

Customer satisfaction under heterogeneous services of different self-service technologies

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Abstract. *This study aims to evaluate the customer satisfaction of different self-service technologies (SST) when different SSTs provide various services. This study compares overall customer satisfaction according to the four types of SSTs (Mobile Channel SST, ATM SST, Telephone SST and online SST) when SSTs provide heterogeneous services. We used both primary and secondary data. Primary data consisted of a survey questionnaire applied to a final sample size of 400 people. Data analysis was performed via ordered logistic regression. The results showed that customer satisfaction on different SSTs for different services positively associate with overall customer satisfaction in the banking sector, and this study finds customer satisfaction of mobile banking (MB) more positively associate than other SSTs with customer satisfaction. This study conducted on one profit-making organization (bank) of Bangladesh. Therefore, the geographic bases of SST contexts limit the extension of our findings. Future investigation is needed for evaluating the customer satisfaction on non-profit organizations and educational sector. Understanding what factors determine customer's satisfaction in the different services provided by each SSTs contribute to manage and coordinate multiple services delivered by various SSTs and to know the process of improving the customer satisfaction across the services offered. Previous investigations were focusing on the customer satisfaction when provided services and/ or SSTs are homogeneous, but this study examines the customer satisfaction when both services and SSTs are heterogeneous. This study significantly impacts both the management and research of developing operations strategies for organizations.*

Keywords: Customer satisfaction, ATM, Telephone banking, Mobile banking, Online service, Self-service technologies

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Introduction

In the modern era, technology is changing the service delivery process (Leek et al., 2003). The users of technology based on self-service devices increase day by day, with customers showing much more interest in functional and user-friendly interfaces. Interfaces of Self-service technologies (SST) help customers to create benefits in the absence of any representative of organizations. (Beatson et al., 2007; Curran and Meuter, 2005; Åkesson et al., 2014). There are many types of SSTs such as automated teller machines (ATMs), hotel check-in/check-out kiosks, retail self-scanners, automated telephone banking and online ticketing (Ostrom et al., 2002). SSTs help customers to change the way of accessing many services, including banking services (Bobbitt and Dabholkar, 2001). However, the adoption process of a service provided by banking differs according to the SST (Curran and Meuter, 2005; Åkesson et al., 2014). This highlights the existence of theoretical frameworks in which differences in the customer's adoption process might lead to different customer's satisfaction. Therefore, studies on the customer satisfaction for SST technologies should take in to account the heterogeneity of services provided. This remains a challenge since actual empirical research focused only the homogeneous SSTs type (Robertson et al., 2016) and thus give an incomplete picture of customer satisfaction on the SST provided by the bank. The banking industry earlier adopted the self-service technology and always tried to develop innovative technology-related service in the search for differentiation from other competitors (Devlin, 1995). Usually, banks adopt cutting-edge self-service technologies (SST) and assist by diverse types SSTs– such as automated teller machines (ATMs), telephone banking (TB), internet banking (IB), and mobile banking (MB). This diversity leads the banking industry in a search for meeting both the customer's needs and desires together with bank employees (Meuter et al., 2000) by diversifying the access to services provided by the bank industry. Their major goal consist in providing tools to increase customer satisfaction, but the heterogeneity of SST technologies challenges the understanding of a complete picture regarding general customer satisfaction.

Our present study addresses this limitation by investigating the overall customer satisfaction across different and heterogeneous self-service technologies in the banking industry of Bangladesh. Typically bank uses four SSTs (ATM, TB, IB, and MB) each of one providing a different set of SSTs. We aimed to measure the satisfaction level on different SSTs for different service and evaluated the impact for each SSTs on overall customer satisfaction. Mainly we were interested in four central questions: (i) What is the satisfaction level for different SSTs for heterogeneous services in the banking industry in Bangladesh? (ii) For which service customers are more satisfy for each SST? (iii) Are sources of Customer satisfaction and dissatisfaction different among SSTs? (iv) Does the level of satisfaction/dissatisfaction from SSTs affect Customer relationships? For conducting our study, we chose, as a model, the Dutch-Bangla Bank Ltd (DBBL) one of the leading retail banks in Bangladesh. In the different parts of Bangladesh, it has 169 branches and 4429 ATMs. The mobile application for the DBBL is called Rocket (number of active users: 1,021,337). DBBL provides different services for different SSTs: (i) automated teller machines (ATMs) allow to withdraw money, check for balance inquiry, for account information, but forbid cash deposit, Money sending, top Up and Bill pay. Telephone banking (TB), internet banking (IB), and mobile banking (MB) also allow and disallow different services.

Table I. Services provided by different SST of Duch Bangla Bank Ltd.(DBBL), Bangladesh

| Services | SSTs | | | |
|---------------------|--------|--------|--------|-------|
| | ATM | TB | IB | MB |
| Cash withdraw | Allow | Forbid | Forbid | Allow |
| Cash Deposit | Forbid | Forbid | Forbid | Allow |
| Balance Inquiry | Allow | Forbid | Allow | Allow |
| Send Money | Forbid | Forbid | Allow | Allow |
| Account Information | Allow | Allow | Allow | Allow |
| Mobile top up | Forbid | Forbid | Allow | Allow |
| Utilities Bill pay | Forbid | Forbid | Allow | Allow |

Note:

¹ATM: automated teller machine; TB: telephone banking; IB: internet banking; MB: mobile banking.

