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Development of a Service Quality Scale for Multiple Technology Interfaces in Commercial Banking

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Abstract

The objective of this paper is to develop a service quality scale by identifying the dimensions affecting the service quality across various technology interfaces in retail banking. The paper examines the literature involving the various technology interfaces and aims to propose a conceptual model involving dimensions that affect the perceptions of service quality of the technology interfaces used in banks. The paper also seeks to establish the psychometric properties of the scale thus arrived. The literature review reveals that the models currently available to measure the service quality of the technology interfaces are limited in their focus, encompassing mostly one electronic channel – the internet – and few others studying the ATM and telephone banking channels. However, there is a gap with regard to the study of other technology interfaces like call centers and queue systems used in the branches. In this study, an attempt is being made to explore the influence of the various technology interfaces on banks' service quality like the ATM, telephone banking, call center services, queue systems in the branches etc. which the customers use in combination and thereby to develop a scale to measure technology interface service quality (TISQ).

Key words: **Technology interfaces; banks, service quality; ATM; internet banking; call centers; telephone banking; Queue systems.**

INTRODUCTION

Numerous models have been developed to measure customer perceptions of service quality. Most of these models utilized face-to-face interaction between customers and the employees of service providers to conceptualize service quality measurement models. However, developments in information and communications technology have provided a platform by which companies can design, develop and deliver services that can be perceived by customers as superior (Surjadjaja et al., 2003). There are several competitive advantages associated with the adoption of technology in service organizations, some of which include the creation of entry barriers, enhancement of productivity, and increase in revenue generation from new services. Service quality is one of the main factors that determines the success or failure of electronic commerce (Santos 2003). Technology interface service quality has tended to lag behind because practitioners have focused mainly on issues of usability and measurement of use, with little or no consideration to the issues of service quality.

The role of technology in service organizations as discussed by Kelley (1989) has been predominantly employed to reduce costs and eliminate uncertainties. In the service sector, technology has been used to standardize services by reducing the employee/customer interface. The majority of consumers now more than ever prefer to opt for a technology-based service delivery over that of the employee. This emerging trend raises some important issues about the impact that technology will have on service quality and customer satisfaction levels. Dabholkar (1996) suggests that little is known about consumer preference for self-service options, particularly those that are technological based.

To provide greater understanding of the main issues relating to service quality in the electronic marketplace, this study attempts to put in place a comprehensive model to measure customer perceptions of service quality of technology interfaces used in commercial banks in Oman. The study is justified as it provides a model incorporating the key dimensions that should be assessed when measuring customer perceptions of technology interfaces' service. This will allow bank administrators to gain a comprehensive understanding of the importance and quality issues associated with technology interfaces, thereby allowing them a better opportunity to improve service quality and customer satisfaction and help gain a competitive advantage.

LITERATURE REVIEW

Over the past few decades, service organizations, including retail banks, have been driven by such key trends as advancements in technology and deregulation to focus greater attention on their distribution channel strategies.

Technology, in particular, has been increasingly employed in service organizations to enhance customer service quality and delivery, reduce costs and standardize core service offerings. Its greater integration in the area of service delivery has had a dramatic effect on the nature of the core offerings and made customer participation in service delivery more widely possible.

After reviewing the literature intensively, it is observed that there currently exist many studies identifying the key service quality factors in the traditional banking environment, where the interaction between employees and customers is the main communication channel.

However, there are only a few studies that have investigated attributes of technology based service delivery channels in banking. Joseph et al (1999) investigated the role that technology plays in Australian Banking based on Hemmasi et al's Importance Performance grid and revealed six factor model comprising of – covenience/accuracy, feedback/complaint management, efficiency, queue management, accessibility and customization. Madu and Madu (2002) propose 15 dimensions of e-quality for virtual operations – performance, features, structure, aesthetics, reliability, storage capability, serviceability, security & systems integrity, trust, responsiveness, product/service differentiation, customer and web store policies, reputation, assurance and empathy. Santos (2003) proposed two main dimension of service quality with respect to e-commerce – incubative and active – each consisting of five and six sub-factors respectively. Dabholkar (1996) proposes two alternative models of service quality – based on attribute versus overall affect approach- in service firms offering technology based self-service options.

