Internet Banking Service Quality in Malaysia: An Empirical Investigation

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Abstract—**This study is among the first research that develops an instrument to measure Internet Banking Service (IBS) quality in Malaysian context based on Technology Acceptance Model (TAM) and nine service quality dimensions. The objective of this research is to highlight the weaknesses and strengths of IBS quality dimensions from Malaysian users' perspectives in order to increase the adoption of IBS. Five hundred and forty seven questionnaires were distributed and collected from the Klang Valley area in Selangor state. Data was analyzed using descriptive statistics. The study results show that Malaysian Internet Banking users' have attitudes and intentions of using IBS (mean rating more than 3.00). Furthermore, Malaysians users realize the advantages of using IBS by giving high mean ratings for service quality dimensions to ease of use, competence, product/service portfolio, reliability, security/privacy, and relative advantage. However, other dimensions such as response and contact, efficiency, and enjoyment obtained relatively low mean ratings as indictor of users' behavioral intentions towards IBS. Implications and suggestions for future research were given.**

Index Terms—**Behavioral Intention; Internet Banking Services; Service Quality Dimensions; User Acceptance.**

I. INTRODUCTION

Internet Banking Services [IBS] has been launched in Malaysian market since June 1, 2000 following the permission of Malaysian Central Bank to the owned commercial local banks to offer this service to their clients [1]. Nowadays, it becomes the most popular e-services in Malaysian market. By the end of Nov. 2016, the total numbers of Internet Banking subscribers was 23.5 million representing 74.2% of Malaysia total population using IBS that offered by 32 local and international banks [2]. IBS is a delivery channel through which bank customers can access his or her account(s) through the Internet network to request information and conduct different financial transactions such as fund transfer, balance enquires, bill payments, etc. [3]. Abundant researches have been conducted to investigate issues related to IBS quality dimensions from users' perspectives [4-7]. However, the service quality of these dimensions are still insufficient in terms of the service quality and users experience in confirming user satisfaction, user-friendly interface, and loyalty caused by lacking of human contact [8-10]. Furthermore, some attitudinal-related dimensions concerning the human intervention and experiential aspects e.g., "Competence" and "Enjoyment" were intentionally ignored from IBS quality measurement [11, 12]. Therefore, Malaysians both local and international banking institutions should have an obvious realization of the factors that are influencing users' adoption of IBS which is crucial for the banks success to maintain the competitive advantage [10]. Thus, the objective of this research is to perform a comprehensive study based on users' perspective for the service quality dimensions to increase service quality as well as adoption of IBS globally and specially among Malaysian users. This research applied Technology Acceptance Model (TAM) as a standard, powerful, and robust model for information systems acceptance to help measure user adoption of IBS. Although, many studies have applied TAM and extended TAM models for envisaging user's adoption in using IBS, a few empirical studies has examined IBS adoption in Malaysian context [7, 13]. To our knowledge, this study is among the first research that develops an instrument to measure IBS adoption in Malaysian context based on nine service quality dimensions identified from previous validated literature.

This study highlights the weaknesses and strengths of IBS dimensions from Malaysian users' perspectives. It also provides both local and multinational banks' stakeholders and developers in Malaysia with valuable insights and implications for users' concerns on adoption of IBS and ultimately assists them in the development of improved IBS that respond to users' needs and interests. Furthermore, it also assists the authorities specially Bank Negara Malaysia (Central Bank) in establishing guidelines and standards to help banks to develop an improved user-interface that will increase service quality as well as adoption of IBS.

The following section which is Section II, related to theoretical background and the research model. Section III discusses the research methodology in terms of data collection, measures, and respondents' profile. Section IV presents the results. Section V provides discussion and recommendation for the future research. Finally, Section VI presents conclusion and future works.