Source: dutchbanglabank.com

Literature review and hypotheses

"SST" term was first introduced by Meuter et al. (2000) to define “technological interfaces enabling customers to use a service without the direct involvement of service-employee”. Nowadays technology interface dramatically impacts the long-term success of the business (Meuter et al., 2005; Åkesson et al., 2014) and customer interactions increased significantly. Further studies contributed to establishing the term SST which gained wide acceptance and improved classification (Curran and Meuter, 2005; Lee and Allaway, 2002; Forbes, 2008). A system contains three parts: input, process, and output. Due to the inseparable character of the self-service technology, it's not possible to provide the service without customer action. The customer interacts with a SST in the input stage, then the system process the customer's requirement through the available technology, and, ultimately, the SST gives the desired result to the customers. According to Curran and Meuter (2005), "self" indicates a customers' willingness to participate in the process during service encounter. Thus, customers' performance creates value for an organization's SSTs (Dabholkar,1990; Xue et al., 2005; Robertson et al., 2016). Therefore, during a service encounter, customers likely become an organization's “partial employees” (Bettencourt, 1997; Xue et al., 2005), i.e., customers provisionally involve with SSTs during service production by contributing some activities, such as effort. According to Lawler's affect theory of social exchange (Lawer, 2001), customers “jointness” or joint responsibility with the system also becomes crucial for determining their satisfaction on SSTs during service delivering, mainly because of the high degree of inseparability between the SSTs and the customer. Consequently, this creates a scenario where customers' satisfaction determines the usability of the SST in future activities (Sierra and McQuitty, 2005; Sierra et al., 2009; Åkesson et al., 2014; Robertson et al., 2016).

Past study found that reliability, user-friendly, enjoyment, and perceived control of the service associated positively with customer satisfaction for online and interactive voice

response (IVR) (Robertson et al., 2016). However, here again, the evaluated SSTs provided the same services. The customer satisfaction under heterogeneous SST remains mostly unknown. Consequently, customers should efficiently operate services provided by SSTs, if customers are unable to execute a function in the proper way that can lead failure of SSTs activities (Sierra and McQuitty, 2005). The organization also should provide service with high technology and ease SSTs. So customers' satisfaction depends on their performance and perfect activities of SSTs (Sierra and McQuitty, 2005; Jun and Palacios, 2016).

When customers use SSTs, many associated factors and functionalities of SSTs become vital for customer satisfaction (Dabholkar, 1994), the so-called features of the service: (i) reliability of service (Dabholkar, 1996; Dabholkar et al., 2003); (ii) usability (Curran and Meuter, 2005; Dabholkar, 1996; Dabholkar et al., 2003; Robertson et al., 2016); (iii) enjoyment (Dabholkar, 1996; Dabholkar et al., 2003; Robertson et al., 2016); (iv) perceived control (Dabholkar, 1996; Dabholkar et al., 2003; Lee and Allaway, 2002; Robertson et al., 2016); and (v) perceived speed (Dabholkar, 1996; Dabholkar et al., 2003; Robertson et al., 2016; Jun and Palacios, 2016). All these features are considered by the customer when searching for the services provided by the SSTs, namely, Cash withdraws, Balance Inquiry, Money transfers, Account information, Mobile top up, and Utilities for Bill payments. Therefore, that five features reported contributing to determining the customer satisfaction which might vary widely when the technologies are heterogeneous. For better-understanding customer evaluations across different self-service technologies for heterogeneous services, we must disentangle both features and services and isolate their effects in overall customer satisfaction. In general, not all SST provide the same service, but all can be evaluated according to the same features. This allows us to establish a conceptual framework (Figure 1) to include the six services (provided by different SSTs) combined with the five features. The conceptual framework allows us to obtain a complete picture of customer satisfaction applicable for any kind of SST developed.

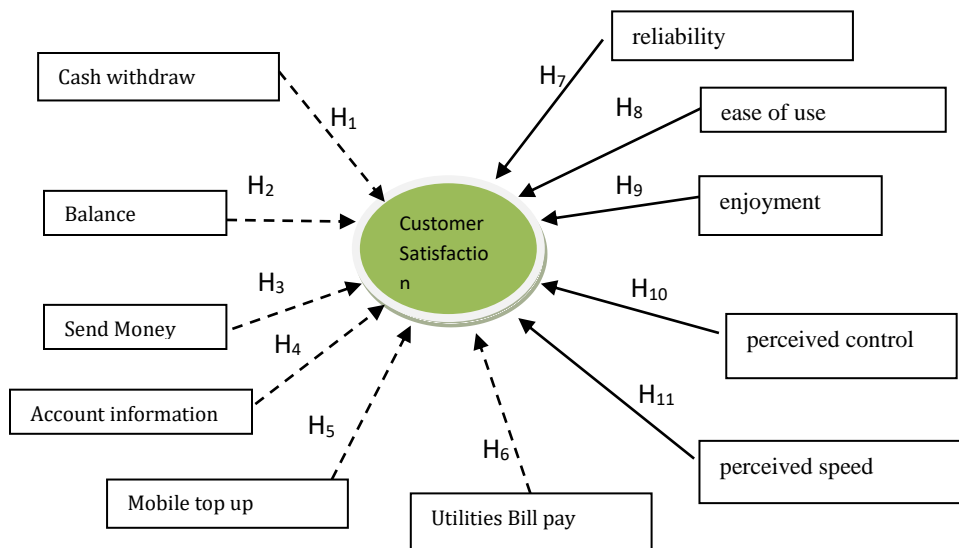


Figure 1. Hypothesised framework of SST satisfaction

Note: Main contributions of this study indicated by dot lines.

Source: Authors' own representation.