Surjadjaja et al (2003) presented three dimensions- service marketing, service design and service delivery- consisting of 20 determinants essential for e-service operations. Zhu et al (2002) proposes a service quality model for IT-based service options linked to the traditional service dimension as measured by SERVQUAL. Ibrahim et al (2006) in their study of electronic service quality perception, identify six composite dimensions. Zeithaml (2002) draws attention to service delivery through electronic channels but limits the scope to internet banking. Similarly, Parasuraman (2005) confines the study to the service quality of websites. There exists a significant gap in the research carried out on the service quality of technology interfaces.

Mols (2000) argued that customer acceptance of new technology-based channels of service delivery in banks may bring a dramatic change in the way retail banks build and maintain close relationships with their customers. Al-Hawari et al (2005) propose 5 dimensions of automated service quality- ATM service, telephone banking service, internet banking service, price perceptions and core service. The introduction of new technology-based channels of service delivery has made customer participation more widely possible and researchers therefore need to adopt new ways to conceptualize technology interfaces service quality, taking into consideration the attributes of all electronic delivery channels.

Ostrom et al (2010) in the study express that cross-disciplinary work is critical for effective service design. They emphasize that service design involves the orchestration of clues, places, processes and interactions that together create holistic service

experiences for customers. This in today's service organizations is being brought about by the use of technology interfaces. Hence, it is important to explore the effect of the technology interfaces on the service quality as more and more customers in retail banking prefer to use technology interfaces, in combination, for interaction. A number of marketing scholars identify ATM, internet and telephone banking as the principal automated delivery channels for retail banking. However, call centers and queue systems used by the banks to enhance the quality of service provided to the banks have been largely overlooked. Hence, this paper aims to identify various dimensions affecting the service quality across various technology interfaces and empirically test the influence of the various dimensions thereby developing a scale for measuring the Technology Interface Service Quality (TISQ) in the context of the retail banking sector.

CONCEPTUAL FRAMEWORK

Structural changes within the financial sector tend to place increased pressure for improvements in communication between the service provider and the customer. In the past, the process of long-term relationship building has occurred primarily through face-to-face contact with staff. Zineldin (2000) further argued that while the need for relationship development is important it is not complete without the use of technology. Kapoulas et al. (2002) refer to this phenomenon as "technologicalship" marketing, which they regard as a symbiosis of technology and marketing which tends to enhance the relationship-building process. The technology interface service quality (TISQ) model proposed in this paper encompasses the following technological interfaces that may shape customer perceptions of service quality.

ATM

ATM, the most frequently used electronic distribution channel, allows customers to perform their main banking transactions, such as deposits and withdrawals, 24 hours a day.

Telephone banking

Telephone banking provides interactive voice response services such as account balances, instruction to issue bank cheques, account payments etc.

Internet banking

Internet banking channel can realize significant savings in the area of customer acquisition. Benchmarks suggest that the all-in cost to acquire new accounts through the web can be between 15 and 45 percent lower than through the branch or call center. Moreover, internet banking is well suited to offer assistance (e.g., live online chat pop-ups when customers spend too much time on one page). These actions reduce abandonment rates for sales transactions significantly. Hence, e-commerce and the internet have been regarded as a potentially transformational force in nearly every industry and particularly in the financial services sector (Achrol and Kotler, 1999).

Communication and Call/Contact Center services

Mukherjee and Nath (2003) argue that to build and maintain a relationship with customers that lacks the physical presence of bank personnel "trust" must be central in "fostering customer loyalty". It could thus be argued that central to building and maintaining trust is communication, bi-directional communication between the customer

and the service provider (bank). This is facilitated by the call center services. Moreover when self-service channel is not designed properly, it is known to lead to customer frustration, decreased customer loyalty, or even defection. The contact center is the first to hear about these frustrations as customers call the service center to address their issues. With intelligent recording technologies, contact centers can record customer complaints about self-service channels and provide valuable feedback and insight to other departments that are developing these avenues of service thereby enhancing service quality.

