



The Impact of E-Banking Service Quality on Customer Loyalty: Mediated by Customer Satisfaction

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ABSTRACT

This study investigates the impact of e-banking service quality on customer loyalty mediated by customer satisfaction in the East Coast Region, Malaysia. This study intended to address a critical gap in understanding the evolving dynamics of customer loyalty as well as satisfaction within the banking sector. Through a cross-sectional quantitative approach and random sampling of 182 online banking users in this area. The research employs partial least square structural equation modelling (PLS-SEM) to analyse the data. The results reveal a significant correlation between online banking service quality, customer satisfaction, and loyalty, with customer satisfaction identified as a mediating factor in this relationship. By applying the cognitive-motivation-relational (CMR) theory, the study not only contributes to theoretical frameworks but also offers practical insights for the banking industry. This research provides valuable implications for future strategies, improving service delivery and responsiveness to the evolving needs of customers. Thus, this study enhanced the overall understanding of online banking dynamics in rural settings and offering a foundation for continued advancements in the field.

Keywords:

E-banking service quality; E-banking; CMR theory; Customer satisfaction; Customer loyalty

1. Introduction

In the era of Banking 5.0, the use of technology has changed the pattern of customer management from traditional to online which is increasingly efficient and effective in the service industry. The increasing digitalization has led to the gradual integration of e-banking services into the modern marketplace, catering to customer needs.

A wider utilization of e-banking services such as internet banking (e.g., cardless ATM and smartphone banking) and e-banking cards with microchip sensors (e.g., master, credit, and visa cards) by many users encourages banks to develop and promote e-banking services to the users [1].

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E-banking is also better known as electronic banking, online banking, and internet banking used in other literature [2]. Singh [3] defined e-banking as the electronic delivery of banking services to clients, whether at their business premises or residential locations. When change began to blow through the banking industry, most, if not all, accepted the use of e-banking for transactions [4]. This technological leap has not only levelled the playing field in the banking sector but has also generated significant value for both financial institutions and their clients, enabling the latter to engage in banking transactions digitally with the bank without the need for human contact and physically visit the bank [5].

Fundamentally, e-banking is a where customers can used online banking for transactions account inquiries, bank statements, bill payment, and fund transfer [6]. When e-banking was introduced, it facilitated the daily business of customers because it can interact with banks regardless of time and place which increased online banking users in Malaysia, especially during the COVID-19 pandemic from 30.8 million users in January 2020 to 33.6 million [7]. Due to e-banking, the financial services industry is changing, becoming more innovative, expanding, and becoming more competitive both domestically and internationally [8,9]. Thus, the main purpose of the study was conducted in the rural areas of the state in East Coast Malaysia to study the effect of the E-Banking Service Quality (EBSQ) dimensions on customer loyalty. This study also suggests customer satisfaction in e-banking as a mediates between the dimensions of E-Banking Service Quality (EBSQ) and customer loyalty. Therefore, when the consumer rate in the e-banking system is increasing causing banks run into problems competition as each bank provides the same services and makes it difficult for them to differentiate services. The main strategy for differentiating bank services is in terms of high-quality e-banking services to gain a competitive advantage in this platform [10]. Besides, cognitive-motivation-relational (CMR) theory was applied in this study to correlate the E-Banking Service Quality (EBSQ) dimension with customer loyalty.

There are various studies conducted on customer perceptions of the quality of physical banking and e-banking services using the SERVQUAL [11,12]. However, little research on the effect of e-banking using EBSQ dimensions such as privacy and security, reliability, web design, and customer service and support on customer behaviour such as customer loyalty and customer satisfaction [6]. Also, banks failed to deliver a more diverse portfolio of competitive services and redesign services in meeting customer needs [13]. There is an insufficient number of studies focusing on the impact of service quality on customer satisfaction and loyalty in the private banking sector and the government banking sector that needs to be scrutinized to fill this gap [13].

Hence, this study might open opportunities for the banking industry to be more concerned about the safety and privacy of their customers than to be exposed to any hackers. This opens awareness to the banking industry to take action more carefully and be able to provide technology-based service to customers with more stringent security features. Through technology, they can get information on the current needs of their customers to deliver better services in the future to ensure customer loyalty to them. Thus, the importance of the use of technology in the banking industry has enabled them to better interact with customers and be able to enjoy the benefit of customer relationship management completely obvious [14]. Additionally, bank management can make changes to differentiate their services from competitors because it can identify perceptions or dimensions of service quality based on technology in more detail indirectly can increase the satisfaction and loyalty of their customers from time to time [15].

Hence, in this study, four research objectives are intended to be investigate:

- i. To examine the effect of privacy and security, web design, reliability, and customer service and support on customer loyalty
- ii. To examine the effect of privacy and security, web design, reliability, and customer service and support on customer satisfaction
- iii. To examine the effect of customer satisfaction on customer loyalty
- iv. To examine the role of customer satisfaction in mediating the effects of the privacy and security, web design, reliability, and customer service and support on customer loyalty.

Apart from this, this research also contributes to theoretical and academic implications that can provide a deeper understanding of the impact of e-banking service quality on customer loyalty is accompanied by interesting research results from this study.

