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CORPORATE E-BANKING: A STUDY BASED ON DELONE AND MCLEAN'S IS SUCCESS MODEL

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ABSTRACT

Although there are ample of studies dealing with retail internet banking, very few studies have investigated corporate internet banking. The objective of the current research is to study the determinants of the intention to continue use online banking of the existing corporate customers. This study collected data from 154 customers of an international bank to test a model developed from the DeLone and McLean's IS success model. The results show that system quality contributes most to the perception of overall quality of the corporate e-banking service as well as the impact on the future use intention. Other factors that are found to be important are human service quality, information quality, and accuracy and security of the system.

Keywords: DeLone and Mclean model, corporate electronic banking, service quality

INTRODUCTION

There is scant of study that has investigated corporate internet banking. Few exceptions include Rotchanakitumnuai and Speece [15], which investigated how benefit and barrier factors affected the adoption of internet banking by Thai's corporate customers. In their study, transaction benefit, information quality, and distrust were found to discriminate adopters and non-adopters. Cheng et al. [2], based on the Technology Acceptance Model, found that perceived usefulness, perceived web security, and attitude affected the intention to use positively. However, perceived ease of use did not affect the intention directly.

Researchers' interest in service quality delivered by websites has prompted the development of a number of instruments such as E-S-QUAL [13] and .comQ [18] to measure website service quality. Careful analysis of these instruments reveals that they do not only measure the online characteristics of the website, they also measure some offline service components, like fulfillment and customer service. However, most of these instruments are targeting the e-tailing websites. A number of studies did attempt to understand the electronic service quality of personal internet banking [e.g., 9,17]. However, study investigating the quality attributes for corporate internet banking is scanty.

Thus, the current study attempted to identify the quality attributes of corporate internet banking services and how these attributes affect the future use intention of the existing corporate customers based on the DeLone and McLean's [6] model of IS success.

DeLone and McLean [4], after reviewing over 180 articles on system success, introduced a comprehensive success taxonomy based on six major dimensions of IS success – System Quality, Information Quality, Use, User Satisfaction, Individual Impact, and Organizational Impact. They also proposed an IS success model linking these six dimensions. Ten years later, they refined their model by adding service quality and usage intentions to the model, while at the same time they collapsed the individual impact and organizational impact dimensions into one net benefit construct [6]. The updated D&M model is shown in Figure 1.

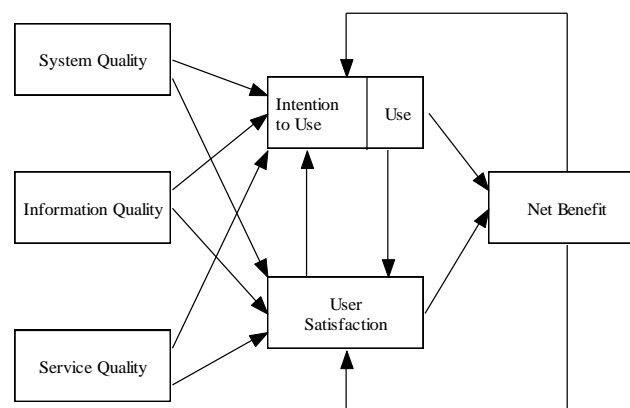


Figure 1 Updated D&M IS Success Model [Adopted from [6]]

In this model, three quality attributes are identified as measures of success. In the current study, we are interested in how the system quality, information quality, and service quality affect the intention of the current corporate to continue to use internet banking.

In order to understand which aspects are important in determining the overall quality perceptions of the corporate electronic banking service, we have modified the D&M model to include the Overall Quality of the service to replace the User Satisfaction as a mediator of the quality dimensions and the future use intention. Our research model is shown in Fig. 2

System Quality is concerned with whether or not the internet banking system is reliable, responsive, easy to use and whether the design of the interface is consistent. A large part of this definition of system quality, such as the consistency of interfaces and ease of navigation, is concerned with whether users can use the system with minimum effort and difficulties. This is very similar to the concept of perceived ease of use in the TAM. Other aspects of system quality include customerization, security and reliability of the system [5]. Information Quality assesses the system's output in such area as relevance, timeliness, and accuracy [6,16]. Service quality captures the support delivered by the bank to the corporate customers [6]. [Add SQ definition here].

Our nomological network is shown in Figure 2. Based on the DeLone and McLean's Model and the results of previous studies [6,10,11,19], we postulated that all the relationships are positive.