Queue Systems or "Q-matic systems"

Queue systems or "Q-matic systems" have been very helpful in bringing order to otherwise chaotic queues in the branches (Yavas et al., 1997). The banks try to explore the advanced versions of Q-matic systems to market their services where customers look at TV screens to keep track of their number in the queue while still getting information about services.

In the banking sector, customers tend to use the different service delivery channels in a complementary way. Customers use different service delivery systems depending on their assessment of each channel and how it contributes to the "overall service offering". Hence service satisfaction will not merely be based on isolated service encounters and experiences but rather on the overall feelings of satisfaction. Consequently, developing a relationship with the customer can be achieved from any one of these media and more likely, a combination of them (Lang & Colgate, 2003). Dabholkar 1996 suggests that customer evaluation of technology-based service options and their intention to use a particular option are directly affected by their perception toward the attributes associated with that option. Every electronic delivery channel has its own attributes that differ from the others, so it is important to measure the quality of each channel separately to get a more accurate picture of customer perceptions of technology interface service quality.

The quality of every technology-based delivery channel will be important to form the customers' overall perception of TISQ and each delivery channel has been considered as a factor in the proposed TISQ model.

Additional determinants of technology interface service quality

Price

Price is essential factor in determining customer perception of technology interface service quality. Pricing problems associated with perceptions of unfairness and non-competitiveness, for example fee charges, often contribute to consumer decisions to switch banks. Consequently, price has been incorporated as an additional factor that could influence the customers' overall perception of TISQ.

Core Service

According to Sureshchandar et al (2002), the core service ("what" is being offered) has features that shape customer perception and differentiate one service provider from another. The core service is considered important as the product offerings and product information represent a set of elements that could positively impact the service quality delivered by the technology interfaces. Also, Product innovation and knowledge development factors have a significant effect on the success of electronic delivery

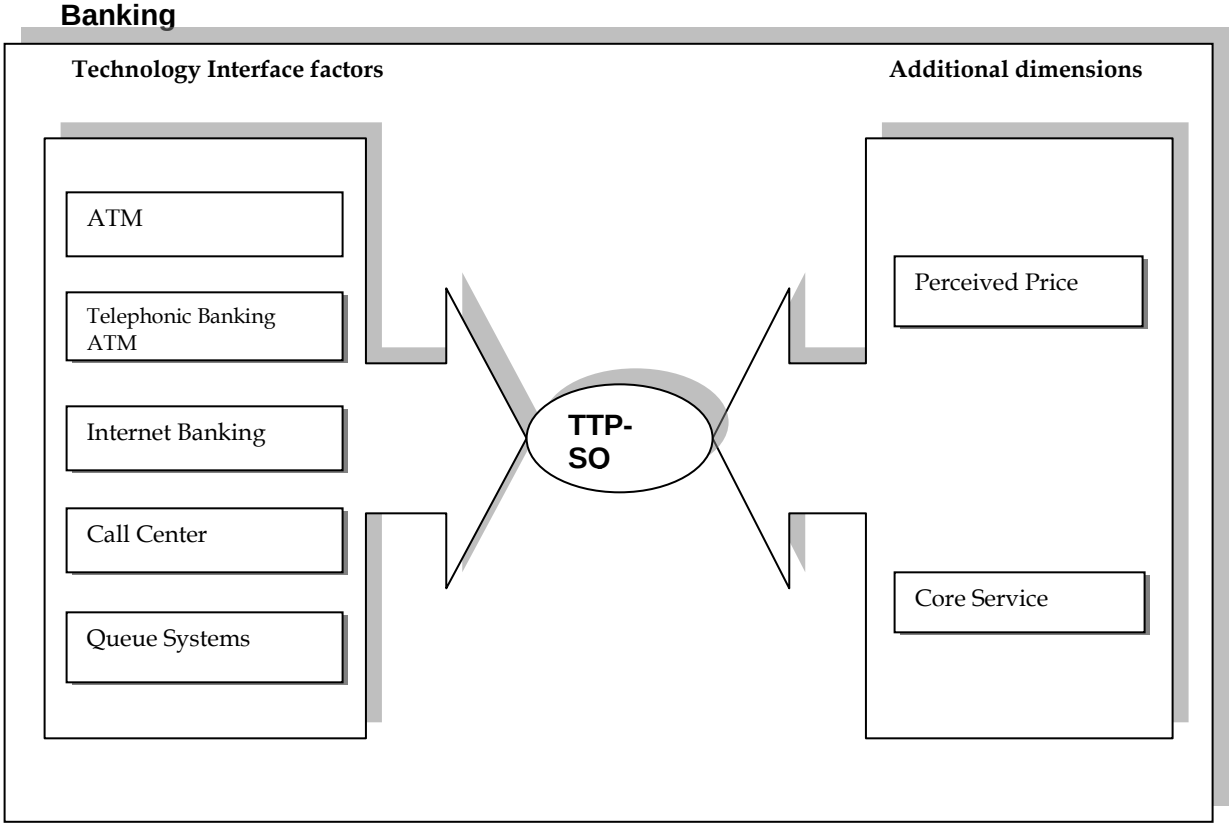
channels.