2. Literature review

2.1 Customer Loyalty

Customer loyalty can be explained through attitudes or behaviours so that customers spread word of mouth to others that have a positive impact in terms of profit to the organization [16]. Behavioural loyalty is the behaviour of customers who repurchase because they love the product or service provided by the organization but this does not fully show loyalty because the measurement of customer loyalty is relatively objective. Moreover, attitude loyalty reflects the emotional and psychological desire of the customer to repurchase and recommend to others. Loyalty to this attitude is driven by a strong customer stand to protect and be willing to pay more for a product or service continuously in the future but shifting behaviour may occur due to situational and marketing efforts [17]. But there are different approaches in measuring customer loyalty which are behavioural measurement, attitude measurement, and composite measurement. Islam [13] states that the only measure of customer retention is based on the behaviour of customers who make repeated purchases. This approach has drawn criticism because Haron [11] argue that customer behaviour does not lead to customer loyalty with a particular provider. Therefore, the approach to measuring customer loyalty through customer attitudes is more relevant to reflect the emotional attachment and psychological aspects of loyalty [11]. However, this second approach has also received criticism by [18]. The next approach states that these three approaches such as behavioural measurement, attitude measurement, and composite measurement are combined [19]. This is because there are contemporary researchers more likely to support a loyalty framework that uses aspects of behaviour and attitude. Therefore, in this research, customer loyalty is defined as the extent to which customers reflect behaviour on repeated purchases from service providers and have a positive attitude.

2.2 E-Banking Service Quality (EBSQ)

Nowadays, almost all banks across the country offer services based on technology or e-banking which is used as a basic strategy to be more competitive to provide superior quality of service in this platform [2]. This is because the banking industry is becoming more competitive as each bank provides the same services which makes it difficult for them to differentiate their services. The "EBSQ" dimension has gained attention in service marketing over the past few decades. E-banking service quality is used by the services industry to make customer response on the quality of banking services delivered through the internet that get attention from marketing academics and global level practitioners on this concept [20,21]. Banking offers e-banking services that can be accessed anytime and anywhere. Localization is defined as banks can track customer locations such as information on

the availability of ATMs [2]. Hence, the dimensions applied to measure service quality in the context of offline banking or the context of generic service delivery are not suitable for measuring service quality in the context of e-banking. The SERVQUAL dimension is not relevant for use in the context of online banking. The application of the ESBQ concept is more suitable for measuring customer perceptions that interact with technology rather than with service personnel. The quality of web services (portals) becomes the link between customers and banks in the context of e-banking supported by several studies conducted by researchers [17,21]. Researchers have shown that privacy and security, web design, reliability, and customer service and support can maintain customer loyalty to e-banking services.

2.3 Customer Satisfaction

Generally, customer satisfaction is based on customer evaluation. Good customer perception of products and services can be measured as customer satisfaction. However, different customers will have different experiences and levels of satisfaction despite using the same services and products [26]. According to Malik and Ahsan [27], acknowledges that customer satisfaction leads to customer loyalty and repetitive purchase decisions while Amegbe and Osakwe [28] states that customer satisfaction is closely related to customer perceptions performing a comparison of expectations before and after purchasing or using a particular service. Thus, there is a related relationship between customer perceptions and expectations. Furthermore, Asad *et al.*, [29] state that customer satisfaction results are based on customer evaluations. Customer satisfaction occurs as customer behaviour when the services and products meet the expectations and needs of the customers after using them. This shows that customer satisfaction affects the quality of service where the higher the quality of service, the higher the customer satisfaction. However, Noor and Mohammed Ali [30] argue that customer satisfaction can be achieved through personal experience gained based on the customer's actual expectations and perceptions. This is because there are studies that prove that customer satisfaction with products and services depends on the customer experience from previous purchases. Satisfaction will influence customer behaviours after making a purchase such as praise, complaining, loyalty, attitude, and brand change [30]. However, there are also several dimensions of customer satisfaction in the service industry which are satisfactory interactions with personnel, satisfaction with core services, and satisfaction with the organization [31]. The quality of the E-banking offerings is the key determinant of customer satisfaction that encourages the client to stick with the banks and maintain long-term and fruitful relationships [32]. So, customer satisfaction and loyalty are positively correlated with service quality parameters [8,9].

2.4 Theoretical Support

The cognitive-motivation-relational (CMR) theory introduced by Lazarus [33] is applied in this study which is the relationship between EBSQ and customer response such as customer satisfaction and customer loyalty. This theory is more suitable for explaining the relationship between cognitive assessment and emotional response. Cognitive exists when individuals begin to make assessments such as purpose, beliefs that affect emotional responses to signals in the environment. Additionally, CMR theory also shows a relationship between service quality and customer response. This is because in this study it is shown that EBSQ is a cognitive assessment while customer loyalty and satisfaction is an emotional response. Therefore, customers will evaluate cognitively based on the e-banking environment which consists of EBSQ dimensions such as privacy and security, reliability, web

design, and customer service and support. Once the assessment is made will produce a behavioural response that is customer satisfaction and loyalty to the e-banking environment.

2.5 Influence EBSQ on Customer Loyalty

The first dimension of EBSQ is security and privacy, which refers to the level of customer trust in the websites offered by the organization that has high-security features from intrusion and personal information shared through a protected platform [30,34]. As customer management is changing from face-to-face services to technology services in the banking context that has raised concerns about customer security problems when conducting financial transactions using banking websites such as online banking [12]. The ability of banking to provide services using technology that can ensure the security of customer information is maintained further encourages loyal customers and trust them [1]. The bank's ability to provide a clear privacy and security policy will result in good consumer response to service supervisors [6]. Thus, this research forged the first hypothesis:

H1. Privacy and Security positively affect customer loyalty.

