Impact of Self Service Technology Quality on Customer Satisfaction: A Case of Retail Banks in Western Province in Sri Lanka

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Abstract: Rapid technological advancement in the banking environment drives Sri Lankan banks to adopt self-service technologies to deliver services via SMS banking, Internet banking and telephone banking facilities, Automated Teller Machines (ATM) etc. This study explored the perceived quality of the self-service technology of these services and its effect on customer satisfaction. The literature survey and in depth interviews helped to formulate quality dimensions: security, efficiency, eases of use, reliability and convenience and those dimensions were assessed through a questionnaire. This study surveyed 215 customers from branches of six dominating commercial banks located in Western Province of Sri Lanka. Data were subjected to Principal Component Analysis and retained factors were regressed using multiple regressions to assess the impact of quality dimensions on customer satisfaction. The results revealed that reliability and convenience have positive impacts on customer satisfaction but efficiency has a negative effect.

Abstrak: *Kemajuan teknologi yang cepat dalam lingkungan perbankan mendorong bank-bank Sri Lanka untuk mengadopsi teknologi self-service dalam memberikan layanan melalui SMS banking, internet banking dan fasilitas phone banking, Automated Teller Machines (ATM) dan lain sebagainya. Penelitian ini mengeksplorasi kualitas yang dirasakan dari layanan teknologi ini dan efeknya terhadap kepuasan pelanggan. Survei literatur dan wawancara mendalam membantu untuk merumuskan dimensi kualitas: keamanan, efisiensi, kenyamanan penggunaan, keandalan dan kenyamanan dan dimensi-dimensi tersebut dinilai melalui kuesioner. Penelitian ini mensurvei 215 pelanggan dari enam cabang bank komersial yang mendominasi dan terletak di Provinsi Sri Lanka Barat. Data dijadikan sebagai komponen Sasaran Analisis Utama dan beberapa faktor yang tertahan di tarik ke arah yang berlawanan menggunakan regresi berlipat untuk memperoleh akses terhadap pengaruh dimensi-dimensi kualitas terhadap kepuasan pelanggan. Hasil penelitian menunjukkan bahwa keandalan dan kenyamanan memiliki dampak positif pada kepuasan pelanggan sedangkan efisiensi memiliki dampak negatif.*

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Introduction

Rapid advancement of technologies has allowed many service oriented organizations to enter into a technology mediated self-service environment and it is extensively exhibited in the retail banking environment. Service organizations, including retail banks, deliberately adopt self-service technologies while encouraging their customers to adopt them too (Dabholkar and Bagozzi 2002; Zhu et al. 2013), in which customers produce and consume services by themselves without direct employee assistance (Meuter et al. 2005). Retail banks employ numerous types of self-service channels to reach their customers including ATM, Automated Telephone Banking, Web Banking, SMS Banking, Kiosks etc. Particularly, banks deploy a number of different channels to deliver their services to customers and therefore these service channels play an important role in consumer interactions with retail banks. Motivated by efficiency gains, flexibility and productivity and improved corporate performances (Dabholkar 1996), service organizations, including retail banks, are driven to readily apply different types of self service technologies (SST) (Lee et al. 2009) and therefore, it is necessary to understand the customer evaluation of these multiple service channels in order to improve the organizational status, especially in banks and customer satisfaction in a dynamic competitive environment (Orel and Kara 2014).

Nevertheless, existing research on self-service technology quality evaluation is limited to internet based services (Lin and Hsieh 2011) or e-services (Orel and Kara 2014) while ignoring the other self- service channels applied by service organizations (Shamdasani et al. 2008). Therefore, more exploration of customer perception of self-

service technologies is needed (Schumann et al. 2012). Further, instruments for systematically measuring the quality of SST as a whole remain underdeveloped (Verhoef et al. 2009) or inconsistencies have been found in their conceptualization (Lee et al. 2011) and even the applicability of the models to test the perceived service quality that have been developed vary across the SST diffusion phases and within different markets (Lin and Hsieh 2011). Additionally, given the importance of customer satisfaction in service setting, a significant number of studies have been devoted to assessing the relationship between service quality and satisfaction. Yet in literature, the impact of self-service on customer satisfaction is unresolved due to the conflicting results on the direction of impact (Buell et al. 2010) and even these relationships are tested by selecting one service channel at a time. Consequently, there is a strong need to assess the service quality dimensions of self-service technology (Shamdasani et al. 2008) as a whole in the banking context along with their effect on customer satisfaction. In addition to that, a contextual understanding of perceived SST quality of banking environment in a growing economic environment is needed.

Thus, the objectives of the current study are twofold. *First*, it attempts to examine service quality dimensions to measure the SST quality of retail banks by using five attributes including ease of use, reliability, efficiency, convenience and security. Particularly, high mobile phone penetration along with the increasing internet usage in Sri Lanka has forced many retail banks to offer their services through new service channels, i.e. through self-service technologies, in order to be more competitive. This allows Sri Lankan banking customers to access their bank accounts via these technologies and to conduct

a range of transactions including the payment of utility bills, transfer funds, etc. instead of physically visiting their banks. This has permitted banks to reduce their costs drastically while converting growing tech-oriented Sri Lankan banking customers to self-service customers. Accordingly, fast implementation of ATM, Automated Telephone Banking, Web Banking, SMS Banking, Kiosks can be seen in the retail banking environment in Sri Lanka. In such a context, it is important to recognize the quality of self-service technologies introduced by Sri Lankan banks.

Second, this study attempts to investigate the impact of these perceived quality attributes on customer satisfaction. Similarly, it is essential to identify whether Sri Lankan customers are satisfied with the quality of the existing self-service technologies of Sri Lankan banks. Hence, researchers have investigated the impact of perceived quality of SST on customer satisfaction of the retail banking environment in Sri Lanka under this research.