II. THEORETICAL BACKGROUND AND RESEARCH MODEL

Internet Banking Systems are considered as innovative information application. Previous researches on user acceptance of Information Systems (IS) can be useful in understanding success and adoption of IBS. Our research model comprises TAM model and IBS quality dimensions as main components of our model to provide explanations of users' behavioral intention of adopting IBS in Malaysian banks.

A. TAM Model

TAM model was originally proposed by Davis (1989) [17], adapted from Theory of Reasoned Action (TRA) [18], was specifically adjusted to handle user adoption of IS. The

purpose of TAM model is to explain the factors of computer adoption to understand the user behavior towards a wide range of different application of information technologies and user populations.

Figure 1 shows the research model for the study, referenced as behavioral intention to use IBS. This research extended and employed the TAM model as the base model for IBS acceptance. The research model develops the rational for the causal relationships based on TAM model and IBS quality dimensions as external variables that combined both of perceived ease of use and usefulness from the original TAM model. These dimensions directly affect attitudes towards using IBS which in turn leads to attitude and intention of use of the IBS. Therefore, we propose the research model as follows:

Usefulness = Ease of Use + External Variables ⎤ TAM
Ease of Use = External Variables ⎦ model

In this study model:

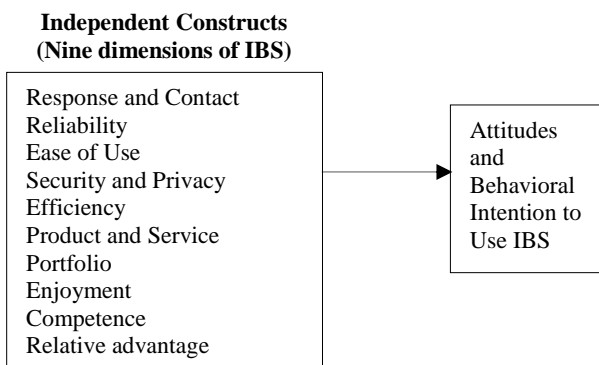IBS Quality Dimensions=Ease of Use+ External Variables

Figure 1: The research model

B. IBS Quality Dimensions

Based on a comprehensive literature review, several studies examined the dimensions that were affecting the adoption of IBS from different countries, four research disciplinary perspectives that includes finance, marketing, information technology, and service management [13].

However, after systematic review of the related literature specifically studies that developed scales of Internet banking service quality dimensions. Based on the distinctness and comprehensiveness of these dimensions to combine both the technical and human-related quality aspects, we identified and propose nine dimensions in order to measure both technical and human quality dimension of Internet Banking websites (Figure 1). The identified dimensions are: response and contact capability, reliability, ease of use, security and privacy, efficiency, product and service portfolio, enjoyment, competence, and relative advantage. The first six dimensions are related to technical performance of the Internet banking website while the rest related to the human-related quality. In the following we identify the operational definition for each dimension based on relevant literature:

i. Response and contact is the ability of Internet Banking users to get help if there is any problem arise or enquiry (problem handling). The contact is the availability of Internet banking website's assistance through

telephone, chatting, email, or online customer service representative [12, 14].

ii. Reliability is the ability of the website to perform the promised service dependably and accurately [15].

iii. Ease of use dimension is the level to which Internet Banking website design quality is easy to use such as easy navigation, speed of response, well-organized structure, and ease of completing an online transaction [16, 19].

iv. Security and privacy is the degree of customer credibility as to whether the website is secure and if personal information is protected [14, 19].

v. Efficiency is the degree to which users of Internet Banking website complete banking transactions quickly and easily with a minimum effort which involves login/ page download speed and faster contact to the bank's representatives [14, 20].

vi. Product and service portfolio is range of products and service that are offered to users by Internet Banking website [16, 19].

vii. Enjoyment is the degree to which Internet Banking website is enjoyable [21].

viii. Competence is the degree of banks staff's ability to answer users enquires, their ability to solve problems that emerge and complaisance with user's request [19].

ix. Relative advantage dimension is the degree to which Internet Banking website is realized superior than traditional bank branch [22].