The Internet has an enormous impact on bank customers on overall customers satisfaction that helps to get service without bank person (Rahman, 2004). In the modern era, customers can quickly switch to online based services due to their usability, enjoyment with high perceived speed and perceived control (Meuter et al., 2000). Thus, banks try to implement effective strategies for online banking activities (Kolodinsky, 2004; Robertson et al., 2016; Åkesson et al., 2014). In Denmark, Mols (1998) showed that internet banking users become more loyal and satisfied with banks than non-users of internet banking. Interestingly, customers of internet banking also become less sensitive to price than non-internet banking users. This creates a potential for not only increasing the fidelity of the bank clients, but also an opportunity for improving the bank profits.

Self-service technology does not only give more control to customers, but it also reduces time, workload and operational cost of organizations (Ding et al., 2007; Mortimer et al., 2015). Therefore, benefits provided by SST, such as convenience, customization, and accessibility, create more value for customers than price (Fornell, 1992; Zeithaml et al., 1996; Mortimer et al., 2015; Demoulin and Djelassi, 2016). Customers use ATM, telephone banking, Internet banking and Mobile banking for saving time (Sarel and Marmorstein, 2003; Robertson et al., 2016; Kaushik and Rahman, 2015). M-banking differs from online-banking by providing a mobile technology that guarantees the customer access independently of the internet (Kim et al., 2010). In our study case Bangladesh, customers access all activities of mobile banking without internet. This creates a scenario that fosters the customer's involvement with the technology, thus raising the importance of satisfaction to consider not only the services provided but also the features characteristics for each SST. Previous studies found that involvement of customers with the process of service co-production can influence customer satisfaction, time of service delivery and the out put value (Cook et al., 1999; Bendapudi and Leone, 2003). Meuter et al. (2000) noted that SSTs satisfaction relates to the capacity to service customization. Bitner et al. (2002) indicated that easy access to services make customer satisfaction on different SSTs and complex and faulty functions cause customer dissatisfaction. SSTs can create a more satisfied customer using customization and improved accessibility of services. (Meuter et al., 2000; Bitner et al., 2002; Demoulin and Djelassi, 2016). Many authors have investigated the relationship between customers satisfaction with SST but examined homogeneous SSTs (Meuter et al., 2000) or when the provided services were homogeneous (Robertson et al., 2016). When the SST is heterogeneous the technology that offers most of the services with the majority of desired features might result in higher customer's satisfaction.

Jun and Palacios (2016) described that mobile banking has enabled financial organizations to offer their consumers extremely value-added services, such as reliability, easy to use, enjoyment of service and capability to access monetary services like cash withdraw service, balance inquiry, money transfer service, account information, mobile top-up service, and bill payments service and without time and geographical constraints (Shih et al., 2010). Focusing on m-banking, Thakur (2014) mentioned that the consequence of m-banking is still greater due to the growing focus of financial institutions on mobile device in order to get in touch with a larger group of consumers. Since mobile banking (MB) provides many different services, we hypothesize that it will score higher than any other SST. For testing this, we divided our current hypothesis into six hypotheses: the interaction between customer satisfaction with heterogeneous SST will score higher on MB than any other SST

due to the provisioning of (H1) cash withdraw service; (H2) Balance Inquiry; (H3) money transfer service; (H4) account information; (H5) mobile top-up service; and (H6) bill payments service.

On the other hand, customer satisfaction does not only depends on the diversity of services provided by just one SST. The quality in which the SSTs deliver each service also plays a major role in determining customer's satisfaction. As we stated earlier, customers seek self-service technologies for some reasons such as (i) time-saving (Howard and Worboys, 2003), (ii) cost saving (Meuter et al., 2000; Kaushik and Rahman, 2015), (iii) ease of use (Yang and Jun, 2002), (iv) avoid dependence on service personnel (Bateson, 1985; Kaushik and Rahman, 2015), and (v) personal control (Bateson, 1985; Meuter et al., 2000; Dabholkar, 1996;). Services adequately provided by SSTs that combines the proper technological function with service accuracy contributes to make the offered technology more reliable (Weijters et al., 2007; Demoulin and Djelassi, 2016). According to Collier and Kimes (2012) reliability is essential for determining customer's satisfaction when using SSTs, which, therefore, constitute the main factors in determining customer satisfaction. Robertson (2012) showed that due to a SST failure like the case of speech recognition of telephone banking or IVR context likely leads customers to dissatisfaction. Holloway and Beatty (2003) also found that complex designing problem of the website and in appropriate coding might lead to customer dissatisfaction. Therefore, reliability also constitutes an influencing factor in determining satisfaction with a SST. Another critical factor, the usability indicates the scale in which a determined service is provided by SST with reduced efforts (Davis, 1989). For mobile banking, customer easily accesses all service. Ease of use function of SST also influences satisfaction of customer (Chen et al., 2009; Weijters et al., 2007; Mortimer et al., 2015). Difficult technology combined with complex processes can lead customer dissatisfaction (Meuter et al., 2003; Hossain et al., 2018). For visual interface of online SSTs make customer delight than IVR (Dean, 2008) because reorganization system of telephone banking voice is complicated (Kolodinsky, 2004). Operating mobile banking also as secure as ATM (Hossain and Zhou, 2018). The degree to which customer believes that the function of executing SSTs activities are enjoyable is called enjoyment (Dabholkar et al., 2003; Weijters et al., 2007; ; Demoulin and Djelassi, 2016). Enjoyment can create customer satisfaction on services provided by SSTs (Weijters et al., 2007; Mortimer et al., 2015).