The second dimension of EBSQ is a web design, which consists of detailed information elements, transaction processing, and navigation which are important to users especially when interacting with e-banking websites [21]. Banking provides e-banking services equipped with in-depth information that facilitates their customers to use the website and enhances interaction with their customers. Such a website design will increase the trust and confidence of the customers in the e-commerce platform and it will encourage the customers to be more loyal to the online service providers [35,36]. Similarly, the interactive e-banking website interface will increase customer loyalty and willingness to use online banking services more frequently [2]. Therefore, this leads to the second hypothesis:

H2. Web design positively affects customer loyalty.

The third dimension of EBSQ is reliability, which refers to the ability of service providers to provide the services offered accurately and consistently [37]. In the context of e-banking is the ability to offer quality services to customers, the availability of services without errors, accuracy in providing promised services that encourage customers to remain loyal to their services. Reliability is also one of the important aspects that influence good customer response against e-banking services. Furthermore, timely transaction processing in the system is a critical success factor of e-banking services in retaining customers towards these services [12,37,38]. Henceforth, the next generation of hypothesis is as follows:

H3. Reliability positively affects customer loyalty.

The last dimension of EBSQ is customer service and support which refers to the services provided to customers to solve the problems they face and respond promptly to customer complaints [39]. In the context of e-banking, customers need support from skilled or professional parties if they experience complications when using e-banking services especially when service supervisors update their technology and website, customers are more likely to seek technical support from e-banking providers [1]. If the online customer support team can provide quick solutions to customer queries, carry out responsibilities easily and transparently, it will influence customers to trust the service

provider [2,39]. As a result, customers will remain loyal to e-banking and spread positive news about the services they used [30]. Thus, the proposed hypothesis is as seen below:

H4. Customer service and support positively affect customer loyalty.

2.6 Influence EBSQ on Customer Satisfaction

EBSQ relationships and customer satisfaction have a great debate [6]. However, according to Foroughi *et al.*, [40], a study conducted on the quality of US banking services shows a high quality of EBSQ towards customer satisfaction. The first dimension of EBSQ is privacy and security. There are studies on e-commerce that prove that privacy and security are important aspects in determining customer satisfaction with the services offered [1,6]. Dimensions play an important role because of privacy and security in determining the success of banking. Furthermore, experienced customers using IT-based systems such as e-banking are more concerned with the high level of security and encourage their satisfaction to use banking services more frequently [41]. Therefore, the following hypothesis is formulated:

H5. Privacy and security positively affect customer satisfaction.

There are various conflicting views and opinions from researchers based on the findings, as some researchers argue that EBSQ is an antecedent of customer satisfaction. According to Tabrani *et al.*, [17], shows that customer satisfaction is easier to achieve service can provide high-quality EBSQ. Yet various attributes give different perspectives on customer thinking. This proves the interrelationship between website design and customer satisfaction. Hence, the hypothesis is as follows:

H6. Web design positively affects customer satisfaction.

The third dimension is reliability is how easily a service can be accessed quickly. In terms of services, reliability is a service that can be easily and smoothly accessed through telecommunications, reduce waiting times, and service facilities that can be used in any situation. Teeroovengadum [42], states that reliability in banking services positively leads to customer satisfaction. According to Shayestehfar and Yazdani [43], shows that reliability in terms of accessibility is the highest value indicator to measure the quality of banking services in the Iran context. The results of a study conducted by Khamis and Ab Rashid [38], reported that customers are more interested in banks that can provide and offer e-banking that is easily accessible in Tanzania. Islam [13], also shows that reliability that can be easily used in business has a strong appeal and influence to attract new customers and retain existing customers. Next, the following hypotheses are presented:

H7. Reliability positively affects customer satisfaction.

The last dimension of EBSQ is customer service and support which is the response to the customer through a call centre and the willingness of the organization in assisting the customer and the ability to provide a quick response and it also involves the punctuality of the service [6]. In the banking context, customer satisfaction in banks is directly influenced by customer service and is the main element in the overall satisfaction of Indian banking service [44-46]. However, there is some evidence to show that banking in the public sector is a source of customer dissatisfaction because it is not able

to provide services immediately and does not have in-depth knowledge of customer inquiries [47]. The following hypothesis is therefore proposed:

H8. Customer service and support positively affect customer satisfaction.

2.7 Mediating Role of Customer Satisfaction

Customer satisfaction is a factor that needs to be emphasized and positively associated with customer loyalty. There are studies conducted by Haron *et al.*, [11], in Islamic banks and conventional customer loyalty has a great impact on customer satisfaction. A study conducted by Vetrivel *et al.*, [46] on customer service in banking shows the indirect effect of service on customer loyalty intentions through customer satisfaction as mediated. Teeroovengadam [42], shows that the relationship between loyalty and customer satisfaction is interrelated. When satisfied customers will encourage them to use the service more often because customers are satisfied with the services provided to meet the standards, they will be more likely to be loyal to the organization and committed when making the purchase decision. Teeroovengadam [42], also supports customer satisfaction being the main foundation of customer loyalty. Also, the objective of an organization is to achieve customer satisfaction with the services offered which can be seen from the tourism context that shows customer satisfaction leads to customer loyalty [48]. Customer satisfaction with e-banking encourages customers to use many services so that it tends to high customer loyalty [49]. There are studies conducted by researchers in the context of the literature that shows the strong relationship between customer satisfaction and loyalty but in the banking context, this relationship is rarely measured. Thus, the hypotheses of this study are formulated as follows:

H9. Customer satisfaction positively affects customer loyalty.