In order to achieve the above objectives, the rest of the paper is organized as follows. Initially, the authors present the overview of the existing literature on SST quality and satisfaction that is valuable for the present study. This is followed by a hypothesis related to service quality and satisfaction. The next section describes the sample selection and measures used in this study. Subsequently, the results of the analyses are presented and discussed. Finally, the authors present the conclusion, implications, and future research directions.

Literature Review

Self-Service and Quality Attributes

Traditionally, consumers directly interact with service organizations and service encounters take place between the front line service employees and the consumers (Bitner 1990); this traditional interpersonal focus of service encounters is heavily replaced by technologies (Bitner et al. 2000) and presently consumers encounter these new self-service technology facilities (Beatson et al. 2007; Meuter et al. 2000). These new service delivery approaches play a more important role in the service environment (Beatson et al. 2007) and they can be defined as technological interfaces that enable customers to produce a service independent of direct involvement of the service employees or minimum participation of service employees (Orel and Kara 2014; Meuter et al. 2000). Usage of SST can be seen in a range of services including traditional high contact services and low contact services (Curran et al. 2003) and range from Automated Teller Machines (ATM) at banks, self-accessed airline services or hotel facilities, self-scanning supermarket checkouts, web interfaces in banks, Kiosks in airlines, and pay at pumps in gas stations etc.

Self-service technologies are popular among retailers including banks though it is a resource intensive investment. Yet, as per the researchers, it provides a payoff for the organization by giving range of advantages (Beatson et al. 2007) including productivity

gains though a reduced number of employees and longer opening hours (Curran et al. 2003; Dabholkar 1996), lowering labor costs (Lin and Hsieh 2011), speed of service delivery (Zhu et al. 2013) and further it has the advantage of limiting the two difficulties of traditional service delivery namely heterogeneity and perishability (Curran et al. 2003). These benefits drive service organizations to utilize a range of SST encounters for its customers and it has become the major trend in the present environment (Lin and Hsieh 2011). Accordingly, banks have adopted these

technologies heavily to deliver the services through new channels, i.e. Automated Teller Machines (ATM), Web based banking, Kiosks, Short Message System Banking, App based banking etc. These service delivery mechanisms in banking environment are also known as "off-site" (Lee et al. 2011) transaction options for customers.

Apparently, retail banking customers tend to evaluate the quality of these channels in the SST encounter environment and therefore the success of these service deliveries largely rests on the quality of the ser-

Table 1. **Previous Findings on SST Quality Attributes**

Service Quality Attributes	
Convenience, queue management, personalizing, responsiveness, security, commitment, Trust, Customer Delight	(M. A. Al-Hawari 2011)
Ease of use, usefulness, Cost saved, self-control	(Ho and Ko 2008)
Functionality, enjoyment, security/privacy, Assurance, Design, Convenience, Customization	(Lin and Hsieh 2011)
Convenience, Ease of use, Control, Enjoyment	(Lee et al. 2011)
Efficiency, ease of use, performance, perceived control, convenience	(Yen 2005)
Functionality, enjoyment, assurance, design, convenience	(Orel and Kara 2014)
Speed of service, ease of use, reliability, enjoyment, control	(Shamdasani et al. 2008)
Availability, perceived risk, ease to use, compatibility of devices, entertainment	(Özer et al. 2013)
Fulfillment, security, reliability, efficiency, responsiveness, web site attributes, privacy	(George and Kumar 2014)
Web design, reliability, security, customer service, customer perceived value	(H. H. Chang et al. 2009)
Reliability, responsiveness, competence, ease of use, product portfolio, security	(Yang et al. 2004)

vice. Nonetheless, SST quality remains underdeveloped (Lin and Hsieh 2011) due to usage of channel specific measurement of service quality in the internet/web environment (Lee et al. 2011; Lin and Hsieh 2011; Parasuraman et al. 2005). Thus, it reduces the ability to generalize these scales to measure the range of SST quality (Lin and Hsieh 2011). Hence, this requires common definition for overall self-service technology quality and the overall excellence of the service delivered through internet, ATM, telephone banking, Kiosks, SMS etc (Al-Hawari et al. 2003). Academic researchers have mentioned the usage of criteria/attributes to assess the quality of self-services (Dabholkar 1996; Lin and Hsieh 2011; Shamdasani et al. 2008). As a result, perceived attributes pertaining to self-service technologies have been largely utilized to assess the quality of self-service technologies (Al-Hawari et al. 2005; Dabholkar 1996; Meuter et al. 2000; Shamdasani et al. 2008).

Accordingly, an extensive literature review was undertaken to propose five attributes to measure the service quality of the SST environment of banks. Table 1 shows the various quality dimensions so far identified in the literature to explain the perceived service quality of SST. The quality dimensions for this study were identified by evaluating the existing studies in similar context and were finalized by obtaining the insights from academic experts, managers and customers (Figure 1).

Firstly, time conscious consumers see self-service technologies as a time efficient mechanism to obtain services (Bateson 1985) from the service organizations. Accordingly, the efficiency attribute is the reduction of time and effort that is required to complete the tasks (Johnson et al. 2008) and the cost associated with transactions in the tech-en-

abled service environment. Further, Yen (2005) stated efficiency as the ability of SST to solve users problems better than other options while saving time. Accordingly, speed of service or time taken to perform the transaction plays a vital role in deciding the quality of SST (Al-Hawari 2011). As per Yen (2005) citing (Ledingham 1984) speed as being considered an important factor among consumers whenever conducting IT based banking activities. As per Meuter et al. (2000), time savings offered by SST play a bigger role in consumers adopting SST and therefore they significantly influence consumers in evaluating the quality of service in the self-service environment (Shamdasani et al. 2008). Additionally, possible customer cost savings (i.e. expend fewer resources on travelling and conducting transactions) associated with SST play a considerable role in evaluating SST by the customers.