Perceived speed indicates the total time to execute a particular service. Less time is necessary for customer satisfaction on SSTs for performing the specific function. For IVR activities more time needed than online activities (McCartan-Quinn et al., 2004) and customers feel that mobile banking activities are less time to consume than other SSTs (Hossain and Zhou, 2018). Also, perceived control is another driver of customer satisfaction, that indicates customer can execute functions for performing meticulous activities. If customers control more the SSTs, they become more loyal to them (Yen, 2005). Dean (2008) indicated that customers of internet banking get more control than telephone banking Dean (2008). Lee and Allaway (2002) found that personal control of customers persuades high degree of adoption intention by reducing perceived risk and creating higher perceived value on SSTs. Based on that, we hypothesize that mobile technology will score higher than any other SST. For testing this hypothesis in combination with our proposed framework (Figure 1) we also divided it into other seven different hypotheses by assuming

that the interaction between overall customer satisfaction and isolated customer satisfaction will score higher in mobile banking due to (H7) reliability; (H8) easy to use; (H9) enjoyment of service; (H10) perceived control; and, (H11) perceived speed. To attend customer needs, many organizations provide service by using multichannel and multiple channels (Rangaswamy and Bruggen, 2005; Åkesson and Edvardsson, 2018). The difference between multichannel and multiple channels consists of multichannel method organizations offer different options to customer and customers may select a diverse channel at different times for getting their service (SST channel and traditional channel) such as online retail stores provide service by using online shopping and in-store shopping channel (Lee and Tan, 2003). Some in-store shopping channel allows checkout through the counter or self-service machine. On the other hand, multiple channel method indicates that company selects the different channel for providing service to the different segment (e.g., one channel for male and another channel for female). Most of the Banks also use two types of the channel (SSTs and traditional) for delivering service to customers. Dutch Bangla Bank Ltd, Bangladesh provide seven major services through four SSTs. Offered services are heterogeneous for different SSTs, and mobile banking (MB) is only one that provides all services. So this study investigates the changes in customer's satisfaction under heterogeneous services.

Materials and Methods

In this study, the banking industry of Bangladesh were selected as the target context because, in the modern scenario of banking diffusion, Bangladesh can be considered as a country with a growing number of banking users. To estimate the customer satisfaction under heterogeneous services provided by different SSTs, we select the users of SSTs from Dutch Bangla Bank Ltd (DBBL), which is one of the leading retail bank in Bangladesh as the population of this study. We performed an exploratory research to estimate the level of customer satisfaction of different SSTs when they provide heterogeneous services. Probability sampling technique used for collection of primary data. This study included 400 respondents as the sample. The respondents originated from different parts of Bangladesh and were chosen based on random selection.

For obtaining information on satisfaction, we collected primary data via a 5-point labeled Likert type scale questionnaires, which anchored from "Strongly Agree" to "Strongly Disagree" (Croasmun and Ostrom, 2011; Hossain et al., 2018) and primary data were collected from June to July 2018. The Likert scale is useful for studies on social science and attitude research project by helping to obtain a range of responses to a series of statements (Leung, 2011 ; Hossain, et al., 2018), thus allowing to quantitatively evaluate qualitative variables, in our case customer satisfaction. Previous studies adopted the 5-point labeled Likert type scale questionnaires to obtain information on customer satisfaction (Coelho and Esteves, 2007) in different organizations such as luxury hotels and chain restaurants (Kim and Kim, 2005) and airline industry (Chen and Hu, 2013). Additional data and other necessary information also were obtained by interviewing SSTs developer, and experts from both banking and SST sectors. The 5-point labeled Likert type scale questionnaire was randomly delivered to 2000 customers of Dutch Bangla Bank Ltd, in the different parts of Bangladesh and a total of 1000 responses were received. From this group, a total of 400

customers were selected for this study because they were users of all of the available SSTs (ATM, TB, IB, and MB).

The sampled population is constituted by 163 (40.75%) female, 273 (59.25%) male; according to scholarly 182 (45.5%) were student, 37 (9.25%) were housewife, 56 (14%) were executive, and 125 (31.25%) were businessmen. Secondary data (collected from journal, books, social media site and website) was also included for better describing the resulting phenomenon. The data obtained from the questionnaires was analyzed via ordered logistic regression modeling. Ordered logistic regression allows modeling a dependent variable with more than two categories, in our case, the 5-point labeled Likert scale of customer satisfaction. Each category has a meaningful sequential order which we used to identify the logit coefficient of the different SST, the services, and features provided for each SST. Our analysis was performed in the Stata-14. We report the logit regression coefficient to indicate the impact of a determined technology on the overall customer satisfaction.

Results

Results of this study showed that on overall satisfaction highest coefficient for ATM was 1.43 for providing cash withdraw service, IB was 10.88 for perceived speed, TB was 0.83 for balance inquiry service and MB was 2.12 for sending money service. On the other hand, the lowest coefficient for ATM was 0.94 for ease of use, TB was -0.22 for perceiving control characteristic of service, IB was 0.51 for perceived control and MB was 1.71 for account information services. Table II showed a significant difference in the overall customer satisfaction according to the different SST available (ATM, TB, IB, and MB) ($p < 0.00001$, Likelihood Ratio (LR) Chi-Square = 548.80 and McFadden's pseudo-R-squared = 0.5074), thus indicating that each SST contributed to determining the customer satisfaction. Overall customer satisfaction became higher to the customer that adopts mobile technology MB, but it was only 9.8% higher when compared with the ATM with no significant difference between the customer satisfaction. On the other hand, MB coefficients generate 4.2 times more customer satisfaction than TB technology.