CONCEPTUAL MODEL

In summary, this research posits that customers' perceived technology interface service quality for banking services is based essentially on seven factors, namely:

1- ATM service,
2- Telephone banking service,
3- Internet banking service,
4- Call center service
5- Queue systems
6- Customer perception of price and
7- Core service

Figure 1.Critical factors of Technology Interface Service Quality (TISQ) in Banking



METHODOLOGY

This research had the goal of generating a valid and reliable instrument for measuring the service quality of technology interfaces, for application in the retail banking industry.

Content/Face validity

In this research, we propose to test the applicability of the technology interface service quality model in the retail banking sector of Sultanate of Oman. To test the content or face validity of the model and factors suggested therein, in the context of Omani banking sector, in-depth interviews with 6 customers and 2 bank managers were conducted.

This qualitative stage, designed to elicit customers' construal of service quality with respect to the technology interfaces in the retail banking context, brought to the forefront two more technology interfaces namely, call centers and queue systems apart from the already proposed 5 factors: a. three technology interfaces – ATM, telephone banking and internet banking; and b. two additional factors- perceived price and core service.

Item generation

29 items were generated based on indepth interviews with 6 customers and 2 bank managers and from extensive literature review (Joseph and Stone (2003), Buttle and Aldaigan (2002), Bahia and Nantel (2000) and Jabnoun and Al-Tamimi (2003), Yang & Jun 2002, Zeithaml 2002, Long & McMellon (2004), Jun and Cai (2001), Zineldin (2000), Kapoulas et al (2002), Mukherjee and Nath (2003), Sureshchandar et al (2002), Yavas et al (1997)). This qualitative phase proposed seven factors for technology interface service quality scale in retail banking services. (Refer table 1).

Table 1. Items for Technology Interface Service Quality dimensions

TISQ dimensions	**Related items**
ATM	• Sufficient number of ATM • Secure locations* • ATM has a user-friendly system* • Conveniently located • ATM functions
Telephone Banking	• Reasonable number of voice prompts • Short waiting time • Clear instructions • Reliability • Telephone banking options
Internet Banking	• Availability of information • Easy to use • Secure • Error free transactions • Attractive web-site • Website interface accuracy • Up-to-date information
Call Center services	• Ready availability of call center contact details • Diverse access channels like telephone, email, online chat, VOIP calls etc. are available • Satisfactory problem resolution in the first call • Knowledgeability of call center personnel
Queue systems	• Enable better process order • Providing information about products and services

Price	• Adequately explaining service charges • Acceptable fees • Competitive fees
Core Product	• Wide range of services (retirement's accounts, loans for cars, foreign exchange, purchases of cars, etc.) • Diverse service features (different interest rates, wide choice of loan periods) • Follow the most advanced technology

***Items deleted in Stage 1**

RESEARCH DESIGN

The study was conducted in two stages.