H10. Customer satisfaction mediates the effect of privacy and security on customer loyalty.

H11. Customer satisfaction mediates the effect of web design on customer loyalty.

H12. Customer satisfaction mediates the effects of reliability on customer loyalty.

H13. Customer satisfaction mediates the effects of customer service and support on customer loyalty.

3. Methodology

The minimum sample size was 138 determined using G-Power analysis and a total of 182 responses was received. Also, the cross-sectional study uses a survey methodology to achieve its research objectives. The questionnaires of this study is adapted from several articles that are suitable to this study [1,6].

The data analysis technique used for this study is Partial Structural Equation Modelling (PLS-SEM) with SMART PLS 3.2.3. This method is widely used in research because it is more interesting in estimating complex models without imposing distributional assumptions on the data itself. Then, PLS-SEM is also considered as a causal-predictive approach for structural equation modelling in which it reiterates the forecasting of a statistical model that is estimated to be able to provide a causal explanation [50]. This method is more widely used in research because of its ease in estimating complex models with the inclusion of many other constructs, variable items, and structural modelling paths without assumptions of distributions applied to data [10]. Furthermore, the PLS-SEM approach is also suitable for use in small sample size conditions, many constructs, and a large number of items as a feature of the PLS-SEM algorithm in SmartPLS 3.2.3 computes partial regression relationship

measurements and structural models separately via squared regression. It is also occurring when there is abnormal form of data that results in peak and skewed distributions that are present when the bootstrap process is initiated in SmartPLS 3.2.3 However, this can be easily solved with a bias-corrected and accelerated bootstrapping (BCa) process that can regulate the confidence interval from the skewed distribution. The statistical capabilities and benefits in PLS-SEM are so great that it gives importance to researchers to measure significant relationships and the higher the statistical accuracy, the higher the reliability [50,51].

4. Results

4.1 Demographic Profile

Table 1 summarises the profiles of the respondents showing that 50.54 per cent (92 respondent) of the respondents were male, 49.45 per cent (90 respondent) female and the majority are between the ages of 18 and 24 (96 respondent). In terms of education level, more than half of the respondent highest education level are bachelor's degree with 42.85 percent (78 respondent). As for profession highest number are students with 48.35 percent (88 respondent). Next, for type of banking sector, majority of the respondent are using Islamic commercial bank with 58.24 percent (106 respondent). Lastly, for monthly income, most of the respondent income are less than RM 1000 with 48.35 percent (88 respondent).

Table 1

Dimension of EBSQ

Dimension	Definition	References
Privacy and Security	System designed to ensure that users' personal information is securely protected such as business and personal data, voice conversation and others used through various technologies developed to store, create, use, and convert information into access not safe to use.	[22]
Web Design	The process of planning, conceptualizing and organizing content online. Designing a website goes beyond aesthetics to encompass the entire functionality of the website.	[23]
Reliability	The ability of the organization in providing services as promised is equipped with service accuracy. The accuracy and perfection of the service are considered to be the main feature of reliable service.	[24]
Customer Service and Support	Interact with users using chat channels such as phones, website chat apps, and social media messaging to provide technical assistance and focus on the customer experience.	[25]

Table 2

Respondent Profile

Profile	N	Percentage (%)
Gender		
Male	92	50.54
Female	90	49.45
Age		
18-24 years	96	52.74
25-34 years	45	24.73
35-44 years	18	9.89
45 and above	23	12.63
Education level		
Bachelor's degree	78	42.85
Diploma/ matriculation	34	18.68
Master's degree	5	2.74

PhD	3	1.64
SPM/STPM	62	34.06
Profession		
Government sector	33	18.13
Private sector	33	18.13
Retired	4	2.19
Self- employment	17	9.34
Student	88	48.35
Unemployment	7	3.84
Type of banking sector		
Conventional commercial bank	62	34.06
Development financial institutions (DFI)	4	2.19
Investment bank	10	5.49
Islamic commercial bank	106	58.24
Monthly Income		
Less than RM1,000	88	48.35
RM1,001- RM3,000	54	29.67
RM10,001- RM20,000	5	2.74
RM3,001- RM5,000	21	11.53
RM5,001- RM10,000	14	7.69

4.2 Findings

Data for this study were analysed using PLS-SEM. Before the data are analysed, first the collinearity of the construct is tested. According to Hair *et al.*, [52], it is vital to ensure that collinearity between constructs is not an issue before. In this method all the variables will be regressed against a common variable and if the $VIF \leq 3.3$ then there is no bias from the single source data. The analysis yielded VIF less than 3.3 thus single source bias is not a serious issue with our data (refer Table 3).