Table II. Coefficient of ATM, TB, IB, and MB on overall customer satisfaction (CS)

| CS | Coef. | Std. Err. | z | P> z | [95% Conf. | Interval] |
|-------|----------|-----------|-------|-------|------------|-----------|
| ATM | 1.526233 | .1656052 | 9.22 | 0.000 | 1.201653 | 1.850813 |
| TB | .3648025 | .1057607 | 3.45 | 0.001 | .1575153 | .5720898 |
| IB | .9398491 | .1266966 | 7.42 | 0.000 | .6915283 | 1.18817 |
| MB | 1.677249 | .167046 | 10.04 | 0.000 | 1.349844 | 2.004653 |
| /cut1 | 12.27561 | .8920284 | | | 10.52727 | 14.02396 |
| /cut2 | 14.97669 | 1.04842 | | | 12.92183 | 17.03156 |
| /cut3 | 17.81553 | 1.189605 | | | 15.48395 | 20.14711 |

Notes:

² Ordered logistic regression, Number of obs = 400, LR chi2(4) = 548.80, Prob > chi2 = 0.0000, Pseudo R2 = 0.5074, Log likelihood = -266.34247

³ATM: automated teller machine; TB: telephone banking; IB: internet banking; MB: mobile banking.

Source: STATA output.

Customer satisfaction under heterogeneous services

Among four SST offered by DBBL, only two (ATM and MB) provide cash withdraw service. Table III indicated that this service significantly contributed to generating customer satisfaction (LR test $p < 0.00001$, Likelihood Ratio (LR) Chi-Square = 440.81 and McFadden's pseudo- $R^2 = 0.41$). Moreover, the MB technology likely provided more satisfaction with a coefficient 22% higher than ATM (ATM=1.44, and MB= 1.76), due to the lack of overlap between the 95% confidence interval of the MB technology and the mean of ATM coefficient we also observed that MB technology score higher score higher than ATM when providing the service of cash withdraw.

Table III. Coefficient of customer satisfaction (CS) according to the different provided service (cash withdraw, balance inquiry, money transfer, account information, mobile top-up, and utilities for bill payments) for each SST (ATM, TB, IB, and MB).

| Service | CS | Coef. | Std. Err. | z | P> z | [95% Conf. Interval] | |
|---|---|----------|-----------|-------|----------|----------------------|----------|
| Cash Withdraw | ATM | 1.439975 | 0.150237 | 9.58 | 0 | 1.145517 | 1.734433 |
| | MB | 1.756986 | 0.154711 | 11.36 | 0 | 1.453758 | 2.060214 |
| | /cut1 | 8.678242 | 0.653401 | | | 7.397599 | 9.958885 |
| | /cut2 | 10.73007 | 0.751869 | | | 9.256438 | 12.20371 |
| | /cut3 | 12.9989 | 0.848601 | | | 11.33567 | 14.66213 |
| | LR chi2(2) = 440.81, Prob > chi2 = 0.0000, Pseudo R2 = 0.41, Log likelihood = -320.33 | | | | | | |
| Balance Inquiry | ATM | 0.657663 | 0.184376 | 3.57 | 0 | 0.296292 | 1.019033 |
| | TB | 0.827935 | 0.17964 | 4.61 | 0 | 0.475848 | 1.180023 |
| | IB | 0.867155 | 0.119876 | 7.23 | 0 | 0.632201 | 1.102108 |
| | MB | 1.725474 | 0.156817 | 11 | 0 | 1.418119 | 2.03283 |
| | /cut1 | 11.42003 | 0.844836 | | | 9.764186 | 13.07588 |
| | /cut2 | 13.7457 | 0.966103 | | | 11.85225 | 15.6393 |
| /cut3 | 16.2924 | 1.085404 | | | 14.16509 | 18.4198 | |
| LR chi2(4) = 495.97, Prob > chi2 = 0.0000, Pseudo R2 = 0.46, Log likelihood = -292.76 | | | | | | | |
| Money Transfer | IB | 0.732338 | 0.105455 | 6.94 | 0 | 0.52565 | 0.939026 |
| | MB | 2.117964 | 0.156546 | 13.53 | 0 | 1.811141 | 2.424788 |
| | /cut1 | 7.81446 | 0.605752 | | | 6.627208 | 9.001712 |
| | /cut2 | 9.653093 | 0.684082 | | | 8.312317 | 10.99387 |
| /cut3 | 11.76136 | 0.769777 | | | 10.25262 | 13.27009 | |
| LR chi2(2) = 401.51, Prob > chi2 = 0.0000, Pseudo R2 = 0.37, Log likelihood = -339.99 | | | | | | | |
| Account Information | ATM | 1.212896 | 0.258376 | 4.69 | 0 | 0.70649 | 1.719303 |
| | TB | 0.230903 | 0.232226 | 0.99 | 0.32 | -0.22425 | 0.686056 |
| | IB | 0.794159 | 0.115419 | 6.88 | 0 | 0.567942 | 1.020376 |
| | MB | 1.710646 | 0.159194 | 10.75 | 0 | 1.398632 | 2.02266 |