Stage1: Pilot Study
A pilot study was conducted to refine the test instrument that involved the administration of a survey to 34 respondents with all surveys being included in the exploratory analysis. The survey instrument consisted of 29 items towards the 7 proposed factors. The instrument was divided into four main sections. Section 1 consisted of the definitions of the various dimensions. Section 2 consisted of rating scale for assessing the importance of the various dimensions from the customer's perspective. Section 3 consisted of 29 items for assessing the service quality measurement and a single statement for measuring overall satisfaction with the banks' services. Section 4 was designed to collect the demographic data. Specific issues addressed were question ambiguity; the refinement of the research protocol and the confirmation of scale reliability. Test of dimensionality and reliability analysis reveals the following:

a. Dimensionality: An underlying assumption and essential requirement for creating a summated scale is that the items are uni-dimensional, meaning that they are strongly associated with each other and represent a single concept (Hair et al, 1998). Factor analysis using Principal Axis Factoring (PAF) with VARIMAX rotation was conducted on the 29-item scale on SPSS; seven factors were extracted, based on the Eigen values and the scree plot, which coincided with the number of conceptualized dimensions. The items were found to load under the respective factors showing uni-dimensionality.

b. Reliability Analysis: The Cronbach alpha coefficient was found to be above 0.7 for all but one of the proposed dimensions which indicated an acceptable level of reliability (Nunnally & Bernstein, 1994). The Cronbach alpha coefficient for the ATM dimension was 0.4486. Henryson (1971) noted that an item-to-total test correlation should be over 0.3 for inclusion in a survey test. Consequently, "The ATMs are in Secured locations" item and "ATM has a user-friendly system" was deleted as it had a value of less than 0.3. This in turn, led to an increase in the reliability of the ATM service dimension to 0.67 which is very close to required value. The Cronbach alpha for the overall scale was a respectable 0.9418.

Stage 2: Main Stage
This stage involved the distribution of 275 revised questionnaires (based on the findings from Stage 1) to the retail banking customers of the various commercial banks in Sultanate of Oman using. Only respondents who used at least one of the bank's technology interfaces were accepted in this sample. Respondents were asked to give their perception of the quality of technology interfaces enabled banking services on a five point Likert scale ranging from "1" indicating "Strongly disagree to "5" indicating "Strongly agree". A total of 162 useable surveys were collected which gave a response rate of 59 percent.

The 27 items in the questionnaire were factor analyzed with principal axis factoring on the data set. The Factor matrix was rotated orthorgonally using VARIMAX. Table 2 shows the seven factors that emerged. The Kaiser Meyer-Olkin (KMO) measure of sample adequacy yielded "0.87" considered as "good" by Kaiser (1974).
And the variance explained by all the 7 factors was 83.2 percent. Overall, factorial membership of the items is similar to that of the pilot stage.

Table 2. Principal Factor analysis using VARIMAX Rotation
Rotated Component Matrix for TISQ Scale

Factors	Components						
	1	2	3	4	5	6	7
Factor 1: Internet Banking							
a. The website is easy to use	.913						
b. The website is attractive	.910						
c. The transactions are secure	.909						
d. Website interface accuracy is of required quality	.909						
e. Information available is accurate	.905						
f. All necessary information is readily available on the site	.900						
g. The transactions are error free	.881						
Factor 2: Telephone Banking Services							
a. The instructions are clear		.927					
b. The information is reliable		.894					
c. The telephone banking options are sufficient		.893					
d. The waiting time is short		.889					
e. The system provides reasonable number of voice prompts.		.874					
Factor 3: Call Center Services							
a. Diverse access channels like telephone calls, email, online chat, VOIP calls etc. are available			.907				
b. Call center personnel are knowledgeable to address the various issues			.899				
c. Call center contact details are readily available			.875				
d. The problem or issue was resolved satisfactorily in the first call			.872				
Factor 4: ATM Services							
a. The ATMs are conveniently located				.883			
b. The bank provides sufficient number of ATMs				.841			
c. ATMs satisfy all the intended functions				.819			
Factor 5: Price							
a. Fee for the services is acceptable					.840		
b. Service charges are explained adequately					.738		

c. Fee charged is competitive					.726		
Factor 6: Core Service							
a. Diverse service features are available						.833	
b. Wide range of services are available						.774	
c. Follow the most advanced technology						.647	
Factor 7: Queue Systems Services							
a. The Q-matic systems have been successful in bringing order							.939
b. Q-matic systems also help to get information about services							.924

a Rotation converged in 6 iterations

Validity Assessment of TISQ Scale

Validity of the TISQ Scale was assessed by performing three validity tests: content validity, and two forms of construct validity: convergent and discriminant validity.