Secondly, Davis (1986) has mentioned the importance of perceived *ease of use* of a system for it to be accepted by the users and further he defined it as "degree to which a person believes that using a particular system will be free of effort." Consumers consider the effort involved in learning and using new systems (Oghazi et al. 2012) and they tend to avoid systems which require extra effort of mentally and physically (Bateson 1985; and Venkatesh 2000). Accordingly, effort and complexity of a system are found to be related concepts and encompass the concept of ease of use (Davis et al. 1989) and therefore, ease of use was found be the one quality dimension of assessing self-service technology (Venkatesh 2000; and Venkatesh et al. 2002). User-friendly interfaces drive consumers to evaluate SST positively (Lee et al. 2011) and indication of proper instructions in the SST environment reduces personal effort and risk from learning new fea-

tures by spending time and the possibility of making errors (Shamdasani et al. 2008). Equally, it focuses on the interactivity aspects of the interface of SST (Collier and Kimes 2012). Thus, customers feeling comfortable using SST improves the perception of SST (Kim and Stoel 2004; and Lin and Hsieh 2011).

The third attribute is reliability and it encompasses the accuracy of the service received over the SST (Shamdasani et al. 2008) and Yen (2005) termed it as performance. Researchers have found out about the importance of reliability in service encountering environments (Davis et al. 1989; and Parasuraman et al. 1988) and especially in the electronic banking environment (Lee and Lin 2005). Tasks performed in service encounters should be free from errors. Specifically, new service delivery mechanisms such as SST raise the issue of breakdowns causing customers to lose faith in them. Thus correct functioning and accurate service delivery are important aspects of the service quality SST environment (Lin and Hsieh 2011). Accurate and error free performance of SST (Lin and Hsieh 2011 citing Zeithaml et al. 2002) leads to favorable evaluation of service quality of SST and this was also noted by Collier and Kimes (2012).

The fourth attribute is *convenience* and it refers to the availability of SST to customers 'when and where they need it' (Meuter et al. 2000). It is the perceived ability of access to SST for customers at the time and location convenient for them (Yen 2005). In a self-service environment customers are in greater control of dictating the time and location of service consumption and therefore it overcomes the problem of inconvenience of the full service environment (Collier and Kimes 2012). Nevertheless, the ability of the customers to access intended service from any devices given by the organizations, irrespective of the location and time, is considered as a key indicator of SST quality (Lin and Hsieh 2011) since it gives an effective transaction experience for the customers (Collier and Kimes 2012). Accordingly, Collier and Sherrell (2010) noted the importance of the convenience factor in evaluating the SST and Ding et al. (2011) noted the criteria of convenience when evaluating service quality of SST.

The final and the fifth attribute is *security* and it refers to freedom from danger, risks or doubts that customer will feel (Li and Suomi 2009) while interacting with self-service technologies. As per the study by Parasuraman et al. (2005), security and privacy are most important factors in evaluating SST. Similarly, customers tend to assess the SST as to what extent it reduces their stress (Bobbitt and Dabholkar 2001) and anxieties due to lack of control exerted over the information exchange through the SST. Therefore, SST should be free of performance ambiguities (Parasuraman 2000) in order for it to be perceived as a quality service environment. Perceived risk and uncertainty have a negative impact on the attitude of the consumers and evaluation of SSTs (Pan and Zinkhan 2006), therefore customers tend to evaluate the security of the system whenever they consume the service rendered over SST. In other words, there is an inclination on the part of consumer to evaluate the probability of improper usage of information exchange over SST (Li and Suomi 2009). So, this plays a vital role in evaluating the quality of SST.

Satisfaction and Quality Satisfaction

Academic researchers have proclaimed the importance of customer satisfaction to assess the future performance of organizations when compared with financial and accounting based measures (Miguel-Dávila et al. 2010). It is recognized as a fundamental marketing concept (Fournier and Mick 1999) driving managers to set it as one of the major objectives of marketing organizations. Hence, this has been studied heavily in the domain of marketing (Fornell 1992; and Oliver 1980). Accordingly, literature has two view points on satisfaction: the transaction-specific construct which results from immediate post purchase judgment (Oliver 1993) and the cumulative-specific construct which resulted from customers' overall experience to date with a product or service (Anderson et al. 1994). However, this study rests on cumulative customer satisfaction and accordingly it is customers' overall judgment towards service experience within the SST service environment provided by service organization. Nevertheless, service quality has been recognized as an important antecedent that decides customer satisfaction and according to Cheng et al. (2013) it has become an effective strategy to evaluate the perception of satisfaction regarding the service quality. Additionally, service quality is found to be the most influential antecedent for customer satisfaction in the service environment (Andreassen 2000; Baker and Crompton 2000) but also high customer satisfaction due to the high service quality (Darsono and Junaedi 2006). Contrary to that, there is literature that also indicates conflicting results of the direction of impact of service quality on customer satisfaction (Buell et al. 2010).

Nevertheless, when it comes to the SST environment, Dabholkar (1996) proposed SST an attribute based model to explain the quality satisfaction in the SST service environment (Figure 1). Cognitive evaluation of the SST attributes has been identified as perception of service quality (Dabholkar 1996; Yen 2005) and therefore, the authors measured the influence of these attributes on satisfaction towards to SST. Accordingly, previous studies have found the effect of SST quality on customer satisfaction (Meuter et al. 2000; and Miguel-Dávila et al. 2010) in the retail environment (Mols 1998; and Yen 2005), and banking environment (Al-Hawari et al. 2006). Accordingly, investigation of SST literature identified SST attributes pertaining to the retail banking environment which act as service quality dimensions and ultimately influence customer satisfaction.