| Service | CS | Coef. | Std. Err. | z | P> z | [95% Conf. Interval] | |
|---|-------|----------|-----------|-------|------|----------------------|----------|
| | /cut1 | 11.08186 | 0.819159 | | | 9.476338 | 12.68738 |
| | /cut2 | 13.36916 | 0.938891 | | | 11.52897 | 15.20935 |
| | /cut3 | 15.8987 | 1.055621 | | | 13.82972 | 17.96768 |
| LR chi2(4) = 489.53, Prob > chi2 = 0.0000, Pseudo R2 = 0.45, Log likelihood = -295.98 | | | | | | | |
| | IB | 0.745389 | 0.109716 | 6.79 | 0 | 0.53035 | 0.960429 |
| | MB | 2.075258 | 0.153903 | 13.48 | 0 | 1.773613 | 2.376903 |
| Mobile top-up | /cut1 | 7.564128 | 0.583672 | | | 6.420152 | 8.708104 |
| | /cut2 | 9.415477 | 0.665199 | | | 8.111711 | 10.71924 |
| | /cut3 | 11.50541 | 0.750852 | | | 10.03376 | 12.97705 |
| LR chi2(2) = 398.00, Prob > chi2 = 0.0000, Pseudo R2 = 0.37, Log likelihood = -341.74 | | | | | | | |
| | IB | 0.788083 | 0.114881 | 6.86 | 0 | 0.56292 | 1.013246 |
| | MB | 2.029084 | 0.15309 | 13.25 | 0 | 1.729033 | 2.329136 |
| Utilities Bill pay | /cut1 | 7.583117 | 0.588764 | | | 6.429161 | 8.737074 |
| | /cut2 | 9.396243 | 0.666723 | | | 8.08949 | 10.70299 |
| | /cut3 | 11.47222 | 0.751416 | | | 9.999468 | 12.94496 |
| LR chi2(2) = 392.60, Prob > chi2 = 0.0000, Pseudo R2 = 0.36, Log likelihood = -344.44 | | | | | | | |

Notes:

⁴ Ordered logistic regression, Number of observations = 400.

⁵ ATM: automated teller machine; TB: telephone banking; IB: internet banking; MB: mobile banking.

Source: STATA output.

All SSTs provide balance inquiry service. Despite that, MB technology likely induces more customer satisfaction (MB= 1.73), even though all other SST made a significant contribution (Table III) (LR test $p < 0.00001$, Likelihood Ratio (LR) Chi-Square = 495.97 and McFadden's pseudo-R-squared = 0.4586). Coefficient for customer satisfaction (ATM=0.66, TB=0.83, and IB=0.87). All the other three SST (ATM, TB, and IB) presented nearly the same capacity of contributing to overall customer satisfaction (confidence interval overlaps with the coefficient). Regarding money transfer, only the IB and MB technologies provided this service. Although both technologies did contribute to significantly increase the customer satisfaction (LR test $p < 0.00001$, Likelihood Ratio (LR) Chi-Square = 401.51 and McFadden's pseudo-R-squared = 0.3713), MB technology largely overcome the IB, with a regression coefficient 2.9 times bigger (Table III). Therefore, the customer that need to transfer money likely become more satisfied when using the available mobile technology. Moreover, when we evaluate the customer satisfaction in obtaining account information, our results revealed that MB did present the highest coefficient (Table III), but the ATM also seemed to suffice customer need without differing significantly from the MB technology. Here again, TB presented the lowest coefficient, indicating a small likelihood of providing customer satisfaction when they seek for account information. Interestingly, IB did not provide a similar customer satisfaction than a customer obtain when using a MB technology (non-overlapping confidence intervals) but may reach a similar satisfaction than when a customer used ATM technology.

Mobile top-up is offered by only two SST (IB and MB). MB largely overcome the IB in inducing more customer satisfaction (Table III) with a coefficient 2.79 times higher. Even, though IB significantly contributed to customer satisfaction (LR test $p < 0.00001$, Likelihood Ratio (LR) Chi-Square =398.00 and McFadden’s pseudo-R-squared =0.3680), the MB technology likely contributed much more. When seeking for SST capable of providing utilities for bill payment, a customer from the DBBL has available the IB and MB technology. Once again, our analysis showed that MB provided much more customer satisfaction differing significantly from the IB for this service (Table III). Altogether, despite the ATM technology might contribute to customer satisfaction for some specific services like cash withdraw and account information, MB technology suffices most of the customer needs.

We also investigated how likely a customer evaluated the different SSTs according to the reliability, usability, enjoyment, perceived control, and speed (Table IV). Even though these characteristics allowed to compare all the different SST, we continue to observe a similar high score of MB technology. When asked about reliability, the customer found much more satisfaction when using the MB, which differed significantly from all three other services. According to our interviewed customers, the less reliable technology is IB with the lowest coefficient when comparing with the other two SST (ATM and IB). Both ATM and IB seemed to provide similar reliability.

Table IV. Coefficient of customer satisfaction (CS) according to the different provided features (reliability, usability, enjoyment, perceived control, and perceived speed) for each SST (ATM, TB, IB, and MB).