III. METHODOLOGY

A. Data Collection

547 completed questionnaires were collected from the respondents who are the Internet Banking users any they carried out banking transactions on the Internet banking website from major cities in Klang Valley area in Selangor state in Malaysia via Simple Random Sampling (SRS) method where elements of the population have equal and known chance to be selected as being subject. All respondents had information technology and business background. The questionnaire comprised of two parts: Part A about respondents' demographic data; and Part B is about identifying level of bank user's perception and satisfaction of IBS quality.

B. Measures

The initial instrument comprised 52 items, nine service quality dimensions, and two dependent variables which were identified after interviewing experts from academics and professionals to evaluate importance of items and dimensions. An instrument was pilot tested by 42 respondents and analyzed using Rasch model statistical analysis software for variables reliability, and items and persons quality. By applying the Statistical Package for Social Sciences (SPSS) version 24, an Exploratory Factor Analysis (EFA) and Confirmatory Factor Analysis (CFA) was conducted to help define the final instrument which leads to 30 items for the final measurement as shown in Table 2. The measurement instrument comprised of thirty questions representing nine dimensions that measures IBS quality and two dependent variables measuring attitude and intention of use. All items were adapted from prior tested literature. Of these, six dimensions namely: response and contact, efficiency, ease of use, security/privacy, product/service portfolio, and

enjoyment, are measured with three questions to each of them. Whereas reliability was measure with 5 questions, and competence was measure with four questions. The dependent variable attitude is measured with three questions, and intention to use with four questions. The four-point Likert scale that is ranging from 1- strongly disagree to 4 – strongly agree are used for the items to mention the level of disagreement/agreement with each of item's statement related to a certain construct. A descriptive analysis was conducted using SPSS version 24 to analyze the data.

IV. RESULTS

A. Respondents Profile

Table 1 describes the respondents' demographic characteristics which comprises of gender, race, age, experience with IBS use, occupation, income, and the highest educational level. From the total number of respondents, more than half (56.1%) are female while 43.9% are male. Among the respondents, half of them (50.7%) are Malay, 22.5% are Chinese, 11.3% are Indian, and 15.7% are other nationalities. 76% of the respondents surveyed are in the 20-39 age categories while 15.9% of them were equal and above 40 years old. On the experience of the respondents in using IBS, almost 82% have more than one year experience in using IBS while only 18.5% having experience less than one year. Approximately half of the respondents (49.5%) are professionals while 26.9% are students, the remaining 20.3% are technical/clerical staff and only 3.5% are housewife/husband/self-employed. For the respondents' monthly income, 23.8% are less than RM1000 income while 35.4% ranging between more than RM1000 and less than or equal RM3000. However, the monthly income of about 41% of the respondents is more than RM3000. The respondents' level of education is higher; almost half of them hold Bachelor degree while 22.7 % holds at least Master degree.

Table 1
Respondent Profile

Item	Categories	Frequency	%
Gender	Male	240	43.9
	Female	307	56.1
Race	Malay	276	50.5
	Chines	123	22.5
	Indian	62	11.3
	Others	86	15.7
Age	Below 20	42	7.7
	20-39	418	76.4
	40 and above	87	15.9
Experience with IBS Use	<1 year	101	18.5
	1-4 years	230	42.0
	5 years and above	216	39.5
Occupation	Professional	270	49.4
	Housewife/husband/self-employed	19	03.5
		34	6.2
	Technical Staff	77	14.1
	Clerical Staff	147	26.9
	Students		
Income	Less than RM1000	130	23.8
	RM1001 - RM2000	92	16.8
	RM2001 – RM3000	102	18.6
	More than RM3000	223	40.8
Educational Level	SPM/STPM or equivalent	80	14.6
	Bachelor Degree	273	49.9
	Certificate/Diploma	70	12.8
	Master/PhD	124	22.7