Meuter et al. (2000) mentioned that ability to perform the transactions more quickly in the SST environment compared to the interpersonal service environment increases customer satisfaction. Further, Yen (2005) has found that the efficiency attribute of SST environment leads to customer satisfaction. Accordingly, consumers are expected to be satisfied with SST if they perceive there to be efficiency in the self-service technology environment (Weijters et al. 2007; and Weijters et al. 2005). Moreover, perceived waiting time, which is associated with the efficiency aspect of the SST in the retail setting, has a positive influence on customer satisfaction (Buell et al. 2010). Further, Eriksson and Nilsson (2007) found that the convenience dimension, which represent the usefulness of SST, has a positive influence on multichannel SST satisfaction. Accordingly, researchers postulate that,

H1: Efficiency of SST has a positive effect on customer satisfaction towards service provided by commercial retail banks in Sri Lanka.

Ease of use of a system largely determines the attitudes of consumers towards SST (Davis 1986) and thereby satisfaction with its usage. In an e-commerce setting, Devaraj et al. (2002) found a positive relationship between perceived ease of use and customer satisfaction while creating positive evaluation towards the online channel. Meanwhile, Yen (2005) has also found that a positive relationship between the SST attribute of perceived easiness to use and customer satisfaction. Meanwhile, academic researchers have found a strong positive relationship between perceived ease of use and continued intention to use the SST service offered by banks (see for El-Kasheir et al. 2009). Additionally, perceived ease of use has been found to be one of the strongest predictors of formation of attitude towards SST and thereby actual usage of a system because of customer satisfaction (Weijters et al. 2007). Therefore, researchers postulate that,

H2: Ease of use of SST has a positive effect on customer satisfaction towards service provided by commercial banks in Sri Lanka

The dimension of reliability is found to be the important attribute in assessing the quality of a service environment and researchers have found that there is a positive influence of the reliability of SST attribute on customer satisfaction (Meuter et al. 2000; Yen 2005). Likewise, reliability is found to be one of the strong predictors of continuous usage and thereby influencing customer satisfaction in the retail context (Weijters et al. 2007). Nguyen et al. (2014) found that customer satisfaction towards to usage of ATM machines is influenced by the attribute reliability. Meanwhile, accuracy of service rendered by the SST service environment has been shown to have a positive relationship with customer satisfaction (Collier and Kimes 2012). Therefore, researchers postulate that,

H3: Reliability of SST has a positive effect on customer satisfaction towards service provided by commercial banks in Sri Lanka

Further, it has been found that customers feel satisfied with SST if it provides the service when and where they want it (Meuter et al. 2000). Accordingly, Yen (2005) has found that there is a positive relationship between the convenience attribute of internet mediated SST service encounter environment and customer satisfaction. Further, there is evidence that supports the idea that attribute convenience stemming from the SST service environment acts as a driver of customer satisfaction (Collier and Sherrell 2010). Further, convenience of SST has an influence on customer satisfaction (Wang 2012). Accordingly, researchers postulate the fourth hypothesis,

H4: Convenience of SST has a positive effect on customer satisfaction towards service provided by commercial banks in Sri Lanka

The perceived security of SSTs determines the acceptance (Dixit and Datta 2010) and usage of SST to conduct transactions by customers. Reduction of perceived risk of SST (avoidance of losing personal information and improper usage of information by third parties) leads to customers intending to use them and therefore customer satisfaction. Further, privacy and security of the ATM environment leads to customer satisfaction regarding financial need among Jordanian customers (Al-Sawalqa 2012). Secure features available in an SST environment have also been shown to affect service quality perception and satisfaction towards SST services (Liljander et al. 2002). Accordingly, the researchers have proposed a fifth hypothesis as.

H5: Security of SST has a positive effect on customer satisfaction towards services provided by commercial banks in Sri Lanka.

Figure 1. **Conceptual Model Developed by the Researcher**
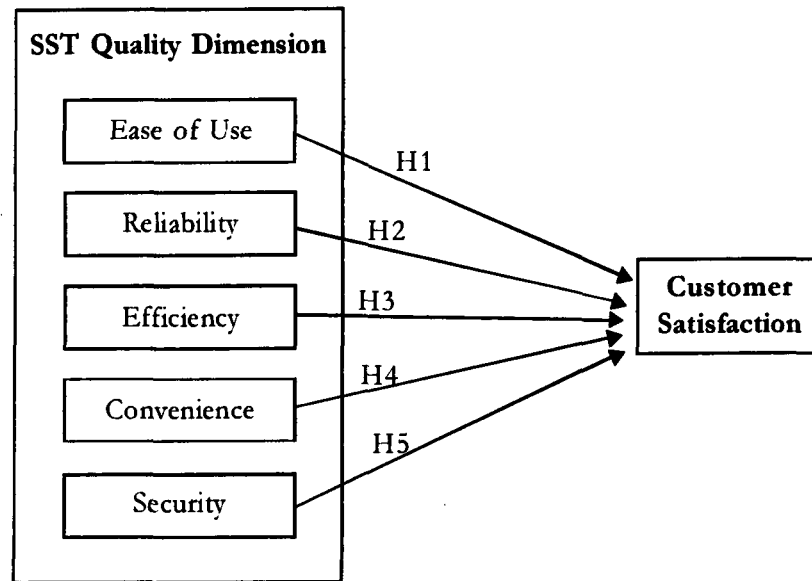
Methods

The proposed model was tested by collecting data from the customers who use different banking self-service technologies in Sri Lanka. Growing deployment of SST among commercial banks in Sri Lanka had driven this study and observations have also provided evidence of higher usage of the same technology among the customers of these banks.