Content or Face validity which is the discussion of conceptual definitions, has already been done in the section 5.1.

Construct validity: convergent and discriminant validity

For the practical significance test of convergent and discriminant validity, Pearson's correlation coefficients were computed. The results appear in Table 3.

The scale's convergent validity assesses the degree to which two measures of the same concept are correlated. The TISQ scale's convergent validity was assessed by statistical and practical significance of its association between the weighted TISQ and the un-weighted TISQ. Correlation between the weighted TISQ and un-weighted TISQ was found to be high at 0.77; which showed high convergent validity.

Discriminant validity is measured by the correlation of the weighted TISQ with a similar, but conceptually distinct measure - overall satisfaction (OSAT) - as measured by a single statement in the survey. The correlation was found to be poor at 0.267 indicating discriminant validity.

Table 3. Evidence of TISQ's Convergent and Discriminant validity

Variable		OSAT (Overall satisfaction)	UNWTSQ (Unweighted TISQ)
WTSQ (Weighted TISQ)	Pearson Correlation	.267(*)	.775(*)

Note: * Significant at 1% level (2-tailed)

DISCUSSION AND CONCLUSION

The aim of the study was to develop a scale to measure technology interface service quality (TISQ). It involved the identification of various dimensions of technology interface service quality including the ones overlooked in the literature of service quality of technology enable service delivery channels. Subsequently, this paper proposed a conceptual model of technology interface service quality, as perceived by customers, with specific emphasis on the retail banking sector. The proposed comprehensive model has been empirically validated by perceptual data collected from customers of banks in Sultanate of Oman. All of the proposed seven factors of customer perceptions of TISQ have exhibited strong unidimensionality, reliability, convergent, discriminant, and criterion related validity.

Consequently, it can be accepted that the technology interface service quality in banks can be conceptualized as a seven- factor structure consisting of: ATM service quality (3 items), telephone banking service quality (5 items), internet banking service quality (7 items), call center service quality (4 items), queue systems service quality (2 items), core service quality (3 items) and price quality (3 items).

LIMITATIONS OF THE RESEARCH

Although the technology interface service quality measurement model comprehensively addresses different technological aspects in banks, there may be other aspects needed to be explored and investigated as well.

Technology adoption patterns may differ from country to country. The technology adoption stage of the country needs to be taken into consideration before adopting the TISQ scale.

IMPLICATIONS

The study reveals the various technology interfaces dimensions that affect the service quality in retail banking. The banks to assess the service quality of the various technology interfaces can use the TISQ scale. This would enable them to take suitable corrective action if the values fall short of expectation.
These findings have national significance and indeed can be extended to any other country that has similar financial regulations and banking culture, such as the GCC states.

SUGGESTIONS FOR FURTHER RESEARCH

The study can be replicated in other countries. This would provide insights on the impact of culture on the evaluation of service quality in technology-enabled banking. This is considered an important issue due to the nature of the global market economy in which banking institutions operate.

Future studies can examine the implications that arise from the inherent characteristics of technology interfaces to the various attributes of service quality like “trust” in the absence of human contact, service recovery implementation etc. Also, the influence of the technology interface service quality on the behavioural intentions like loyalty, tendency to switch, barriers to switch etc. can be investigated in future.
The model developed in this study may be tested in other service contexts where on-site, technology-based service delivery options are involved. Examples of such contexts include airlines, hotel industry etc.

The dimension of mobile banking using smart phones and other mobile devices has not been explored in the study. The dimension can be significant in countries with well established applications for mobile banking

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