B. Mean and Standard Deviation

Finding of this study are shown in Table 2 by calculating the Mean and Standard Deviation for the constructs and corresponding items measuring dependent and independent variables. The Mean value represents the distribution of the data which in turn explains the tendency of respondents. While higher Standard Deviation greater spread in the data. The results show that Malaysian Internet Banking users' have high attitudes and intentions of using IBS (Mean rating more than 3.00). Furthermore, as shown in Figure 2, Malaysians users realize the advantages of using IBS by giving high mean ratings for service quality dimensions (close and above 3.00) to ease of use, competence, product and service portfolio, reliability, security/privacy, and relative advantage. However, other dimensions such as response and contact, efficiency, and enjoyment obtained relatively low mean ratings (less than 2.80) as indictors of users' behavioural intentions towards IBS adoption.

Table 2
Mean and Standard Deviation

Constructs with the Corresponding Items	Mean	S.D
1. Response and Contact	**2.643**	**0.746**
1.1 The Internet bank has customer service representatives available online	2.759	0.731
1.2 The Internet bank website tells me what to do if my transaction is not successful	2.609	0.780
1.3 The Internet bank platform quickly solves whatever problems I encounter	2.556	0.728
2. Reliability	**2.800**	**0.677**
2.1 The transaction processing system of my Internet bank is error free	2.556	0.722
2.2 The bank keeps my records accurately	3.086	0.610
2.3 Termination during a transaction does not happen in my Internet Banking	2.616	0.736
2.4 My Internet bank delivers the service accurately and at the promised time	2.976	0.600
2.5 My Internet bank website pages loads promptly and do not freeze once I enter my transaction information	2.729	0.716
3. Ease of Use	**3.037**	**0.651**
3.1 This site is user-friendly	3.064	0.653
3.2 Navigation in this site is very easy, hyperlinks and pages are logically laid out	2.973	0.667
3.3 It easy to understand which button should be clicked for the next step	3.079	0.634
4. Security/Privacy	**2.913**	**0.635**
4.1 The Internet bank website protects my privacy and transaction information	2.920	0.618
4.2 The Internet bank website is equipped with adequate security features	2.920	0.570
4.3 The Internet bank website has clear transaction safety policies	2.900	0.716
5. Efficiency	**2.767**	**0.686**
5.1 The Internet bank web site pages load very fast	2.780	0.675
5.2 Contacting the Internet bank website representatives is very fast	2.600	0.723
5.3 Login in the Internet bank website is very fast	2.920	0.660
6. Product/Service Portfolio	**2.917**	**0.620**
6.1 The Internet bank website provides wide a range of products and services that I need	2.920	0.617
6.2 All my service needs are included in the Internet bank website menu options	2.870	0.642
6.3 My Internet bank website provides most of service features that I need	2.960	0.601
7. Enjoyment	**2.753**	**0.729**
7.1 Visiting the Internet bank website is entertaining	2.700	0.752
7.2 I found visiting the Internet bank website enjoyable	2.710	0.751
7.3 I found visiting the Internet bank website pleasant	2.850	0.683
8. Competence	**2.923**	**0.593**
8.1 The bank's employee have the knowledge to answer my questions	2.931	0.616