Table 3
 Full Collinearity Results

	Customer Satisfaction	Loyalty
Customer Satisfaction		2.703
Customer Service	2.006	2.391
Loyalty		
Privacy and Security	1.478	1.524
Reliability	2.143	2.353
Web Design	1.809	1.894

4.3 Measurement Model

For the measurement model we assessed the loadings, Cronbach Alpha (α), average variance extracted (AVE), the composite reliability (CR) and discriminant validity. The values of loadings should be ≥ 0.6 , the AVE should be ≥ 0.5 and the CR should be ≥ 0.7 . As shown in Table 4, Cronbach's Alpha value of 0.7 or higher suggests strong internal consistency of the instruments [65], the AVEs are all higher than 0.5 and the CRs are all higher than 0.7. The loadings were also acceptable with only one loading less than 0.6, which is loading for customer satisfaction (CS5) [53]. Loading less than threshold value of 0.6 are removed.

Table 4
 Convergent validity of measurement model

Variable	Item	Loading	α	CR	AVE
Privacy and Security	PS1	0.796	0.856	0.902	0.698
	PS2	0.854			
	PS3	0.868			
	PS4	0.823			
Web Design	WD1	0.849	0.828	0.886	0.661
	WD2	0.842			
	WD3	0.807			
	WD4	0.750			
Reliability	REL1	0.777	0.755	0.836	0.507
	REL2	0.755			
	REL3	0.629			
	REL4	0.710			
	REL5	0.678			
Customer Service	CS1	0.752	0.804	0.865	0.564
	CS2	0.798			
	CS3	0.805			
	CS4	0.787			
	CS5	0.594			
Customer Satisfaction	SAT1	0.833	0.883	0.915	0.682
	SAT2	0.868			
	SAT3	0.882			
	SAT4	0.735			
	SAT5	0.804			
Loyalty	LOY1	0.797	0.894	0.919	0.653
	LOY2	0.824			
	LOY3	0.807			
	LOY4	0.797			
	LOY5	0.827			
	LOY6	0.795			

* Note: PS=Privacy and security, WD=Web Design, REL=Reliability, CS=Customer Service, SAT=Customer Satisfaction, LOY=Loyalty

Lastly, discriminant validity was assessed using the HTMT criterion suggested by Henseler *et al.*, [54] and updated by Franke and Sarstedt [55]. The HTMT values should be ≤ 0.85 the stricter criterion and the more lenient criterion is it should be ≤ 0.90 . Table 3 shows that all HTMT values between constructs are below 0.85, except for values between Reliability and Customer Service. However, in a more liberal criterion (HTMT.90), the HTMT value above 0.85 but below 0.90 is acceptable [54]. So, according to HTMT.85 and HTMT.90 criteria, discriminant validity has been established (Refer Table 5).

Table 5
 HTMT result

	Customer Satisfaction	Customer Service	Loyalty	Privacy and Security	Reliability	Web Design
Customer Satisfaction						
Customer Service	0.840					
Loyalty	0.832	0.729				
Privacy and Security	0.554	0.432	0.648			
Reliability	0.844	0.873	0.788	0.522		
Web Design	0.699	0.638	0.637	0.646	0.697	

4.4 Structural Measurement Model

Following the suggestions of Hair *et al.*, [56] for structural model analysis, the path coefficients, the standard errors, t-values and p-values are reported for the structural model using a 5,000-sample re-sample bootstrapping procedure [57]. Table 5 shows the summary of the criteria used to test the hypotheses developed (Refer Figure 1).

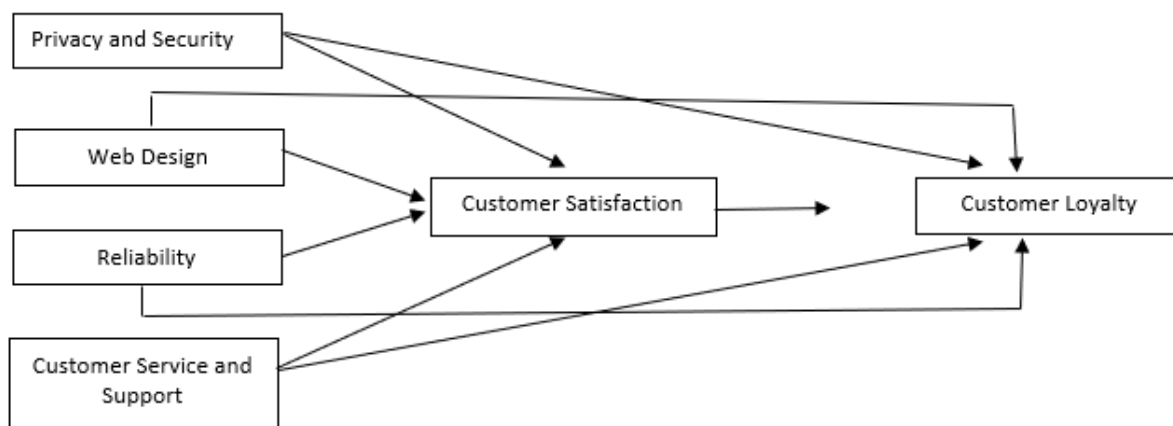


Fig. 1. Research Framework

The following Table 5 present the result of direct hypotheses. According to Chin [58], the t-value should be above 1.645 and P-value should be less than 0.05 at 95% confident interval. As in Table 5, the result supported six hypotheses out of nine. Three hypotheses which are not significant are the relationship between web design and customer service on loyalty and for the relationship between customer service and customer satisfaction.

