

Development and validation of sharia compliance e-commerce quality factors and measurement scales

Ribadu, M. B., Mohammed, A., Sa'ad, S. and Umar, K. I.

Department of Information Technology, Modibbo Adama University Yola, Adamawa State, Nigeria.

Paper History

Received: 01st June, 2023

Accepted: 01st Jul, 2023

Published: August, 2023

Abstract:

The growth of e-commerce has been rapid and stimulated by its numerous benefits which attracts businesses and consumers to adopt. However, despite the religious obligation for Muslims to patronize only Sharia compliant products, services, and systems, yet, Sharia compliance e-commerce (SCE-C) quality factors and measurement scales for evaluating e-commerce systems is non-existent. Hence, the need to develop and validate SCE-C quality factors and measurement scales. Therefore, both the Sharia compliance requirements and the e-commerce quality factors and measurement scales was deduced and conceptualized from extant literatures. This study collected 451 valid responses from Muslim participants using self-administered questionnaires within four university campuses in Malaysia. The data was subjected to exploratory and confirmatory factor analysis with the aid of IBM SPSS 23 and Amos 23 respectively. The SCE-C quality factor structure revealed seven factors comprising of information accuracy, information completeness, devoid of haram, usability, customization, security, and service quality. Cumulatively, these factors revealed a scale of thirty-one measurement items. The model achieved good model fitness, convergent and discriminant validity, and construct reliability. Consequently, the validation of the seven SCE-C quality factors and thirty-one measurement scales can be operationalized in evaluating the SCE-C quality of e-commerce systems.

Corresponding author

Ribadu, M. B.

mb.ribadu@mau.edu.ng

Keywords: E-commerce, Devoid of Haram, Information accuracy, Information completeness, Usability, Security, Customization, Service quality

1. Introduction

The advent of e-commerce has transformed the scope of traditional commerce with the proliferation of new products/services, processes, opportunities, and challenges. It offers businesses a unique access to global markets through expedient technologies and processes. Several studies revealed that using e-commerce platform for commercial transactions have not been without predicaments and concerns [1 - 7].

Muslim consumer trust in an e-commerce system is not only confined to the ability of an e-commerce platform to be Sharia compliant but its quality too [8]. DeLone & McLean [9] highlights e-commerce quality as the desired characteristics of an e-commerce system. It comprises of the system quality, information quality, and service quality dimensions of e-commerce. Over the years, e-commerce quality has been established as an important factor of e-commerce trust and consumers positive disposition to buying online [2, 4, 7, 10] and user satisfaction [2, 10]. However, there is no known study that determined SCE-C quality factors for e-commerce systems or its evaluation mechanism. Therefore, the need to determine the SCE-C quality factors and their measurement scales in order to support the development and evaluation of SCE-C systems.

The reviewed literature on e-commerce quality suggests an extensive and successive validation of e-commerce quality factors. However, none of the extant literature studied or determined the e-commerce quality factors from an Islamic or Sharia compliance perspective. Although, the existing dimensions of information quality, systems quality, and service quality are very extensive and includes factors that have Sharia compliance connotations, but they could not sufficiently fulfil the SCE-C requirements such as avoidance of *haram*. Whereas, the Sharia compliance requirements from literature have specified compliance with Islamic law of contract form, contracting parties, subject matter, and avoiding fundamentally prohibited elements of *riba*, *gharar*, *haram*, and *maysir*. Motivated by these research gaps, this study proffered Sharia compliance requirements for e-commerce systems in order to guide the development and evaluation of SCE-C systems. The SCE-C quality factors and scales were developed and operationalized based on the Sharia compliance requirements and extant e-commerce measures.

2. Literature Review

2.1 E-commerce from an Islamic Perspective

Islamic law denotes the same connotation to e-commerce as the traditional commerce which fundamentally implies that, e-commerce is halal and indeed encouraged as long as the Sharia stipulations are adhered [10 - 13]. E-commerce is seen as a recent innovation that facilitates commercial transactions through a virtual medium. Therefore, the Sharia obligations of the buyer, the seller, and witnesses in the traditional commerce setting are also applicable to the e-commerce systems. It is an essential Islamic obligation upon all Muslims to adhere to Sharia teachings in all their endeavours, because, Islam is a complete way of life.

The Sharia doctrines are mainly derived from the holy Quran, the *Sunnah* (practices of the holy prophet), *Qiyas* (deductive analogy from the Quran and *Sunnah*) and *Ijma* (consensus of scholars) [13]. The Sharia compliance of e-commerce requires e-commerce systems to conform with the principles of Islamic law of contract form, contracting parties, and the subject matter [10, 13, 14]. Furthermore, it must be devoid of any fundamentally prohibited element of *riba*, *gharar*, *haram*, and *maysir*. These requirements are mainly aimed at ensuring obedience to God and the mutual good of buyers, sellers and the society at large. A comprehensive review of the Sharia compliance requirements for e-commerce systems from extant literature is depicted in Table 1.