Sample and Survey Procedure

This study was empirical in nature and a survey method was employed to collect the data. Data for this study were obtained from six selected bank branches located in Western Province in Sri Lanka. Sekaran and Bougie (2010, p. 296) cites that Roscoe (1975) proposed a "sample size larger than 30 and less than 500 is appropriate for most research" and most of the researchers suggest its appropriateness for conducting multivariate research analysis. Accordingly, to collect data from customers who are using SST in Sri

Lanka, six top Sri Lankan commercial banks were selected on the basis of key financial data published by Thalgodapitiya and Bhoumik (2012) and www.cse.lk (key performance data in 2012). Accordingly, Bank of Ceylon (BOC), People's Bank (PB), Commercial Bank (CB), Hatton National Bank (HNB), Seylan Bank (SB) and Sampath Bank (SB) were selected for this study. Bank branches were selected from Western Province and it was revealed that each bank had its own specific customer data base and records of customers were found to be regularly updated making the infinite population. Further, it revealed the dispersion of usage of SSTs by the customer. Hence, sixty (60) respondents were randomly selected from the data bases of each bank while getting the support from the branch managers of these banks. At the point of time, the registered users of the banks' SST were considered to be the infinite population (Anderson et al. 2011). A total of 360 respondents was selected from these banks and while selecting

the customers, a special filtering approach was applied by the mangers to select the customers who are having at least ATM transactions with the respective bank. Each customer was accessed with the help of the bank's customer officers. Further, a few questionnaires were sent to customers' personal addresses enclosing return address envelopes. A power analysis level of 0.80 suggested by Cohen et al. (2003) was applied to determine the sample size that would provide adequate statistical power for testing the hypothesis.

Measures

This study was based on the pre-existing concepts in the literature and the scale items were developed largely with the help of literature and preliminary in-depth interviews. The SST quality dimensions and satisfaction items used in this study were extracted from different research findings (refer to Table 2). A total of 19 items was identified to measure the five dimensions proposed to be used to measure the SST quality of banks: ease of use, efficiency, reliability, security and convenience. Ease of use is operationalized as having 5 items adapted from Gefen and Straub (2000); Oghazi et al. (2012); Chang and Chang (2013); Davis (1986); Venkatesh (2000); Venkatesh et al. (2002); Lin and Hsieh (2011); and Al-Hawari et al. (2009). Efficiency dimensions consist of 4 items adapted from Al-Hawari et al. (2009), Miguel-Dávila et al. (2010), Ganguli and Roy (2011), Kim and Lim (2001), Parasuraman et al. (2005), Bitner (1990), Bitner et al. (1997) and Yen (2005). To measure the reliability, this study uses 4 items adapted from Chang et al. (2009), Ganguli and Roy (2010), Yang et al. (2004), Santos (2003), Van Riel et al. (2003) and Dabholkar and Bagozzi (2002). Security is measured with the support of 3 items adapted from Ganguli

and Roy (2010); Yang et al. (2004); Kumar and Bose (2013); and Li and Suomi (2009). Finally, convenience is measured with the 3 items derived from Ganguli and Roy (2010); and Meuter et al. (2000). In addition to that, customer satisfaction is measured with 3 items adapted from Chang et al. (2009); Özer et al. (2013); and Cronin et al. (2000). The generated items were then subjected to review by two academic experts in Information System environments and two IT managers from two selected banks. All measures were measured with five point scales (1= strongly disagree, 2=disagree, 3= neutral, 4= agree and 5= strongly agree). Similarly, the questionnaire used in this study had closed-ended questions, which included usage behavior of SST alternatives and the respondents' demographic details.

The scale developed to measure the SST quality and satisfaction was subjected to a refining process in order to ensure the psychometric properties. Generally, items placed in the questionnaire were positively perceived by the respondents. Mean values calculated for the five dimensions tend to show that respondents agree with the statements in the questionnaire. Additionally, the researchers tested the reliability and validity of the scale by administering the survey instrument to 50 customers before the survey. Cronbach's alpha coefficient was utilized to identify the reliability status of each dimension that measures the bank's SST quality. Coefficient alpha range from 0-1 and Gliem and Gliem (2003) citing Darren and Mallery (1999) proposed a rule of thumb; "$\rightarrow$0.9 (Excellent), $\rightarrow$0.8 (Good), $\rightarrow$0.7 (Acceptable), $\rightarrow$0.6 (Questionable), $\rightarrow$0.5 (Poor), and $\rightarrow$0.5 (Unacceptable)." Questionnaires were piloted with 50 respondents. Initial reliability statistics pertaining to the concepts used in this study are in the following table (Table 3).

Table 2. SST Quality and Satisfaction Items

Service Quality Dimensions and Items

Ease of Use
It is easy to become expert using Self Service Technology provided by my bank(Gefen and Straub 2000; Oghazi et al. 2012)

I find that my bank's self-service technologies are easy to use(C-C. Chang and Chang 2013; F. D. Davis 1986; Gefen and Straub 2000; Oghazi et al. 2012; Venkatesh 2000; and Venkatesh et al. 2002)

My bank's self-service technologies has clear instructions(Al-Hawari et al. 2009; Lin and Hsieh 2011; Oghazi et al. 2012; and Venkatesh et al. 2002)

Self Service Technology provided by my bank is user-friendly (Venkatesh 2000)

Interacting with the system does not require a lot of my mental effort (Venkatesh 2000; and Venkatesh et al. 2002)

Efficiency
My bank's Self Service Technology provides quick service with taking shorter waiting time (Al-Hawari et al. 2009; and Miguel-Dávila et al. 2010)