| Constructs with the Corresponding Items	Mean	S.D
8.2 The employee properly handle any problem that arise	2.923	0.600
8.3 The employee comply with my requests	2.980	0.556
8.4 The Internet bank website responses to my queries/request are personalized	2.857	0.600
9. Relative Advantage	**2.840**	**0.701**
9.1 Using of The Internet banking website is safer and protects my private information more than visiting the bank branch	2.670	0.698
9.2 The cost of Internet banking transactions is lower than the bank branch	2.920	0.740
9.3 The internet bank website affords greater control for financial activities compared to doing so in the bank branch	2.930	0.666
10. Attitude	**3.223**	**0.610**
10.1 I think that using Internet bank website is good idea	3.280	0.616
10.2 I think that using Internet bank website would be a wise idea	3.190	0.627
10.3 In my opinion, it is desirable to use Internet banking website	3.200	0.587
11. Intention to Use	**3.238**	**0.597**
11.1 I would use Internet banking website for my banking needs rather than discontinue its use	3.263	0.584
11.2 My intentions are to continue using Internet banking website services rather than use any alternative means (traditional bank branch)	3.177	0.599
11.3 I am willing to use Internet banking websites for handling my banking transactions (transfer, payment, etc....) in the future	3.274	0.604
11.4 I intend to continue using Internet banking website service features since it is good	3.245	0.601
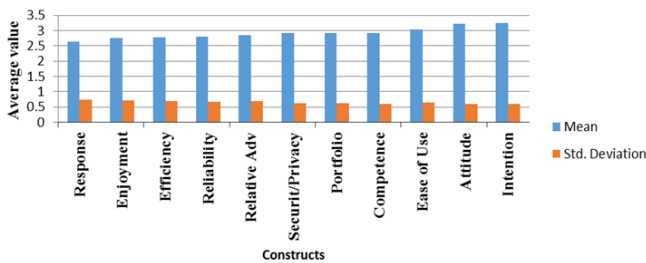
Figure 2: Mean and Standard Deviation

V. DISCUSSION AND RECOMMENDATIONS

In order to detect IBS quality weaknesses and strengths related to adoption of IBS for Malaysian users, the following discussion of the study results is presented in Table 2 for each service quality dimensions, and dependents variables are defined.

A. Weaknesses Dimensions

In this section, we discussed the relatively weaknesses dimensions (with mean rating less than 2.80), namely: response and contact, efficiency, reliability, and enjoyment. For response and contact dimension, Malaysian users have given the lowest rating for the quality of this dimension (No. 1, items: 1.1, 1.2, 1.3) as shown by the average of 2.64 and highest standard deviation of 0.75. This finding stands in line with the previous research [11, 19, 20]. High Standard Deviations (S.D) for all items in response and contact dimension indicate that while some Malaysian Internet Banking users unconcerned with this dimension, others worry about the website capability to respond to their enquires specifically in case of problem management so that could prevent them from fully adopting IBS. However, the reasons for that most of Malaysian Internet Banking websites do not offer online customer service representatives or "Live

Chatting" in order to fast contact the bank (No. 1.1: Mean = 2.76; S.D = 0.73).

The available means of communication with the bank is by calling the bank or sending an email. This is not efficient in term of the cost of making a call and late response time for the emails. Another reason is lack of guidance of bank's website in case of solving a transaction failure (No. 1.2, Mean = 2.61, highest standard deviation = 0.78). Moreover, some users lack confidence of the ability of the website to solves the problems facing the users immediately (No. 1.3: mean = 2.56; S.D = 0.73). All the previous weaknesses of response and contact dimension can be explained by lack of human face or life interaction between users and the bank as in bank's physical branch [8]. Also, this will indicates that some of Internet Banking users still visit physical branch to conduct a certain banking activities that are not easy to do through the bank website (e.g. solving problem).

In order to increase the performance of IBS adoption concerning website responsiveness and contact, IBS providers should develop improved and new models of Internet Banking services and products that fulfills needs, meet demands and expectation of Malaysian users. For example, banks' website developers should consider utilization of life web chat and/or 3D virtual environment to simulate life contact or face-to-face interaction similarly to the physical branch by deploying adequate capabilities to support clients in life-Internet chatting and 3D environment [23].