Table 1 : The Requirements for Sharia Compliance e-commerce Transaction

Sharia Compliant e-commerce Requirements			Reference
Islamic Law of Contract	Form	Offer Acceptance	[10, 11, 14 - 16]
	Contracting Parties	Buyer Seller	
	Subject Matter	Object Price	
Devoid of <i>Riba</i>	<i>Riba</i> medium of payment (Mainly <i>riba</i> credit card) <i>Riba al-Buyu</i> (Items such as gold, silver & other usurious items)		[10, 11, 13 - 16] [11, 16]
Devoid of <i>Gharar</i>	Uncertainty over product or service Uncertainty over price and payment Uncertainty over delivery and deferment		[10, 15 - 17]
Devoid of <i>Haram</i>	Sharia prohibited goods or services		[10, 13, 15, 16]
Devoid of <i>Maysir</i>	Acquisition of wealth by chance		[10, 11, 15, 16]

Adhering to these Sharia compliance requirements is very fundamental in ensuring e-commerce trust among devoted Muslims around the world. Muhammad et al. [14] explained that all forms of business transactions (e-commerce inclusive) are permissible in Islam unless where the clearly violate Sharia principles. Furthermore, all transactions must ensure justice to all parties and the processes involved must be free from fundamentally prohibited elements of *riba*, *gharar*, *maysir*, and *haram* objects. Literally, *riba* means to increase or a practice of lending money at a fixed interest [15,19]. *Riba* is a fundamentally prohibited element that is clearly forbidden by Islam [10, 11, 13]. The Quran states:

“... God has permitted trade and forbidden usury. Those who after receiving direction from their Lord, desist, shall be pardoned for the past; their case is for God; but those who repeat the offence are Companions of the Fire: they will abide therein forever” (2:275).

Therefore, it is forbidden to utilize a *riba* based credit card or any other interest-bearing medium of payment that involves usury in both offline and online transactions. Today, Muslims can conveniently do away with *riba* prone mediums of payment, especially with the rise of Islamic banks and the option for Sharia-compliant credit cards, use of debit cards, pay on delivery and other non-interest payment options. Whereas *gharar* is associated with uncertainties and risk associated with a system or transaction. Therefore, it is unlawful to engage in any kind of transaction with a high uncertainty or excessive risk [10, 13, 15 - 17].

For that reason, it is mandatory to ensure that both buyers and sellers have adequate information of the terms, values, existence, obtainability, quantity, quality, and attributes should be identified and its deliverability must be guaranteed [18, 22, 14 - 15]. Islam also forbids *maysir*, which means the acquisition of wealth by chance [10]. This is meant to ensure justice and to promote industry among individuals and societies. Similarly, it is forbidden to produce, sell, buy, advertise or engage in any form of *haram* product or service. These include items such as alcohol, pork, musicals and phonographic materials.

2.2 E-commerce Quality Factors and Instruments

Understanding and developing customer requirements by e-commerce organizations is a key challenge to their success. Because e-commerce sites that fail to meet up with customer desires and expectations will project a poor image that will be detrimental to their business. Therefore, it is important for businesses to be able to know the quality factors and evaluate their e-commerce systems as perceived by their customers. E-commerce quality represents customers desired characteristics in an e-commerce system [6, 9]. The DeLone & McLean IS success model was a major milestone in the study of e-commerce quality evaluation, it prescribed Information and the system quality dimensions of e-commerce. Furthermore, Molla & Licker [5] added a support dimension which the updated DeLone & Mclean IS success model referred to as service quality dimension. Therefore, e-commerce quality is multidimensional in nature and comprises of information

quality, system quality, and service quality dimensions as illustrated in Figure. 1.

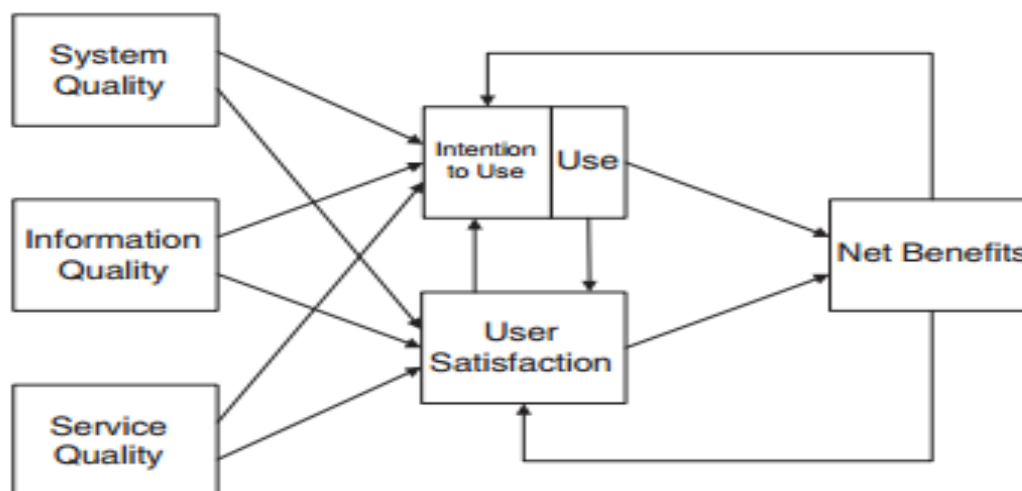


Figure 01 : DeLone & McLean IS Success Model
Adapted from DeLone & McLean [9]