Self Service Technology of my bank save my time (Ganguli and Roy 2010; S. Y. Kim and Lim 2001; and Parasuraman et al. 2005)

My bank's Self Service Technology allows me to complete transactions quickly (Ganguli and Roy 2010; S. Y. Kim and Lim 2001; and Parasuraman et al. 2005)

My bank's self- service technology reduce the cost of my activities with the bank (Mary Jo Bitner et al. 1997; and Yen 2005)

Reliability
I obtain accurate and error free service from my bank's SST (H. H. Chang et al. 2009; Ganguli and Roy 2010; and Yang et al. 2004)

I can depend on the service provides over the bank's SST (Expert insights)

My bank's SST completes my transaction specified in designated time (Chang et al. 2009; Santos 2003; Van Riel et al. 2003; and Yang et al. 2004)

My bank's SST is reliable (Dabholkar and Bagozzi 2002; Ganguli and Roy 2010; and Yang et al. 2004)

Security
I feel safe using my bank's SST(Ganguli and Roy 2010; Yang et al. 2004; and Kumar and Bose 2013)

Risk associated with my bank's SST is low (Ganguli and Roy 2010; Li and Suomi 2009; and Yang et al. 2004)

Personal information exchanged over SST is not misused by bank (Ganguli and Roy 2010; and Yang et al. 2004)

Table 2 (Continued)

Convenience

My bank's Self Service Technology is accessible beyond regular business hours (Ganguli and Roy 2010; and Meuter et al. 2000)

My bank's SST provide allows me to do the transactions anywhere (Ganguli and Roy 2010; and Meuter et al. 2000)

My bank's SST is convenient(Ganguli and Roy 2010; and Meuter et al. 2000)

Satisfaction

Overall I'm satisfied with my bank's SST (Chang et al. 2009; Özer et al. 2013; and Yen 2005)

I made the right decision to use my bank's SST (Chang et al. 2009; and Cronin et al. 2000)

I can easily recommend my bank's SST to my friends and others(Özer et al. 2013)

Table 3. **Reliability Statistics**

Dimensions	No of items	Cronbach's Alpha
Reliability	5	0.756
Ease of use	3	Initially .688 and later .710
Security	3	0.738
Efficiency	3	0.857
Convenience	3	0.761
Satisfaction	3	0.701

Except for the ease of use dimension, the reliability of the results of other dimensions were reported under the acceptable level at the initial stage and items were modified to make it more clear and understandable in Sinhala language and so that modification revealed the acceptable higher alpha value.

Accuracy of the measurement represents the validity. *Firstly*, Bannigan and Watson (2009) cites McDowell and Newell (1996): 'A variety of approaches should be used in testing any index, rather than relying on a single validation procedure.' Therefore, construct items were reviewed by two academics who represent the behavioral aspects of technology and two IT managers to ensure the content and face validity. Construct validity was assessed through factorial validity (Bannigan and Watson 2009) and this was facilitated by exploratory factor analysis. In particular, the study performed a Principal Component Analysis (PCA) with varimax rotation since it is similar to factor analysis. PCA represents the larger number of relationships among interval data in a more parsimonious way (Leech et al. 2005). Initial investigation of a correlation matrix of SST quality structure, namely ease of use, reliability, efficiency, convenience and security, revealed the factorability and showed five interpretable components.

Secondly, Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy and Bartletts Test of Sphericity (BTS) were performed. The Kaiser-Meyer-Olkin measure of sampling adequacy was 0.663 (this was above the recommended value of 0.6) and Bartlett's test

of Sphericity was significant (χ^2 (2161.865)= 171, $p < 0.05$). *Thirdly*, factor extraction was performed and it was based on multiple criteria namely Kaiser's rule (eigenvalues >1 rule) and cumulative percent of variance extracted. Accordingly, the five factor solution resembled the proposed dimensions and explained 68.093 percent variance with 18.011 percent, 15.976 percent, 12.894 percent, 11.550 percent and 9.663 percent for efficiency, ease of use, reliability convenience and security respectively. All the factor loadings were above the recommended cut of criteria 0.40 (Hair et al. 2006) ranging from 0.631 to 0.902 suggesting five factors as proposed by the researchers. Items and their respective loadings on each dimension are given in the Table 4.

Table 4. **Principle Component Analysis**

	Variable and Items	1	2	3	4	5
	Efficiency					
E1	My bank's Self Service Technology provides quick service with taking shorter waiting time	0.883				
E2	Self Service Technology of my bank save my time	0.876				
E3	My bank's Self Service Technology allows me to complete transactions quickly	0.940				
E4	My bank's self- service technology reduce the cost of my activities with the bank	0.839				
	Ease of Use					
E1	It is easy to become expert using Self Service Technology provided by my bank		0.792			
E2	I find that my bank's self-service technologies are easy to use		0.831			
E3	My bank's self-service technologies has clear instructions		0.675			
E4	Self Service Technology provided by my bank is user-friendly		0.743			
E5	Interacting with the system does not require a lot of my mental effort		0.632			
	Convenience					
C1	My bank's Self Service Technology is accessible beyond regular business hours			0.898		
C2	My bank's SST provide allows me to do the transactions anywhere			0.894		
C3	My bank's SST is convenient			0.902		

Table 4 (Continued)

	Variable and Items	1	2	3	4	5
	Reliability					
R1	I obtain accurate and error free service from my bank's SST				0.8⁻9	
R2	I can depend on the service provides over the bank's SST				0.682	
R3	My bank's SST completes my transaction specified in designated time				0.631	
R4	My bank's SST is reliable				0.831	
	Security					
S1	I feel safe using my bank's SST					0.801
S2	Risk associated with my bank's SST is low					0.890
S3	Personal information exchanged over SST is not misused by bank					0.729
	Eignevalues	3.422	3.035	2.450	2.194	1.836
	% of variance Explained	18.011	15.976	12.894	11.550	9.663