| Feature | CS | Coef. | Std. Err. | z | P> z | [95% Conf. Interval] | |
|-------------|---|----------|-----------|-------|-------|----------------------|----------|
| Reliability | ATM | 0.947304 | 0.180967 | 5.23 | 0 | 0.592615 | 1.301992 |
| | TB | 0.421392 | 0.172861 | 2.44 | 0.015 | 0.08259 | 0.760194 |
| | IB | 0.890424 | 0.122373 | 7.28 | 0 | 0.650578 | 1.130271 |
| | MB | 1.848155 | 0.16474 | 11.22 | 0 | 1.525271 | 2.171039 |
| | /cut1 | 11.49405 | 0.847366 | | | 9.833244 | 13.15486 |
| | /cut2 | 13.90546 | 0.976381 | | | 11.99179 | 15.81913 |
| | /cut3 | 16.5529 | 1.103271 | | | 14.39053 | 18.71527 |
| | LR $\chi^2(4) = 512.48$, Prob > $\chi^2 = 0.00$, Pseudo $R^2 = 0.47$, Log likelihood = -284.50 | | | | | | |
| Usability | ATM | 0.934537 | 0.145542 | 6.42 | 0 | 0.64928 | 1.219794 |
| | TB | -0.01958 | 0.128868 | -0.15 | 0.879 | -0.27216 | 0.232992 |
| | IB | 0.942368 | 0.122509 | 7.69 | 0 | 0.702255 | 1.182481 |
| | MB | 1.906099 | 0.1619 | 11.77 | 0 | 1.588782 | 2.223416 |
| | /cut1 | 10.57691 | 0.80007 | | | 9.008801 | 12.14502 |
| | /cut2 | 12.7799 | 0.910462 | | | 10.99543 | 14.56437 |
| | /cut3 | 15.23659 | 1.020337 | | | 13.23677 | 17.23641 |
| | LR $\chi^2(4) = 476.95$, Prob > $\chi^2 = 0.00$, Pseudo $R^2 = 0.44$, Log likelihood = -302.27 | | | | | | |
| Enjoyment | ATM | 1.203516 | 0.172296 | 6.99 | 0 | 0.865822 | 1.54121 |

| Feature | CS | Coef. | Std. Err. | z | P> z | [95% Conf. Interval] | |
|---|-------|----------|-----------|-------|-------|----------------------|----------|
| | TB | 0.119177 | 0.147223 | 0.81 | 0.418 | -0.16937 | 0.407729 |
| | IB | 0.902194 | 0.121575 | 7.42 | 0 | 0.663912 | 1.140476 |
| | MB | 1.796403 | 0.1609 | 11.16 | 0 | 1.481045 | 2.111761 |
| | /cut1 | 11.26903 | 0.841684 | | | 9.619358 | 12.9187 |
| | /cut2 | 13.62547 | 0.9679 | | | 11.72842 | 15.52251 |
| | /cut3 | 16.13841 | 1.08103 | | | 14.01963 | 18.25719 |
| LR chi ² (4) = 494.01, Prob > chi ² = 0.00, Pseudo R ² = 0.46, Log likelihood = -293.74 | | | | | | | |
| Perceived control | ATM | 1.326476 | 0.163588 | 8.11 | 0 | 1.00585 | 1.647103 |
| | TB | -0.21793 | 0.140933 | -1.55 | 0.122 | -0.49415 | 0.058296 |
| | IB | 0.510221 | 0.104338 | 4.89 | 0 | 0.305722 | 0.71472 |
| | MB | 1.720767 | 0.153806 | 11.19 | 0 | 1.419313 | 2.02222 |
| | /cut1 | 9.249061 | 0.723076 | | | 7.83186 | 10.66626 |
| | /cut2 | 11.28061 | 0.814177 | | | 9.68485 | 12.87636 |
| | /cut3 | 13.63064 | 0.914354 | | | 11.83854 | 15.42274 |
| LR chi ² (4) = 448.83, Prob > chi ² = 0.00, Pseudo R ² = 0.42, Log likelihood = -316.32 | | | | | | | |
| Perceived speed | ATM | 1.106005 | 0.61865 | 1.79 | 0.074 | -0.10653 | 2.318536 |
| | TB | 0.069246 | 0.470946 | 0.15 | 0.883 | -0.85379 | 0.992283 |
| | IB | 10.87815 | 1.791108 | 6.07 | 0 | 7.367646 | 14.38866 |
| | MB | 1.798272 | 0.681497 | 2.64 | 0.008 | 0.462563 | 3.133981 |
| | /cut1 | 37.44393 | 7.232436 | | | 23.26861 | 51.61924 |
| | /cut2 | 49.89218 | 9.173626 | | | 31.9122 | 67.87215 |
| | /cut3 | 59.02662 | 10.10086 | | | 39.22929 | 78.82395 |
| LR chi ² (4) = 1027.01, Prob > chi ² = 0.0000, Pseudo R ² = 0.95, Log likelihood = -27.2 | | | | | | | |

Notes:

⁶Ordered logistic regression, Number of observations = 400.

⁷ATM: automated teller machine; TB: telephone banking; IB: internet banking; MB: mobile banking.

Source: STATA output.

Table IV also showed how customer evaluated the four SST according to the usability. Remarkably, the TB technology did not provide any significant contribution to customer satisfaction with a coefficient close to zero. Once again, MB technology overcame all the other technologies, but the usability of ATM and IB technology did present similar contribution to customer satisfaction. Similarly, when evaluating the enjoyment of using a SST, our interviewed customers did not get any significant satisfaction by using TB technology. On the other hand, the enjoyment in using MB technology strongly contributed to customer satisfaction. Customers also seemed to enjoy using ATM and IB technologies but less strongly than MB (-33.0% and -49.8%, respectively). We also observed similar phenomena when evaluating customer perception of control and speed. In both cases, TB technology presented the smallest coefficient and did not significantly contribute to increasing customer satisfaction (Table IV). MB technology also showed the highest

coefficient that differed significantly from the rest of SSTs, but only for the perceived control. When we evaluated the customer satisfaction regarding the perception of speed, the IB technology largely overcame all the SST available. Interestingly, the coefficients of perceived speed presented the broader range of the confidence interval, thus indicating a high variability in customer perception of speed for all the available SST. According to the confidence interval for the coefficients of perceived speed, both ATM and MB technology may provide a similar range of satisfaction, but for the case of ATM, this contribution was weakly significant ($p < 0.08$).