Each of these dimensions is characterized by measures that enable quality evaluation of e-commerce systems. DeLone & McLean [9] contextually highlighted the distinct nature of e-commerce quality and some suitable measures for evaluating its performance. This is necessary to enable business organisations ensure e-commerce quality and continuously appraise their operations in order to improve their offerings, best practices, and competitiveness. Therefore, necessitating the need to appropriately select and adopt quality evaluation measures from extant literature, modify or expand them, and/or develop new quality measures where necessary [9]. The information quality, systems quality, and service quality dimensions of the updated D & M IS success model are part of a comprehensive and multi-dimensional framework in Figure 1.

2.2.1 Information Quality

The information quality of an e-commerce system represents the desired characteristics of the system output in the form of web pages and management reports [6]. DeLone & McLean [9] highlighted the prominence of information quality as a dimension of IS success in their D&M IS success model. Nonetheless, in a subsequent study, they contextually highlighted information quality as a measure of e-commerce success. Information quality involves e-commerce content issues that can enable prospective customers or suppliers to initiate and accomplish transactions through the internet and regularly make return visits to a site [9]. Information quality which is referred to as content quality in some literature is recognized to be one of the determinants of user satisfaction and their intention to use an e-commerce system [2, 6, 9, 24].

Table 2 : Sources of Information Quality Factors & Measures

Information Quality Factors	Sources
Accuracy	[5 – 7, 9, 20]
Relevance	[5 – 7, 9]
Timeliness	[5, 6, 9]
Understandability	[5, 6, 9]
Completeness	[5, 6, 9, 20]
Currency	[5, 6, 9]

Some existing and validated information quality measures used for evaluating e-commerce systems includes highlighted in Table 2 are accuracy, up-to-datedness, comprehensiveness, understandability, completeness, timeliness, reliability, relevancy, currency, and preciseness deduced from literature.

2.2.2 System Quality

System quality is measured by the desired characteristics of an e-commerce system [9]. Stockdale & Borovicka, [21] referred to system quality as the elements of a system that affects the way an end user interact and use an e-commerce system. Some of the e-commerce system quality measures valued by customers as illustrated in Table 3 are usefulness, usability, availability, reliability, adaptability, responsiveness, functionality and security [9, 21]

Table 3: Sources of System Quality Factors & Measures

System Quality Factors	Sources
Usability	[5, 6, 9, 21]
Reliability	[5, 6, 9]
Functionality	[5, 6, 9, 21]
Customization	[6, 9]
Security	[5, 9]
Privacy	[5, 9]

Furthermore, Petter, et al., [6] highlights ease of use, system flexibility, system reliability, and ease of learning, as well as system features of intuitiveness, sophistication, flexibility, and response times as the desired system quality characteristics of e-commerce systems.

2.2.3 Service Quality

The service quality of an e-commerce system is an important dimension of e-commerce success, especially as customers increasingly demand for support from their web providers [5, 9]. It can be perceived as the gap between consumer expectations and the actual service performance [20]. Table 4 depicts some of the service quality factors deduced from various studies and their sources.

Table 04 : Sources of Service Quality Factors & Measures

Service Quality Factors	Sources
Responsiveness	[2, 9, 16, 18, 20]
Assurance	[2, 9, 20]
Empathy	[9, 15, 24, 32]
Follow-up services	[9, 18, 20]
Online support capabilities	[2, 5, 6, 9]

Service quality encompasses the multifaceted support and guidance delivered to customers in pre-sale, during sale and post-sale activities that contributes to customer satisfaction [25]. Because the perception of service quality is formed not just during the purchasing process (which ends when payment is made) but transcends to product delivery and the recovery process in case of delivery failure or a need for product return.

3. Methodology

Quantitative research method was used for testing and validation of the proposed SCE-C quality factors and scales. Therefore, descriptive statistics that included frequencies and percentages were used in analysing the demographic information of participants in all the instruments used in the study. A content validity test of the SCE-C quality factors and scale instrument was also analysed descriptively. Then, the multivariate statistical analysis was employed for conducting an exploratory factor analysis (EFA) and a confirmatory factor analysis (CFA).