Results and Discussion

Descriptive Analysis

For the final survey, a total of 215 survey questionnaires were collected, while 145 questionnaires were eliminated. The survey response rate was 59 percent (refer Table 3). Usage behavioral data, along with the demographic data pertaining to respondents, that were included in this study were as follows: gender, age, educational status, occupation, disposable income, mostly used SST, period of interaction with bank's SST and activities perform over the SST. Nevertheless, almost 64.65 percent respondents belonged to the age level of 18-30. About half (49.30%) of the total respondents were Ordinary Level and Advanced Level qualified persons. About 63.25 percent of the respondents were employed in the private sector, 19.06 percent were employed in the government sector and

9.30 percent of the respondents were self-employed. The rest of the respondents (8.37%) were unemployed. Regarding disposable income, about 68.83 percent of the respondents had an income of 25001-50000. In terms of usage, 75.34 percent of the respondents had less than six months' experience with SMS banking and Internet banking activities. Yet, more than one year experience was reported with ATM and Automated Telephone banking services. Respondents were using more than one SST to interact with their respective banks and ATM was recognized as the most utilized SST banking (100%) followed by SMS banking (79.06%), Internet banking (44.65%) and Automated Telephone Banking (33.02%) from the total sample. Viewing account balance (100%), obtaining money (100%), payment of utility bills (36%) and fund transfer (21%) were represented as the major banking SST activities among the respondents (Table 5).

Table 5. Demographic Attributes of the Sample

Attribute	Frequency (n=215)	%
Gender		
Male	151	70.2
Female	64	29.8
Age		
18-30	139	64.65
31-50	51	23.72
Over 51	25	11.63
Educational Status		
O/L & A/L	106	49.30
Diploma	60	27.91
Basic Degree	37	17.21
Postgraduate Degree	12	5.58
Profession		
Self Employed	20	9.30
Employed in Private Sector	136	63.26
Employed in Government Sector	41	19.07
Unemployed	18	8.37
Monthly Income		
Less than 25000	22	10.23
Between 25001-50000	148	68.84
Between 50001 -75000		
SST Usage Experience		
Less than 6 Months	162	75.3
Less than one year and more than 6 months	25	16.6
More than one year	28	13

Results

The primary concern of this study was to assess the effect of SST quality dimensions on customer satisfaction. Hence, multiple regression analysis was conducted to test the hypothesized relationships. Residuals were checked for normality to assess the suitability of the regression model. Accordingly, SST quality (Table 6) dimensions helped to explain 17 percent (adjusted R squared .154) of the customers satisfaction. The regression model was significant at 0.05 level (F $(5,209)=$ 8.784). Further, post hoc power analysis was conducted with GPower package (Faul et al. 2007) and revealed that power to detect obtained effects at the 0.05 level was 0.99 for the overall regression in prediction of satisfaction.

The coefficient table shows (Table 6) the contribution of each SST quality dimension in explaining customer satisfaction. The predictor ease of use (b=0.009) was not significant (P>0.05, t= 0.133). This has rejected the first hypothesis (H1) formulated by the researchers: *ease of use of SST has a positive effect on customer satisfaction towards service provided by commercial banks in Sri Lanka.* Next, the effect of *reliability* (b= 0.305) was a significant (P<0.05, t= 4.784) predictor and it was the major contributing variable for the customer satisfaction. With that, the researchers have accepted the second hypothesis (H2): *Reliability of SST has a positive effect on customer satisfaction towards service provided by commercial banks in Sri Lanka.* Predictor, *security* (b=0.011) was not a significant variable (P>0.005, t= 0.164). This has rejected the fifth hypothesis (H5) formulated by the researchers: *Security of SST has a positive effect on customer satisfaction towards service provided by commercial banks in Sri Lanka.* Yet, *convenience* dimension (b=0.212) had a significant

Table 6. **Coefficients**

Model	Standardized Coefficients Beta	t	Sig.	95.0% Confidence Interval for B	
				Lower Bound	Upper Bound
(Constant)		6.321	0.000	1.274	2.428
EaseofUse	0.009	0.133	0.895	-0.083	0.095
Reliability	**0.305**	**4.784**	**0.000**	**0.110**	**0.265**
Security	0.011	0.164	0.870	-0.092	0.109
Convenience	**0.212**	**3.363**	**0.001**	**0.051**	**0.195**
Efficiency	**-0.137**	**-2.163**	**0.032**	**-0.123**	**-0.006**

R= 0.416,ᵃ R Square 0.173, Adjusted R Square 0.154, F =8.784, df1 5 and df2 209, P=0.000
b. Dependent Variable: Satisfaction
a. Predictors: (Constant), Efficiency, Ease of Use, Convenience, Reliability, Security

(P<0.001, t= 3.363) positive effect on customer satisfaction. It was the second major contributing service quality dimension that influenced customer satisfaction in self-service technological environment of banks. This persuaded the researchers to accept the fourth hypothesis (H4): *Convenience of SST has a positive effect on customer satisfaction towards service provided by commercial banks in Sri Lanka.* Finally, *efficiency* dimension was having a negative (b= -0.137) significant (P<0.05, t = -2.163) effect on customer satisfaction. Therefore researchers rejected the third hypothesis (H3): *Efficiency of SST has positive effect on customer satisfaction towards service provided by commercial banks in Sri Lanka.*

According to the results, the researchers have found that, among the selected banking self-service technology quality dimensions, reliability and convenience dimensions were having positive effects on customer satisfaction. Yet, it was revealed that efficiency dimension had a negative effect on customer satisfaction. Other dimensions, security and

ease of use were found to be non-influential quality dimensions of customer satisfaction.