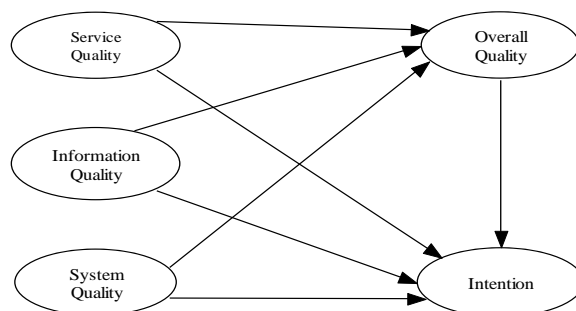


Figure 2 Research Model

METHOD

Questionnaire Design and Measures

The initial items for our constructs were adapted from a number of existing instruments. The initial item pool was reviewed by the senior management of the Internet banking operation and changes were made based on their expert opinions.

Information Quality: The measurement scale for information quality was adopted from Doll and Torkzadeh [7]. This scale consisted of 6 items, asking the respondents about the quality of the information provided by the resultant system, including its content, accuracy, relevancy, format, and timeliness.

System Quality: The measurement scale for system quality was adopted and developed from Doll and Torkzadeh [7] and DeLone and Mclean [6]. Ten items were used to measure the ease of use, system reliability, personalization, and security aspects of the system quality.

Service Quality: The items measuring service quality were developed based on the definitions given by Jun and Cai [9]. We adapted the appropriate items from SERVQUAL [12] and IS-adapted SERVQUAL [14] whenever possible, as well as developed the items for the continuous improvement dimension. Twenty one items were developed to measure the 9 dimensions of the service quality.

Overall Quality: Two items were used to measure the overall quality of the Internet Banking service.

Intention: The expected future usage of the existing corporate customers was measured with two items developed for this study. The questionnaire also contains items that collect information about the companies and the ways they were using corporate Internet banking services.

Data Collection Procedure

A total of 966 questionnaires were sent to the existing Internet banking users of the 281 commercial customers of the XYZ bank. Depending on the number of Internet Banking users they have, two to eight questionnaires were sent to each customer. Together with the questionnaire, a cover letter of the head of Electronic Banking Service Department of XYZ Bank was sent. To raise the response rate, Follow-up phone calls were made to the main contacts of each commercial customer to ask for their cooperation and a bank gift was prepared to thank for their assistance. The respondent questionnaires were sent back either by fax or mail.

Out of the 966 questionnaires, 181 copies of paper questionnaire were returned; twenty seven of them were invalid due to missing data, resulting in an effective response rate of 15.9% and a sample size of 154.

ANALYSIS AND RESULTS

Exploratory factor analysis was performed on the data in order to purify the items and to establish the dimensionality of each scale. Items that did not load heavily on the primary factors and items that had significant cross-loading(s) were removed. In discussing the use of EFA to validate measurement instruments, Burnett and Dart [1] suggested that items with factor loading less than 0.4, and items which have loadings greater than 0.4 on two or more factors, should be removed. Then the remaining items were subjected to another EFA until no further item has to be removed.

Oblique rotation using promax was used in all the factor analyses in this study. Promax attempts to maximize simple structures while allowing the factors to become correlated. It is more reasonable to assume that the set of factors of the current study are related to one another.

The forty one items that measure service quality, information quality, and system quality were subjected to principal component factor analysis. Eigenvalues and a Scree plot were used to determine the number of factors to be extracted. A five-factor structure was suggested using the criteria of an eigenvalue greater than one. A promax rotation was also performed. The result of the rotation showed that four items either has substantial cross-loading or does not load heavily onto any factor. These items were thus removed and another factor analysis was performed. A five-factor structure was again suggested. The extracted factors accounted for 71.79 percent of the total variance. The service quality items were grouped into two factors. The three items measuring the "continuous improvement" aspect were loaded in one factor, with the remaining items loaded onto another. We therefore, name these two factors as "Continuous Improvement" and "Human Service Quality" respectively. The items measuring the system quality were also grouped into two factors. One factor contains 4 items that measure the accuracy of the transaction and security of the system. The other factor contains 11 items that measure the ease of use, reliability, speed, personalization, and accessibility of the system. We thus name the first factor "Accuracy and Security" and use the original name "System Quality" to refer to the 11-item factor. The grouping of the items was shown in Table 1.