3.1 Data collection method

The instrument comprised of three sections, the first section had questions related to respondent's demographics, Sharia compliance and IT knowledge and experience. The second section related to SCE-C quality measures. The second and third sections of the questionnaire were designed on a 5 points Likert scale that ranged from strongly disagree to strongly agree. Initially, questionnaires were self-administered to 50 respondents in a pilot study to ensure that item constructs are reliable and can be used as a tool evaluate the SCE-C quality measures. Consequently, 500 questionnaires were self-administered to Muslim respondents which comprised students, staff, business owners and visitors within university campuses of University Putra Malaysia, University of Malaya, International Islamic University Malaysia, and University Kebangsaan Malaysia.

3.2 Data Analysis Techniques

Exploratory factor analysis (EFA) was used as a statistical approach that is aimed at summarizing data and data reduction [22, 23]. The motive for data summary is to enable the discovery of the appropriate structure of the research variables under specific logic factors [23, 24]. Whereas, the aim of data reduction is to eliminate the uncorrelated measurement items and the shrinking of items within each variable [23, 24]. Therefore, in the quest to achieve parsimony by sequentially determining a rational number of SCE-C quality measures, an EFA was conducted using IBM SPSS 23. A Confirmatory factor analysis (CFA) was used for the verification of the factor structure of a set of observed variables [22, 24]. It enabled the testing of hypothesis that the relationship between observed variables and their underlying latent constructs exists. The pooled CFA was conducted using IBM Amos 23 to test the convergent validity, discriminant validity, and data normality for the SCE-C quality factors and scales.

4. Results and Discussions

This section reveals the outcomes of both EFA and CFA conducted on the proposed SCE-C factors and scales. It highlights these findings and the processes that were carried out.

4.1 Exploratory Factor Analysis for SCE-C Quality Scales

In the quest to determine a rational number of SCE-C quality factors and an instrument that can measure them, an exploratory factor analysis (EFA) technique was adopted. It was used to summarize the initially proposed 21 SCE-C quality factors and the 74 items that measure them. However, because of the efficacy of EFA in explaining the variations in the observed variables and its ability to decompose them into fewer factors, the initial propositions were ignored. Thus, data were subjected to Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy and Bartlett's test of Sphericity to determine its suitability for factor analysis. Furthermore, correlations of items were also observed based on the coefficients of communalities. Then, a highlight of the items deletion procedure and the criteria used. Subsequently, Principal component analysis using kaiser's criterion and scree test was simultaneously used for factor extraction. Hence, varimax rotation was used in obtaining the 7-factor simple structure solution which clearly showed the factor loadings.

4.1.1 Pre-test Requirements

Initially, data were subjected to two pre-test requirements of factor analysis, which are the Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy and Bartlett's test of Sphericity. The KMO test established a sampling adequacy result of 0.95 which is highly desirable because of its proximity to 1. Therefore, the sampling adequacy for this study is deemed to be "marvellous" as it exceeds 0.90 [14]. While Bartlett's test of Sphericity was used to test the strength of the relationships among the SCE-C quality variables. The result was found to be significant ($p < 0.00$),

indicating the appropriateness of correlations between variables.

4.1.2 Factor Rotation

A Varimax with Kaiser Normalization rotation was used to obtain a 7-factor solution to simplify and clarify the data structure of the factor matrix obtained. Furthermore, in order to derive at a simple structure solution, the smaller coefficient scores that were below .4 were all suppressed. Consequently, items that loaded on each of the 7 factors were appropriately labelled as devoid of *haram* (DoH), information completeness (Com), security (Sec), information accuracy (Acc), usability (Usa), customization (Cus), and service quality (SvQ) in order to give meaning to the factors. Whereas, the acronyms of the aforementioned factors were used in naming items.

4.1.3 Factor Loadings

The factor loadings of items on the 7 SCE-C quality factors are shown in Table 5. A set of 9 items loaded on Devoid of *haram* factor, where DoH1: "An SCE-C system should not engage in *haram* (forbidden) advertisement practices" had the highest factor loading of .761 which explained the largest variation. It was followed by DoH2: "An SCE-C system should not engage in the sale of *haram* (forbidden) objects" with a factor loading of .735. Interestingly, all the 9 devoid of *haram* items loaded above .6 which confirms it as a solid factor. The information completeness factor comprised of 8 items with factor loadings above .6 with the exception of Com8. Although, Com8: "An SCE-C system should provide up-to-date information about the vendor reputation and assurances" explained the least variation with its factor loading of .562 which is also a strong loading. Consequently, all the 7 factors with their 42 items were retained for subsequent confirmatory factor analysis.

4.1.4 Reliability

In order to determine the internal consistency of each of the factors, Cronbach alpha (α) coefficients were used as

shown in Table 5. The overall reliability of the SCE-C quality factors is $\alpha = .968$ which indicates significant internal consistency. The factor Devoid of *haram* with 9 items had the highest internal consistency with $\alpha = .925$. Therefore, all the 7 factors showed internal consistency with Cronbach alpha values that exceeds .7 threshold [26]. Consequently, the acceptable criterion for the reliability of SCE-C quality scale has been met.