Next, coefficient of determination (R Square) is tested. It is the variance explained in the endogenous latent variable by exogenous latent variables. According to Cohen, as reported in Tehseen *et al.*, [59], suggested that R-square values of 0.26, 0.13, and 0.02 should be considered as substantial, moderate, and weak, respectively [60]. Therefore, as presented in Table 5 the R-square value of the endogenous construct can be said to be substantial because it is more than 0.26, as suggested.

Apart from examining the degree to which the model explained (R²) variance, Hair and Alamer [61] recommended that Stone-Geisser's Q² should be used to examine the predictive relevance of a model [62]. It is evaluated as having predictive relevance, if the Q² value for the endogenous latent construct is greater than 0 [61]. Table 6 illustrated that, there is substantial evidence of predictive relevance, because the value of the Q² exceeds 0 in line with Sarstedt *et al.*, [50].

Table 6
 Bootstrapping Evaluation – Direct Effect

Hypothesis	β	T	Decision
H1: Privacy and Security -> Loyalty	0.248	3.560***	Accepted
H2: Web Design -> Loyalty	0.010	0.136	Rejected
H3: Reliability -> Loyalty	0.180	2.388***	Accepted
H4: Customer Service -> Loyalty	0.115	1.248	Rejected
H5: Privacy and Security -> Customer Satisfaction	0.131	1.928*	Accepted
H6: Web Design -> Customer Satisfaction	0.178	2.291***	Accepted
H7: Reliability -> Customer Satisfaction	0.180	2.388***	Accepted
H8: Customer Service -> Customer Satisfaction	0.115	1.248	Rejected
H9: Customer Satisfaction -> Loyalty	0.408	5.272***	Accepted

* **Note:** Critical t-values: *1.645 (significance level = 10%); and ***2.57 (significance level = 1%); (R Square) = 0.638 (Loyalty), 0.630 (Satisfaction)

4.3 Mediation Analysis

Mediation test is conducted to discover if a mediator construct can significantly carry the ability of an independent variable to a dependent variable [57]. To test the mediation hypotheses, we followed the suggestions of Preacher and Hayes [63] by bootstrapping the indirect effect. If the confidence interval does not straddle a 0 then we can conclude that there is significant mediation.

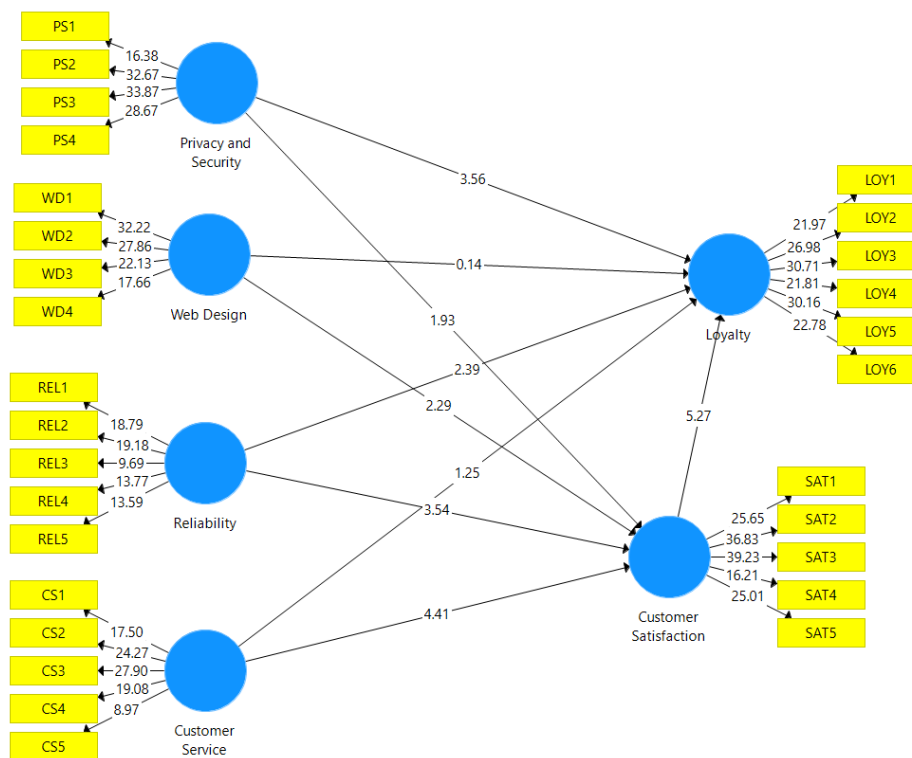


Fig. 2. Bootstrapping for structural model – Direct & Indirect

As shown in Table 7, Privacy and Security -> Customer Satisfaction -> Loyalty ($\beta = 0.053$, T-Value=1.784*), Web Design -> Customer Satisfaction -> Loyalty ($\beta = 0.073$, T-Value=2.232***), Reliability -> Customer Satisfaction -> Loyalty ($\beta = 0.114$, T-Value=3.356***) and Customer Service -> Customer Satisfaction -> Loyalty ($\beta = 0.154$, T-Value=2.880**) was all significant. The confidence intervals bias corrected 95% also did not show any intervals straddling a 0 thus confirming our findings. Thus, H10, H11, H12 and H13 were also supported.