The recent study by [25] for IBS adoption in Malaysia stated that the efficiency dimension quality as a key element in building relationship between clients and their banks. However, this study reveals that Malaysian users have a lower rating for the quality of this dimension (table 2; No. 5; items: 5.1, 5.2, 5.3) as shown by the average (Mean = 2.77; S.D = 0.69). This result is consistent with previous studies [9] [25] which revealed efficiency as highly important for overall service quality as it has less impact on user's satisfaction. From our perspective, efficiency may be indirectly influenced by other factors that are not related to the performance of the website itself e.g. poor Internet connection that affects the speed of the website pages loading (item no. 5.1; Mean = 2.78; S.D = 0.68), and also the speed time to login to the website (item no. 5.3; Mean = 2.92; S.D = 0.66).

However, the poor Internet connectivity could be alleviated by offering high-speed Internet service plans by the Internet service providers. Another item measuring the efficiency dimension, i.e. "Contacting the Internet bank website representatives is very fast" in (No. 5.2) has the lowest mean rating (Mean = 2.6; S.D = 0.72) within the items dimensions' which indicate that while some users are satisfied with the expeditious contact with bank representatives, others are dissatisfied. Moreover, the result of this item can be explained in parallel with the result of item (no. 1.1, Mean = 2.76; S.D = 0.73) in contact and response dimension. Therefore, if the Internet Banking website offers online customer service representative, the users will get fast contact with the bank's representative as well.

Although in IS research enjoyment dimension was conceptualized as crucial factor in determining user's technology acceptance and use [24]. Malaysian Internet Banking users are in doubt with website enjoyment influence towards their adoption of IBS (No. 7; mean = 2.75; S.D = 0.73). Therefore, emotional and experiential value of the website to offer such kind of entertainment, enjoyment, and

pleasant may affect users' adoption of Internet Banking. This result supports the prior study by [5] that found the hedonic-oriented Internet Banking websites to be most significant dimension affects the users' adoption IBS in Malaysia. As mentioned earlier in this paper, developing new business model for IBS using 3D environment will definitely improves IBS adoption with regards to perceived enjoyment.

B. Strengths Dimensions

In this subsection, we discussed the strengths dimensions that obtained high ratings equal or more than 2.80 comparing to three dimensions discussed above. These dimensions are: reliability, ease of use, security/privacy, product / service portfolio, competence, and relative advantage. For the reliability dimension comprised from five items as shown by (Table 2; No. 2; items no. 2.1, 2.2, 2.3, 2.4, 2.5), the average mean is 2.8, and standard deviation 0.68. The interpretation of this result is that reliability dimension has a moderate effect for users' satisfaction of IBS quality which is in-line with study [19]. However, from the five items, only three items obtained low ratings (Items no.2.1; 2.3; 2.5), respondents surveyed had concerns about errors freeness, pages loading, and non-termination of the transaction during processing time. Advertising and graphics/multimedia richness can significantly lower the downloading speed. Consequently to overcome these problems, banks should make balance between multimedia richness and download speed.

Despite the above-mentioned concerns, big part of the respondents surveyed show relatively high rating of the dimension ease of use (No. 3; mean = 3.04; S.D = 0.65) in respect of user-friendly, web page navigation, and simplicity of using the website (items no: 3.1, 3.2, 3.3). To justify the result, this study consists of 42%, 39 % of the skilled respondents having more than one year, and more than five years respectively of experience in adopting IBS. Moreover, users' experience and age moderated effects on use behaviour which proved by Unified Theory of Acceptance and Use of Technology (UTAUT2) [24].

By giving a relatively high rating to security and privacy dimension (No. 4; Mean = 2.9, S.D = 2.64). Malaysian users have worries about transaction safety policies; and the privacy protection of their personal information from being disclosed to third parties or to be stolen by hackers (items no: 4.1; 4.2; 4.3). As showed by Unisys (2017), the biggest security challenges that faces organizations today is authorized user's identity verification to access the data (stealing of username, password etc.) [26]. Therefore, local and international banks in Malaysian market should organize educational programs to their clients to deal with emerging security risks, and displaying the latest security policies. Moreover, banks should consider developing new ways to increase the security measures (e.g. Multi-Factor Authentication, multi model biometrics types such as fingerprint concurrently with non-biometric models).