4.2 Confirmatory Factor Analysis for SCE-C Quality scales

In order to conduct a Confirmatory factor analysis, the 42 items SCE-C quality scale from the preceding EFA (Table 5) was used in the measurement model. The validating procedure used involved testing for model fitness, convergent validity, discriminant validity and construct reliability of the SCE-C quality scales.

4.2.1 Model Fitness of SCE-C quality Scales

The model fitness of the pooled CFA for SCE-C quality scale in both the first order and second order achieved very good acceptable values of absolute, incremental, and parsimonious indices. The second order CFA had RMSEA=.058, CFI=.932, TLI=.925, and Relative $\chi^2=2.519$ which reflects model fitness. Similarly, the first order CFA achieved a good model fit with RMSEA=.057, CFI=.937, TLI=.929, and Relative $\chi^2=2.439$. A comparison of model fitness between the first order and second order CFA indicates that the first order CFA achieved a better fitness as depicted in Table 6.

The factor loadings for all the items on the SCE-C quality scales in Figure 2 were far above the .5 threshold [27, 28, 29]. Although, Awang [27] suggested that the factor loadings for newly developed items should exceed .5, however, for the already established item should exceed .6. Even though the SCE-C quality scales have a combination of newly developed and modified items, the factor loadings for all the items were above .6 with most items' loadings above 0.7.

Table 5: Model fit index

Fit	Fit Index	Authors	Acceptance Level	1 st Order CFA Result	2 nd Order CFA Result
Parsimonious fit	CMIN/DF (Relative χ^2)	Marsh & Hocevar (1985)	< 5.0	2.439	2.519
Incremental fit	Comparative fit index (CFI)	Bentler (1990)	> .90	.937	.932
		Hatcher (1994)			
Absolute fit	Tucker-Lewis Index (TLI)	Bentler & Bonett (1980)	> .90	.929	.925
		Byrne (2001)			
	Root mean square of error approximation (RMSEA)		< .08	.057	.058

Therefore, all the measuring items had acceptable loadings for their respective latent constructs. Significantly, all the SCE-C quality factors also loaded well above .7 on SCE-C quality. The regression path coefficients of the

second order CFA have indicated that devoid of *haram*, information accuracy, information completeness, usability, customization, security, and service quality are indeed SCE-C quality factors.

Table 6 : Exploratory Factor Analysis - Factor loadings, communalities, variance explained and reliability for SCE-C Quality Factors

Factors	Items	DoH	Com	Sec	Acc	Usa	SvQ	Cus	Communalities
Devoid of <i>Haram</i> (DoH)	DoH1: An SCE-C system should not engage in <i>haram</i> (forbidden) advertisement practices.	.761							.759
	DoH2: An SCE-C system should not engage in the sale of <i>haram</i> (forbidden) objects.	.735							.734
	DoH3: An SCE-C system should not use <i>riba</i> (interest) based methods of payment.	.731							.748
	DoH4: An SCE-C system should provide payment options that are permissible by Sharia.	.701							.693
	DoH5: An SCE-C system should avoid online transactions involving <i>ribawi</i> (usurious) items.	.648							.567
	DoH6: An SCE-C system should clearly describe the goods and services they sell.	.644							.717
	DoH7: An SCE-C system should clearly specify the price of each good.	.630							.733
	DoH8: An SCE-C system should clearly specify its return policies and guarantees.	.619							.757
	DoH9: An SCE-C system should clearly specify when goods bought online would be delivered to a customer.	.604							.683
Information Completeness (Com)	Com1: An SCE-C system should provide easy to understand information.		.731						.725
	Com2: An SCE-C system should provide information in an organized manner.		.681						.688
	Com3: An SCE-C system should provide complete information about return policies.		.672						.702
	Com4: An SCE-C system should provide information in a very clear manner.		.650						.673
	Com5: An SCE-C system should provide complete information about the delivery of goods.		.636						.701
	Com6: An SCE-C system should provide complete information about vendor reputation and assurances.		.621						.645
	Com7: An SCE-C system should provide up-to-date information about the return policies.		.606						.675
	Com8: An SCE-C system should provide up-to-date information about the vendor reputation and assurances.		.562						.620
Security (Sec)	Sec1: The SCE-C system should protect my personal information from unauthorized access.			.781					.789
	Sec2: An SCE-C system should not share my personal information with anyone without my permission.			.751					.741