Table 7
 Predictive Relevant Results

	SSO	SSE	Q ² (=1-SSE/SSO)
Customer Satisfaction	910	441.187	0.515
Customer Service	910	588.418	0.353
Loyalty	1092	578.268	0.47
Privacy and Security	728	382.764	0.474
Reliability	910	651.387	0.284
Web Design	728	418.561	0.425

Table 8
 Bootstrapping Evaluation – Indirect Effect

Hypotheses	Std Beta	Std Error	t-values	BCI LL	BCI UL	Decision
H10: Privacy and Security -> Customer Satisfaction -> Loyalty	0.053	0.03	1.784*	-	0.115	Mediate
H11: Web Design -> Customer Satisfaction -> Loyalty	0.073	0.033	2.232***	0.013	0.144	Mediate
H12: Reliability -> Customer Satisfaction -> Loyalty	0.114	0.034	3.356***	0.044	0.177	Mediate
H13: Customer Service -> Customer Satisfaction -> Loyalty	0.154	0.053	2.880**	0.064	0.274	Mediate

* Note: Critical t-values: *1.65 (significance level = 10%); and ***2.57 (significance level = 1%); 95% confidence interval with a bootstrapping of 5,000

5. Discussion

The results shown in the previous chapter validate the conceptualization of e-banking service quality which has four elements as Privacy and Security, Web Design, Reliability, and Customer Service and Support. This element is very important in measuring customer relationships with service providers such as Automated Teller Machine (ATMs) that do not involve human interaction. E-banking services will reach a level of quality when banks provide services according to the needs and expectations of their customers. Therefore, the bank needs to be sensitive to the changing needs of customers who are constantly changing from time to time. Quality services can achieve maximum customer satisfaction and based on the experience of using the service will drive customer loyalty. It will help banks to stay in their industry in the long run because their business is highly dependent on customer satisfaction with the quality of services offered, without which their customers cannot last long.

Interestingly, H1 on the relationship between privacy and security to customer loyalty shows supported results. This proves that privacy and security can directly increase customer loyalty when using e-banking. It also shows that customers feel safer to make transactions using e-banking websites, especially through websites or Automated Teller Machine (ATMs) when customers' personal information or data is always kept confidential by each bank department so as not to be tampered with by all hackers. It can be seen, customers are more likely to remain loyal when the bank improves security in terms of browser protection policy, ensuring strong customer passwords when logging in to their websites. It is also a strong security measure taken by the bank at the same time being able to meet the requirements and regulations in protecting the safety of customers. Besides, it also causes customers to trust more and use e-banking applications or websites without any doubt about the security of their data which gives them a good experience while using e-banking directly customer loyalty is increasing and the bank also benefits.

In contrast, in H2 testing the relationship between web design and customer loyalty showed rejected. This proves that e-banking websites are not updated regularly causing customers to be

disloyal to this service. According to Alkouli [64], that explains an e-banking website that is not updated regularly causes the website to be slow and difficult to use, which will affect customer loyalty and start switching to other banking services. It also said that if a website is used that has distracting, confusing design features it will cause customers to get frustrated with banks that are unable to provide the desired operations. Therefore, customers only access websites that are more suitable according to their needs. It is also supported by previous studies by Haq and Awan [1], which that explains the relationship between web design and customer loyalty is not significant because customers pay less attention to website design by busywork. Web design does not affect customer loyalty.

Furthermore, H3 shows that the relationship between reliability and customer loyalty is supported. The basic element of quality service is reliability which significantly affects customer loyalty to the banking industry in the East Coast Malaysia. The key feature of a reliable service is in terms of the ability to deliver a promised service and completeness of service delivery to customers regardless of time. Based on this study, customers in East Coast Malaysia prefer to use Islamic commercial banks because they believe more in the services offered. When customers start believing in the quality of e-banking services, they are more likely to be loyal and recommend the service to their family and colleague. In short, these results emphasize the need for banks in East Coast Malaysia to enhance and improve their existing services to focus on customer loyalty to directly attract new customers. Banking in East Coast Malaysia should focus on direct services such as ATMs, convenient operating hours, transaction speeds that make e-banking the main choice of customers.

Then, H4 confirmed the relationship between customer service and support on customer loyalty is not supported. Customers are more likely to be loyal to e-banking service quality when customer service can help customers quickly. In other words, it has to do with how the bank responds to customers through their staff assigned as customer service. Efficient and skilled customer service is the main factor in increasing customer loyalty. Customer loyalty exists when they have a good experience using customer service in banking that has extensive knowledge of customer inquiries that can operate for 24 hours a day.

Now, H5 that tests the relationship between privacy and security on customer satisfaction is supported as the previous study by Haq and Awan [1] is also supported. Banks can achieve customer satisfaction directly if they can provide e-banking services that meet customer expectations and desires such as services through e-banking websites can be trusted because every transaction done online requires a strong enough system to protect their personal information. The website or e-banking application provided has restrictions on access or disclosure of information only to authorized users and unauthorized users will be prevented from accessing the website. Each customer's personal information is guaranteed that such information is shared with certain parties with authority only. To increase the confidentiality of customers' data when using e-banking, through authentication methods such as user ID and passwords that identify users that increase customer satisfaction because all statements, transaction details, and payments can be done securely that meet their expectations. Customers are also more concerned about their confidentiality being protected from malware, spyware, and spam.

Next, H6 explains the relationship between web design and customer satisfaction are supported. It shows that the layout of an e-banking website that is organized and has interactive features leads to customer satisfaction. This is because the results of this study found that students are more interested in e-banking websites that have interactive features such as clear graphics compared to the elderly. This means that a well-designed internet banking website can help achieve a superior level of customer satisfaction.