For products and service portfolio dimension (No. 6), also obtained relatively high rating less than three (Mean = 2.92; S.D = 0.62) in terms of the website capabilities to offer different types of banking services and products to their clients (items no: 6.1; 6.2; 6.3) by including more options for users to settle their payment transactions specifically with third-parties commercial companies. Similarly, the competence dimension rating is low (No. 8; Mean = 2.92; S.D = 0.60), may be that is due difficulties faced by clients in contacting and interacting with bank staff using only

traditional ways (e.g., phone, email), so that more improvement for developing user-friendly interface is needed. Additionally, improvement of security measures will reduce Malaysian users concerns and limit or eliminate their visits to traditional branches for comparatively safer access to their accounts information (No. 9; item no. 9.1).

Regarding the competence dimension (No. 8), also obtained relatively high rating less than three (mean = 2.9, S.D = 0.59) in terms of bank staff's ability to answer questions, handling problems, compliance and personalized with request (items no: 8.1; 8.2; 8.3, 8.4). Competence is measured by the customer interaction with the bank's customer service representatives by the means such as telephone, email, or live chat in the bank website. This results implies that high-level of competence in handling problems, complaints, and prompt response from the bank supporting staff will increase the adoption of IBS. Moreover, the development of new ways customer-staff interaction with the simulation of face-to- face interaction as in the physical branches by using 3D technology capabilities will also enhance the bank's staff competency.

Relative advantage dimension obtained a relatively high rating less than three (mean = 2.8, S.D = 0.70), two items concerning the cost and greater control of the transaction in comparison with physical bank branches (No. 9.2; 9.3) have obtained a high mean rating more than 2.9. This result implies that IBS providers should differentiate their IBS from the traditional branches by enhancing and increasing the relative advantage aspects of the Internet banking website.

Regardless the above aforementioned concerns, the respondents show higher level of attitude and intention to adopt IBS (No. 10; 11; Mean = 3.22; 3.24; S.D = 0.61, 0.60 respectively). This emphasizes the previous studies' findings by [6, 7, 27] that Internet Banking industry in Malaysia has high possibility for increasing users' adoption and growth in preserving existing clients and at the same time attracting new clients. As IBS quality is a key factor of the growth, Internet Banking service providers should strengthen the service quality of the dimensions measuring IBS as stated in this study. However, to achieve such quality, revaluation of the performance of these dimensions is needed to satisfy the needs, expectations, and demands of their clients. The aforementioned recommendations are elicited from respondents' perception of using IBS; consequently, implementation of these recommendations will produce higher interactive Internet Banking interface in providing top-level of IBS.

VI. CONCLUSION AND FUTURE WORKS

In summary, Malaysians users realize the merits and advantages of using IBS by giving high mean ratings for service quality dimensions: ease of use, competence, product/service portfolio, reliability, security/privacy, and relative advantage. However, other dimensions such as response and contact, efficiency, and enjoyment obtained relatively low mean ratings as indictors of users' behavioural perception towards using IBS. However, the findings of the study provide Malaysian Internet Banking with advanced guidelines to help develop improved strategies for enhanced IBS service both in short and long terms. In the short terms, urgent improvements are needed specifically for low rating dimensions: response and contact, efficiency, and enjoyment in order to increase overall service quality and IBS adoption

as well.

Due to the limited length of paper, the full results of instrument development stages such factor analysis, structural equation modelling analysis, and the effects moderating demographics characteristic such as race, age, education and income, will be investigated in the future papers. As this study is narrow focusing in Malaysian context in one state, the generalizability of study result will be extended and justified. Future research will be conducted in more different states in Malaysia, other culturally different countries, and multi-countries comparison by applying the same research model and instrument developed by this study.

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