Factors	Items	DoH	Com	Sec	Acc	Usa	SvQ	Cus	Communalities
Information Accuracy (Acc)	Sec3: An SCE-C system should provide safe privacy regulations.			.736					.726
	Sec4: The system of an SCE-C should provide measures that will protect customers from fraud.			.655					.719
	Sec5: The system of an SCE-C should provide a secure electronic payment processing.			.590					.621
	Sec6: An SCE-C system should show evidence of security in its transaction processing.			.543					.603
	Acc1: An SCE-C system should provide me with accurate information about the price of a product.				.778				.792
	Acc2: An SCE-C system should provide me with accurate information about the vendor.				.749				.706
	Acc3: An SCE-C system should provide me with information that accurately describes its products.				.741				.760
	Acc4: An SCE-C system should provide me with accurate Information about the delivery of a product.				.718				.698
	Acc5: An SCE-C system should provide me with accurate information about the return policy of a product.				.662				.715
	Usa1: The system of an SCE-C should provide quick updates and response.					.673			.729
Usability (Usa)	Usa2: The system of an SCE-C should be easy to use.					.667			.716
	Usa3: The system of an SCE-C should be attractive.					.639			.651
	Usa4: The system of an SCE-C should provide ease of navigation.					.629			.723
	Usa5: The system of an SCE-C should use appropriate design.					.590			.656
	SvQ1: An SCE-C system should provide post-sale support services to users.						.764		.685
Service Quality (SvQ)	SvQ2: An SCE-C system should provide information updates on bought products.						.745		.699
	SvQ3: An SCE-C system should confirm the delivery of goods to customers.						.644		.710
	SvQ4: An SCE-C system should provide a feedback mechanism to support users (e.g products reviews and ratings).						.544		.557
	Cus1: The system of an SCE-C should provide users with personalized experience.							.731	.700
Customization (Cus)	Cus2: The system of an SCE-C should enable the user to have control over preferences.							.707	.642
	Cus3: The system of an SCE-C should only provide users with halal (Sharia permissible) preferences.							.597	.569

Factors	Items	DoH	Com	Sec	Acc	Usa	SvQ	Cus	Communalities
	Cus4: The system of an SCE-C should provide functions that can enhance Sharia compliance.							.475	.503
	Cus5: The system of an SCE-C should always be dependable.							.459	.497
	Eigen value	18.652	2.303	2.214	1.696	1.349	1.343	1.170	Total 28.727
	%Variance explained	44.410	5.483	5.272	4.038	3.211	3.199	2.786	68.398
	Cronbach-Alpha (α)	.925	.919	.911	.906	.887	.842	.824	.968