To test the hypothesis, Partial Least Square (PLS) was used to analysis the data. PLS is a component-based structural equation model technique that allow the test of the measurement and path models simultaneously and it is more suited for predictive application and theory building [8].

Before looking at the path model, the psychometric properties of the measures were first evaluated. Convergent validity was assessed based on the criteria that the indicator's estimated pattern coefficient must be significant on its posited underlying construct factor, composite reliability must be higher than 0.7, and the average variance extracted (AVE) higher than 0.5. Discriminant validity was assessed by the criteria that the square root of AVE should exceed that construct's correlation with other constructs [3].

Table 2 shows the composite reliability, square root of the AVE and the correlations among latent constructs. As shown in the second column of Table 2, the composite reliability of all the constructs is higher than 0.7 and the AVEs are higher than 0.5, which imply that the scales are reliable. As shown in Table 1, all the item loadings are quite high and are significant at .01 levels. Together with the fact that the square root of AVEs are higher than the construct's correlation with other constructs (as shown in Table 2), it indicates adequate discriminant validity.

Table 1 Items Loadings from PLS Analysis

Factor	Loading
Human Service Quality	
Performing services right at the first time	.81*
Providing services at the promised time	.83
Responding quickly to customers' requests	.89
Are always willing to help customers	.85
Have the knowledge on banking products and the Internet banking system to answer customers' questions	.86
Have the adequate interpersonal skills to communicate	.88
Treat Customers politely all the times	.84
Deal with complaints in a friendly manner	.79
Give clear answer to each requests	.89
Inform customer of important information	.67
Understand customers' needs	.85
Pay individual attention to customers	.83
Treat the customer as a VIP client	.79
The hotline support can be reached any time in office hour when Customer need help	.74
Continuous Improvement	
XYZ Bank is continuously improving its Internet Banking	.87
XYZ Bank is continuously improving its customer services	.88
XYZ Bank is continuously providing more banking products via its Internet Banking	.83
Information Quality	
The Internet Banking System provides the precise information I need	.90
The Internet Banking System provides enough information for my needs	.91
The Internet Banking System presents information in a logical way that can be read easily	.84
Information downloaded from the Internet Banking System can be easily integrated with my business operation	.82
The Internet Banking System always provides up-to-date information	.84
System Quality	
It is easy to learn how to use the Internet Banking System	.80
It is easy to login the Internet Banking System	.76
It is easy to use the Internet Banking System	.84
It is easy to navigate in the Internet Banking System	.83
It is easy to perform business tasks in the Internet Banking System	.81
The Internet Banking System provides clear result message upon action	.84
I am satisfied with the Internet Banking System's speed performance	.78
The Internet Banking System has clear website design	.81
The Internet Banking System has provided very good customization	.78
The Internet Banking System can be accessed any time	.82
The Internet Banking System has stable performance	.83
Accuracy and Security	
The Internet Banking System always execute transaction accurately	.86
The Internet Banking System always presents information accurately	.84
The Internet Banking System use reliable security measures	.81
Online transactions via the Internet Banking System are secure	.88
Overall Quality	
Based on all of your experience, electronic Banking of XYZ Bank provides a high level of services quality	.95
Based on all of your experience, electronic banking of XYZ Bank provides excellent service	.95
Future Use	
I intend to use the Internet Banking System more to perform banking service	.90
I intend to use more banking services of XYZ Bank and less banking services of other banks	.88

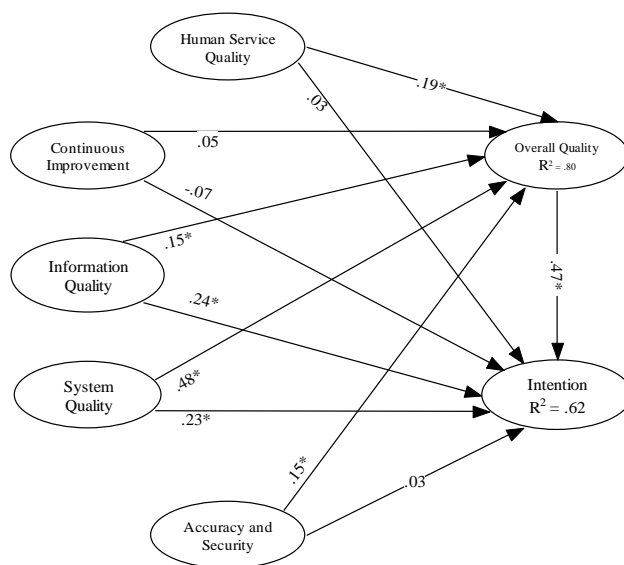
* all factor loadings are significant at $p < .01$