In summary, our results showed that for the majority of services delivered by SST the MB technology tends to achieve the highest score in satisfaction. However, other SST with more heterogeneous services, like the ATM technologies may also reach similar levels of satisfaction, especially in highly specialized services. Similarly, the MB technology also scored high in the majority of SST features, except the perceived speed where a customer of the DBBL mainly preferred to use the IB technology.

Discussions

For cash withdraw services, the coefficient on customer satisfaction scored higher for mobile banking but with no significant difference from the ATM. This result is likely an outcome of the fact that for performing cash withdraw with a MB technology, the customer needs an ATM. In Bangladesh, the ratio of DBBL's ATM and agents (service points authorized by DBBL) is 1:27.40, this rate also create more customer satisfaction on Mobile banking than other SSTs. For mobile banking (MB), customers can effortlessly check balance, which likely explained the highest score in customer satisfaction. Balance inquiry may also be accessed via ATM, but requires the customer to find an ATM location. However, both TB and IB do not need the same amount of effort as the ATM, even though they performed similarly. This result likely represents the common tendency to increase the usage of mobile technology, since mobile phones nowadays provide much more services than just phone calls (Leung and Wei, 2000). A customer that adopted the mobile or internet banking can check their account information easily from anywhere by using mobile phone or website, but ATM technologies require the customer to search for a proper location, which might explain the smallest score in overall customer satisfaction.

Customers can transfer money from one account to another account by using both IB and MB, even though MB technology provided much more customer satisfaction. Interestingly, IB technologies allow all types of transaction (world-wide online shopping, external transaction) through the internet, whereas mobile banking of Bangladesh don't allow the international and external transaction. However, for mobile banking, customers can perform an inter bank transaction without internet access, which is not possible for IB. The lack of internet access is a problem for the population in many developing countries, such as Bangladesh. Therefore, even because IB technologies provide a broader range of services regarding money transfer, the DBBL clients still prefer the MB technology. Customers believe that for money sending from one to other works better with MB technology. In our study case of the DBBL, customers can top up their mobile balance and pay their bills via only two SSTs (IB and MB). Here again, the requirement of internet access seemed to influence the customer satisfaction when choosing MB. Without the internet, IB

technology will not top-up the mobile balance, whereas the client may always use the MB. Therefore, the differences between MB and IB might mostly occur due to the facilitated access to the mobile technology.

Beyond the differences in available tools, we also investigated the customer satisfaction considering the features of all the different SST. Usability indicates the scale that services provided by SSTs will be free of effort (Davis, 1989). From mobile banking, the customer can easily access all service by using their mobile. So the impact of customer satisfaction of mobile banking on overall customer satisfaction was higher than other. Service enjoyment indicates that customers enjoy the whole activities while getting the services. This study found that MB provides more enjoyment service than other SSTs. Also, MB offers more control to customers than other SSTs because the customer can easily access all activities from mobile.

Conclusion and implications

Our study demonstrated that customer satisfaction increases regardless the kind of available SSTs. However, heterogeneity in the services provided and in the features offers might explain the differences between them. Depending on the services some technologies, like the telephone banking, will not contribute to any customer satisfaction, likely an outcome of technological limitation for each SST (e.g., voice recognition). This generates a scenario that favors mobile technology given his capacity to provide several different services and even overcome some limitations from other SSTs, like the need for internet access for the internet banking. In a scenario where technologies rise and fall depending on the customer decision, understanding overall customer satisfaction becomes crucial for the advance of self-service technology capable of sufficing customer needs regarding reliability, usability, enjoyment, perceived control, and speed. We confirm the dominant role of mobile banking in determining customer satisfaction, thus becoming an essential tool for the present and future of banking industry. From a practical point of view our results suggest that banking services increase customer satisfaction by expanding the SST provided via mobile banking. Despite that from a theoretical point of view a more heterogenous services contribute to suffice the needs of SST to a more diverse group of customers. Bank industry should seek the balance between both to obtain an optimized delivery of self-service technology and maximize customer satisfaction.

By understanding what factors influences a customer's satisfaction regardless the heterogeneity in the SST, the organizations may develop better tools and coordinate the multiple services delivered by each one of them. This knowledge might also contribute to improving the customer satisfaction for different SSTs used by different organizaions. Therefore, the implications of our research extended to both the practical and scientific sides, with a particular contribution to guiding better operational strategies for the banking, financial and service sector. Besides consumers can also learn their behavior regarding SSTs in the banking context.

Limitations and future research directions

Although our study did an extensive sampling of a total of 400 people, we are limited to a case-study of a bank of Bangladesh. Future research should enlarge the sampling by

considering more than two banks. Moreover, geographic and cultural differences also might play a role in the overall customer satisfaction in the SST contexts. Different countries also possess a distinct technological infrastructure (cost of internet, Percent of SSTs user, types of SSTs and provided service). For example, in Bangladesh, the ATM and MB do not allow sending money from one bank to another, which does happen in many countries around the world. Future research may also expand the types of services provided, emerging technologies also influence the satisfaction of the earlier adopters and poses challenges to studies on customer satisfaction. In our present study, we decided to focus on the customer that experienced all the selected SST, but future studies may also consider differences in customer satisfaction according to the number of self-service technologies a customer access. We focused on a profit organization (a Bank). However, customer satisfaction on of self-service technologies provided by the non-profit agencies and educational sector also might offer a flourishing field.

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