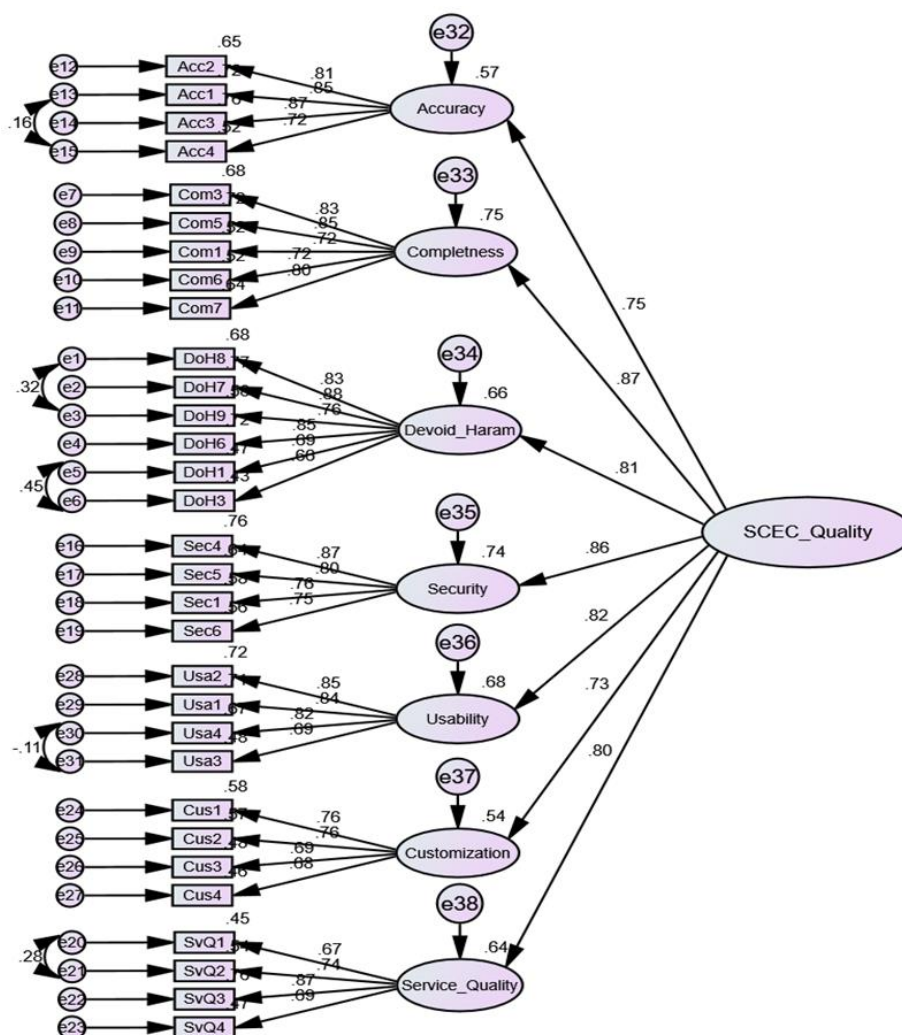


Figure 2: Second Order Confirmatory Factor Analysis of SCE-C Quality Scale

Table 7: The Regression Path Coefficients and its significance in the SCE-C Quality Model

Paths	Estimate	S.E.	C.R.	P	Result
Usability <--- SCE-C Quality	.999	.077	12.987	***	Significant
Accuracy <--- SCE-C Quality	1.000				Reference point
Completeness <--- SCE-C Quality	1.033	.078	13.246	***	Significant
Devoid of Haram <--- SCE-C Quality	.941	.074	12.695	***	Significant
Security <--- SCE-C Quality	1.027	.076	13.593	***	Significant
Customization <--- SCE-C Quality	.940	.087	10.794	***	Significant
Service Quality <--- SCE-C Quality	.874	.081	10.757	***	Significant

Note: Result of hypothesis test path coefficient (β), Standardize error (SE), Critical value (CR) and significant level *** $P < 0.01$

The P-values in Table 7 indicates that the factors in the SCE-C quality model are highly significant at below 0.01.

4.2.2 Convergent Validity and Construct Reliability

In order to determine the ability of the SCE-C quality instrument to measure SCE-C quality, the convergent validity of the measurement model must achieve an average variance extracted (AVE) that is greater than .5 [29]. Furthermore, it must have acceptable factor loadings in order to achieve convergent validity [27]. While construct reliability (CR) which is comparable to Cronbach alpha for all the factors must be greater than .7 to be considered reliable [22]. The convergent validity and reliability for the

SCE-C quality constructs are presented in the ensuing subsections.

4.2.2.1 Information Accuracy Scale

The information accuracy construct of the SCE-C quality measurement model had very good factor loadings that were well above .7 and AVE of .661 which indicates a high convergent validity. Furthermore, it was also found to be very reliable with a CR of .886. The item Acc3 "An SCE-C system should provide me with information that accurately describes its products," had the highest factor loading of .87 as depicted in Table 8.

4.2.2.2 Information Completeness Scale

The information completeness construct of the SCE-C quality measurement model achieved both convergent validity and construct reliability requirements. All of its five items presented in Table 9 had factor loadings that are above .7 and it had a high AVE of .617 which indicates a good validity. While a construct reliability with a CR coefficient of .889 is also very good which is an indication of the internal consistency of the construct.

4.2.2.3 Devoid of Haram Instruments Scale

The devoid of *haram* construct of the SCE-C quality measurement model achieved a good convergent validity and construct reliability. It had an AVE of .611 and all the standardized factor loadings of items were well above .6. While the construct reliability was found to be excellent with a CR of .903. The factor loadings of all the six devoid of *haram* items are depicted in Table 10.

Table 8: Factor Loading, Average variance Extracted and Construct Reliability of Information Accuracy Scale

Item	SCE-C Quality factor	Factor loading	AVE	CR
	Information Accuracy		0.661	0.886
Acc1	An SCE-C system should provide me with accurate information about the price of a product.	0.85		
Acc2	An SCE-C system should provide me with accurate information about the vendor.	0.80		
Acc3	An SCE-C system should provide me with information that accurately describes its products.	0.87		
Acc4	An SCE-C system should provide me with accurate Information about the delivery of a product.	0.72		

Table 9: Factor Loading, Average variance Extracted and Construct Reliability of Information Completeness Scale

Item	SCE-C Quality factor	Factor loading	AVE	CR
	Information Completeness		0.617	0.889
Com1	An SCE-C system should provide easy to understand information.	0.72		
Com3	An SCE-C system should provide complete information about return policies.	0.83		
Com5	An SCE-C system should provide complete information about the delivery of goods.	0.85		
Com6	An SCE-C system should provide complete information about vendor reputation and assurances.	0.72		
Com7	An SCE-C system should provide up-to-date information about the return policies.	0.80		

Table 10: Factor Loading, Average variance Extracted and Construct Reliability of Devoid of *Haram* Scale

Item	SCE-C Quality factor	Factor loading	AVE	CR
	Devoid of <i>Haram</i>		0.611	0.903
DoH1	An SCE-C system should not engage in <i>haram</i> (forbidden) advertisement practices.	0.69		
DoH3	An SCE-C system should not use <i>riba</i> (interest) based methods of payment.	0.66		
DoH6	An SCE-C system should clearly describe the goods and services they sell.	0.85		
DoH7	An SCE-C system should clearly specify the price of each good.	0.88		
DoH8	An SCE-C system should clearly specify its return policies and guarantees.	0.83		
DoH9	An SCE-C system should clearly specify when goods bought online would be delivered to a customer.	0.76		

4.2.2.4 Usability Scale

The usability construct of the SCE-C quality measurement model attained a good convergent validity with an AVE of .641 which is far greater than .5.