Conclusion and Implications

Conclusion

This study attempted to build a scale to measure perceived self-service technology quality dimensions in the retail banking environment in Sri Lanka. Rather than considering each SST service environment separately, this study was focused on all the SST channels. Accordingly, the researchers proposed five service quality dimensions considering all banking self-service technologies and adopted the attribute base approach proposed by Dabholkar (1996) to assess the quality of self-service technology. It was found that consumers evaluate service quality of the SST of banks by considering the *efficiency, ease of use, convenience, reliability and security*. This study considered *efficiency* as an important attribute for evaluating the SST, though other studies have not taken it into consider-

ation. PCA results i.e. identified attributes, were complemented with the previous research findings in the literature (Dabholkar 1996; Ganguli and Roy 2011; Lin and Hsieh 2011; Meuter et al. 2000; Oghazi et al. 2012; Shamdasani et al. 2008; Venkatesh 2000; and Yang et al. 2004; Yen 2005). In the second part of this study, the researchers tried to find out the effect of SST quality dimensions on customer satisfaction. Mainly it was revealed that the quality of SST has an effect on customer satisfaction and this was consistent with the findings of the other research studies (Chang et al. 2009; and Dabholkar et al. 2000). This model helps to explain 17 percent of the variance of customer satisfaction (Cohen et al. 2003) and suggests acceptable value for the social science research setting (Gaur and Gaur 2009).

Further, this study assessed the effect of separate SST quality dimensions on customer satisfaction in order to explore the relative contribution to explain the explanatory variable. Accordingly, regression analysis revealed the importance of *reliability* and *convenience* dimensions to create customer satisfaction. Reliability of the service was largely ensured through the perceived completion of the transaction in the SST environment equivalent to the traditional service environment. This ensured the customer satisfaction. Customer satisfaction was also driven by convenience provided by the banks' SST which ultimately provides accessibility to the bank beyond the regular business hours from anywhere in the country. Further, dimensions of *ease of use* and *security* had no significant effect on customer satisfaction. This was similar to the findings of Chang and Chang (2013) where they have found that perceived security have no effect on intention to use the online financial services. Despite that, this study has produced contradictory findings.

This was the negative effect of *efficiency* on customer satisfaction. The reason for this may be that customers do not need to save their money or save their time by accessing the bank's SST since it provides basic services to them. This was somewhat similar to the idea of Buell et al. (2010) and the authors cite Hitt and Frei (2002) studies have found high customer time involvement in the online environment compared to the offline environment. Therefore, it can be concluded that money saving as well as time saving do not contribute to the customer satisfaction in the self-service environment but contribute negatively. Further this study contributed to the current literature. Mainly, it viewed the service quality as a multidimensional concept and supported the existing literature. In addition to that, studies which capture the generic quality of all the self-service channels are limited. Many researchers have made it their priority to study service quality of the internet based self-service while limiting the investigation into other service channels. Further, many of the studies of SST quality assessments were conducted in developed countries and not in developing countries. Given that, this study was confined to Sri Lanka which is recognized as a developing country. Therefore, this study filled the gaps in the current literature by providing insights from growing economic perspectives.

Implications

From managerial perspectives, this study provides banking marketing managers and supportive IT managers a theoretical insight into the quality levels of SST banking activities. This ultimately helps them to reconsider their approaches. Continuous maintenance and effective communication should be there to maintain the *reliability* as well as *convenience* of the service delivered over the

banks SST which ultimately increase the customer satisfaction. Reliability of the service can be enhanced through providing accurate presentations of figures and facts through enhancing the technical functionalities of the systems. *Convenience* can be enhanced by establishing more ATM machines and Kiosks in different locations in the country as well as by providing common ATM platforms to users by merging system of different banks. Despites that, managers need to increase the perceived ease of use and perceived security of the system.

Research Limitations and Future Research

There are several limitations of this study and they should be considered before interpreting the research findings. Mainly, this study was limited to Western Province in Sri Lanka and consideration should be given to this aspect while generalizing the findings. In addition to that, the study was limited to six banks in Sri Lanka but there are other foreign and domestic banks which offer self-service banking facilities to the Sri Lankan customers. This will limit the ability to generalize the findings. In addition to that, this study was confined to assessing the generic self-service technologies rather than the specific self-service technology quality such as call center service quality, SMS banking service quality, and Internet banking service quality etc. separately. It is recognized that each of the services associates with different technologies and different quality perception (Kumar and Bose 2013). This broader perspective was not addressed through this study. Other than the service quality, there are other factors which determine customer satisfac-

tion in the retail banking environment. These factors were not tested and observed in this research. Managers and other strategists should consider getting the customer engagement on designing the self-service technology channels for their banks and this will ultimately help them to respond to the customer needs better than their competitors. Finally, this study was limited to the retail banking sector and this selection of one industry made the findings limited in terms of building up a general picture of usage of self-service technology within the Sri Lankan environment.

This study sheds light on the other studies. Mainly, other than the dimensions identified, there are other attributes that could influence evaluating self-service technology. Therefore, future researchers can find and validate other attributes that customers use to judge the service quality in self-service technological environments. Self-service technologies are also increasingly being adopted by the business to business sector in their transactions (Meuter et al. 2000) and therefore studies can extend to business to business environments too. It is also important to understand the factors that influence customers to adopt self-service technologies in the banking environment rather than using traditional banking services. Additional research also can be carried out to examine the quality-loyalty relationship as a whole to shed more light on e-service quality and its behavioral consequences. Introduction of self-service technologies increases the distance of customers from the service organizations and therefore the implications of distancing a customer from the interpersonal service delivery also can be studied.

Acknowledgement

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