Table 2 Reliability, AVE, and Correlations among Latent Construct

	Latent Construct	Composite Reliability	1	2	3	4	5	6	7
1	Human Service Quality	.97	.82						
2	Continuous Improvement	.89	.60	.86					
3	Information Quality	.94	.57	.62	.86				
4	System Quality	.95	.64	.64	.78	.81			
5	Accuracy and Security	.91	.67	.57	.62	.69	.85		
6	Overall Quality	.95	.71	.73	.75	.80	.72	.95	
7	Future Use Intention	.90	.53	.56	.69	.73	.56	.76	.89

Note: The diagonal elements are the square roots of AVE.
Off-diagonal elements are correlations between latent constructs.

The research model was tested using the structural path model. Figure 3 presents the standardized structural path coefficients along the arrows of the proposed research model. To avoid cluttering the figure, the indicators of the constructs are not shown.



*Significant at .05 level

Figure 3 Results of the Analysis for the Research Model

As shown in the figure, human service quality ($\beta = .19$), information quality ($\beta = .15$), system quality ($\beta = .48$), and accuracy and security ($\beta = .15$) were significantly positively related to the overall quality evaluation of the internet banking systems. System quality contributes the most to the users' overall quality perception. In all, 80% of the variance in overall quality was accounted for. However, continuous improvement did not have a significant impact on the overall quality. Moreover, information quality ($\beta = .24$), system quality ($\beta = .23$), and overall quality of the internet banking service ($\beta = .47$) were significantly positively related to the future use intention. The variance accounted for is 62%. However, human service quality, continuous improvement, accuracy and security do not have significant direct effect on the future use intention.

DISCUSSION AND CONCLUSIONS

Based on the DeLone and McLean's IS success model, we have developed a scale that measure the human service quality of corporate internet banking and also test a model that investigates the impact of various quality dimensions on the overall quality perception and future use intention. The result show that system quality contributes the most to the quality perception of corporate, internet banking service, followed by human service quality, information quality, and accuracy and security all of which have very similar weight. This ordering of the quality attributes indicated that when judging the overall quality of the corporate internet banking service, customers focus much more on how well the website is running in term of ease of use, good design, reliability, and accessibility. Human service quality is not as important as the system quality because customers may not need to contact the bank personnel if they do not encounter any problem when using the e-banking system. However, when they do need to contact the bank personnel, how the employees are providing service to them is still an important factor that the customers consider when evaluating the quality of the internet banking service.

The factor accuracy and security, after separating from the general system quality factor, only have a weak relationship with the overall quality perception. Most of the discussion suggests that security is a major concern of the customers; it is not in this case. One possible reason is that we surveyed the existing users of the Internet banking of the XYZ Bank. The respondents might have fully evaluated these issue before they adopted the Internet banking provided by XYZ Bank and they also has gained experience

when using the system. They should perceive security being already at acceptable levels; otherwise, they wouldn't use it. After they began to use it, these factor was not significant any more as long as no great changes occurred. Another reason may be due to the nature of banking in general and corporate banking in particular. There are very stringent regulations that bank need to follow, thus the bank customers may believe that the security of the internet banking system should not have much problem. The corporate customers also have closer relationship with the bank so that they are less concern about the security issue.

Information quality contributes only slightly to the perception of the overall quality, but it has a moderate direct impact on the future use intention. Combining its indirect effect on the intention through overall quality, its effect on future use is only second to system quality.

Amongst the antecedents of the future use intention, overall quality has the biggest impact, followed by information quality and system quality which have very similar direct effect. The result also shows that human service quality and accuracy and security do not have direct effect on intent, their effects are totally mediated by the overall quality perception. On the contrary, system quality and information quality do affect the intention directly. Therefore, when combining the direct and indirect effects, the system quality should have the largest impact on future use intention, followed by information quality. Human service quality come in third and accuracy and security is the last amongst the factors that have effect. Continuous improvement does not have relationship with both overall quality and intention. Thus, the bank should put more resource into the development of the technical and informational aspect of the online banking system. If the online system is good, the need for customer service may be minimal. However, if the design of the system is bad, the customers may give up using it before it needs the customer service.

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