H7 shows the relationship between reliability and customer satisfaction is supported. This study shows that customers are more interested and attracted to e-banking services that are easily accessible anytime and anywhere. This can be seen through the study conducted by Shayestehfar and Yazdani [43], which also got the same results in terms of reliability that is easily accessible got the highest indicator value in the context of Iran but this study focuses more on the context of East Coast Malaysia also showed the same results. The majority of e-banking users are 18-24 years old who are those who regularly use e-banking website platforms are very concerned with the reliability dimension, specially making payments or transactions online quickly and can reduce waiting times. When customers have a good perception of the quality of e-banking services that can deliver error-free leads to customer satisfaction. This is because, how to achieve customer satisfaction must start with a good perception of the services provided.

The results of H8 show that customer service and support with customer satisfaction is not supported. E-banking services that meet the needs and expectations of customers can increase customer satisfaction. However, this is not happening in this study, showing that customers are less sensitive on bank employees responsive.

Moreover, the result H9 found that customer satisfaction has a very strong positive relationship with customer loyalty. In general, when a customer uses a service often the purpose of the customer is to get maximum satisfaction. The bank needs to plan and anticipate the customer's needs in advance so that the bank can provide the best service to determine the suitable action to meet the customer's needs. It increases customer loyalty towards them in the long run. Satisfied customers will use the same service regularly and when the customer is satisfied it will drive customer loyalty and commitment to the service. The foundation for cultivating customer loyalty is to start on customer satisfaction because the results of this study explain that loyal customers are significant will enhance a positive experience. Thus, banks need to continuously strengthen relationships between customers to achieve a superior level of customer loyalty.

H10 confirmed customer satisfaction has a mediating effect on the relationship between privacy and security and customer loyalty is supported. In other words, customer loyalty is influenced by privacy and security which is indirectly through customer satisfaction and it shows that high-quality e-banking service is high in terms of strong customer security and safe when used causing the service provided to meet expectations and provide a good experience to customers is associated with customer loyalty. This is because the foundation of customer loyalty results through customer satisfaction. Therefore, banks must constantly be improving the quality of their services in terms of consumer security to attain customer satisfaction indirectly increase customer satisfaction.

H11 shows customer satisfaction has a mediating effect on the relationship between web design and customer loyalty shows a positive relationship. Therefore, e-banking websites need to have a more attractive layout to achieve customer loyalty indirectly customer satisfaction needs to be achieved. In short, customer loyalty is influenced by web design and indirectly through customer satisfaction.

Then, H12 shows customer satisfaction has a mediating effect on the relationship between reliability and customer loyalty are highly significant through statistical testing. This explains that customer loyalty is affected by reliability and indirectly through customer satisfaction. If the bank can meet the needs and desires of customers such as want e-banking to deliver error-free services, providing accurate information will guarantee customer satisfaction which is considered as a mediating effect to customer loyalty.

Lastly, H13 shows that the test results for customer satisfaction have a mediating effect on the relationship between customer service and support, and customer loyalty is accepted. These paths explain that loyalty is affected by customer service and support and indirectly through customer

satisfaction and it can be achieved when customers are happy with the services provided from the aspect of customer and support is associated with increased customer loyalty.

6. Conclusion and Implications

This research examines the dimension model of e-banking service quality (EBSQ), customer satisfaction, and customer loyalty. There are 13 hypotheses generated based on the theoretical framework made by made with the support of the literature in this endeavour. Theoretically, it is a convincing theory in direct and indirect relationships on customer satisfaction and loyalty through the effect of the dimensions of e-banking service quality (EBSQ) consists of privacy and security, web design, reliability, customer service and support. Based on the findings of this study, e-banking service quality such as privacy and security, reliability, and customer service and support directly affect customer satisfaction and customer loyalty except web design shows a non-significant effect on customer loyalty. However, the test-based results on the indirect effect of customer satisfaction on the dimensions of e-banking service quality and customer loyalty are significant.

This study is supported by the theory of cognitive-motivation-relational (CMR) is to links the process of analysing in terms of perceptual and different human emotional responses to evaluation. We applied CMR theory to show the relationship between service quality and customer response in terms of customer satisfaction and loyalty. Furthermore, the researchers also assumed that service quality was closely related to a cognitive appraisal of services while customer responses consist of purchase intention and customer loyalty is an emotional response. This research is to prove that e-banking service quality has the ability in influencing customer satisfaction and loyalty. This research enhances a greater knowledge of CMR theory in the context of e-banking. The findings in this research can provide a valuable contribution to the marketing literature services as in the context of financial services marketing. Overall, this study is useful for researchers to add deeper knowledge and understanding of e-banking.

This study brings some contributions to academics. To test the influence of the e-banking service quality dimension on customer loyalty, a mediated comprehensive was proposed in this study. This proposed mediated model has not been featured in the existing bank marketing literature to increase customer loyalty to e-banking services through EBSQ practices. Thus, the theoretical framework states that the impact of the EBSQ dimension on customer loyalty is mediated by customer satisfaction in e-banking. The results obtained through hypothesis testing showed supporting the effects of mediation such as privacy and security, web design, reliability, customer service, and support on customer loyalty while the direct effect was supported except web design on customer loyalty. This study is also useful as a source of understanding for customer preferences and the focus required from online e-banking services during closed operations, especially during and post COVID-19.

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