs than banks with low routine services. The results suggest that the interactions among ATMs, branch channel, customer segment, and financial performance are more complex than that proposed by hypothesis 2 and deserve further investigation.

Table 3: The coefficients of ATM.

	High routine service group (HRSG)	Low routine service group (LRSG)
Branch oriented group (BOG)	0.032 (0.325)	0.358 (2.852) ***
Non-branch oriented (NBOG)	0.579 (1.721) *	-0.001 (-0.008)

ps: the values in parentheses are the t-values; *, ** and *** represent the significant level 0.1, 0.05 and 0.01 respectively.

In short, the empirical results indicate that customer segments, service channel and their interaction have influences on the relationship between ATMs and bank performance. These conclusions are derived from comparing the regression coefficients of ATM of different subsample. In order to examine the robustness of the above conclusion, Table 4 proposes another way for testing our hypotheses. We first define two dummy variables, Dummy_routine and Dummy_branch. Dummy_routine is equal to 1if a bank is in the high routine service group and 0 otherwise. Dummy_branch is equal to 1 if a bank is branch oriented and 0 otherwise.

Table 4 shows that the coefficients of ATM are positive in both regression models and significant in model 2, partially supporting the expectation that ATMs are positively associated with bank performance. In model 1, the coefficients of ATM* Dummy_routine is 0.220 (t value=1.693), indicating that banks with high routine services draw more

benefit from ATMs than those banks with low routine services. The coefficients of ATM* Dummy_branch is -0.303 (t value=-1.659) in model 2, indicating and that banks which are branch oriented draw less benefits from ATMs than non-branch oriented banks. These results support hypotheses 2 and 3.

Table 4: Robust study

Variables	Model 1	Model 2
Constant	-0.047 (-0.093)	-1.842 (-2.783) ***
ATM	0.098 (0.965)	0.449 (3.036) ***
Dummy_routine	-1.540 (-2.331) **	
Dummy_branch		1.318 (1.463)
ATM* Dummy_routine	0.220 (1.693) *	
ATM* Dummy_branch		-0.303 (-1.659) *
Adj- R^2	0.064	0.028
P-value of F test	0.000	0.005

ps: the values in parentheses are t-value; *, ** and *** represent the significant level 0.1, 0.05 and 0.01 respectively.

CONCLUSION

Driving by the great progress of IT, taking advantage of SSTs to deliver service becomes a prevailing trend in the service industries. Although the contributions of SSTs had had been examined in previous papers, the evidence on the influence of customer segment and service channel on the financial contributions of SSTs are very limited. To the best of our knowledge, this paper is the first study to examine how customer segment and service channel impact the contribution of SSTs in general and ATMs in particular.

Our basic results indicate that ATMs are positively related to bank performance. Furthermore, our results show that the effects of ATMs on bank performance are conditional on customer segment and service channel. Our results suggest that when banks are considering providing services through SSTs, they should take customer characteristics into account. When there is a better fit between SSTs and customer demand, firms can draw more benefits from SSTs. In addition, firms should consider the influence of alternative service channel as well. For firms without powerful physical channel, it is a good way to deploy SSTs to improve financial performance.

Differential effects of different service channels on bank performance are crucial for designing an appropriate multichannel service delivery strategy. Our paper provides empirical evidence for deploying appropriate SSTs in general and ATM in particular for banks with different customer segment and service channel.

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