Furthermore, the item factor loadings were above .8 except for Usa3 which had a loading of .68 which is also good. The construct reliability of usability factor was .876 as depicted in Table 11 indicates a good internal consistency.

Table 11: Factor Loading, Average variance Extracted and Construct Reliability of Usability Scale

Item	SCE-C Quality factor	Factor loading	AVE	CR
	Usability		0.641	0.876
Usa1	The system of an SCE-C should provide quick updates and response.	0.85		
Usa2	The system of an SCE-C should be easy to use.	0.85		
Usa3	The system of an SCE-C should be attractive.	0.68		
Usa4	The system of an SCE-C should provide ease of navigation.	0.81		

4.2.2.5 Security Scale

The security construct of the SCE-C quality measurement model with an AVE of .632 and item factor loadings above .7 achieved a good convergent validity. It

indicates that all the four items on the security scale are statistically significant. Construct reliability was also found to be good at .872. Therefore, the security items in Table 12 have sufficiently met both the convergent validity and construct reliability requirements.

Table 12: Factor Loading, Average variance Extracted and Construct Reliability of Security Instruments

Item	SCE-C Quality factor	Factor loading	AVE	CR
	Security		0.632	0.872
Sec1	The SCE-C system should protect my personal information from unauthorized access.	0.76		
Sec4	The system of an SCE-C should provide measures that will protect customers from fraud.	0.87		
Sec5	The system of an SCE-C should provide a secure electronic payment processing.	0.80		
Sec6	An SCE-C system should show evidence of security in its transaction processing.	0.74		

4.2.2.6 Customization Scale

The customization construct of the SCE-C quality measurement model with an AVE of .517, with all item factor loadings above .6 as depicted in Table 13 achieved a good convergent validity. However, it was found to have the lowest AVE among all the seven SCE-C quality constructs. Yet, it also revealed good statistical significance.

Similarly, the construct reliability for customization at .808 revealed a very good internal consistency despite been the lowest among the constructs in the measurement model.

4.2.2.7 Service Quality Scale

The service quality construct of the SCE-C quality measurement model with an AVE of .581, with all of its item factor loadings above .6 revealed convergent validity. It also had a construct reliability of .846 which revealed a very good internal consistency of the construct. The service quality items, factor loadings, AVE and CR are depicted in Table 14.

Table 13 : Factor Loading, Average variance Extracted and Construct Reliability of Customization Instruments

Item	SCE-C Quality factor	Factor loading	AVE	CR
	Customization		0.517	0.808
Cus1	The system of an SCE-C should provide users with personalized experience.	0.81		
Cus2	The system of an SCE-C should enable the user to have control over preferences.	0.80		
Cus3	The system of an SCE-C should only provide users with halal (Sharia permissible) preferences.	0.63		
Cus4	The system of an SCE-C should provide functions that can enhance Sharia compliance.	0.61		

Table 14: Factor Loading, Average variance Extracted and Construct Reliability of Service Quality Instruments

Item	SCE-C Quality factor	Factor loading	AVE	CR
	Service Quality		0.581	0.846
SvQ1	An SCE-C system should provide post-sale support services to users.	0.67		
SvQ2	An SCE-C system should provide information updates on bought products.	0.74		
SvQ3	An SCE-C system should confirm the delivery of goods to customers.	0.86		
SvQ4	An SCE-C system should provide a feedback mechanism to support users (e.g products reviews and ratings).	0.70		

4.3 Discriminant Validity of the SCE-C Quality Scales

The SCE-C quality scales were found to have achieved discriminant validity based on the finding that the factor correlation coefficients (r) for every pair of SCE-C quality scales is less than .90 [25, 29]. Furthermore, the AVE's for every pair of SCE-C quality scales were found to be greater than their squared correlations [8]. Therefore, discriminant validity of the SCE-C quality scales is evidently achieved based on these two criteria's. This indicates that the SCE-C quality factors are theoretically and actually

distinct from each other. Furthermore, the SCE-C quality measurement model has no redundant items. The largest correlation coefficients for the SCE-quality factors were between information accuracy and information completeness which had an r of .74 as highlighted in fig. 3. The nature of the correlation between the two factors has a theoretical basis, as both factors are measuring e-commerce information quality. Whereas, Information accuracy and customization showed the lowest correlation of .42. Therefore, an acceptable level of correlations

between constructs indicates the absence of any serious redundancy or multicollinearity issue.

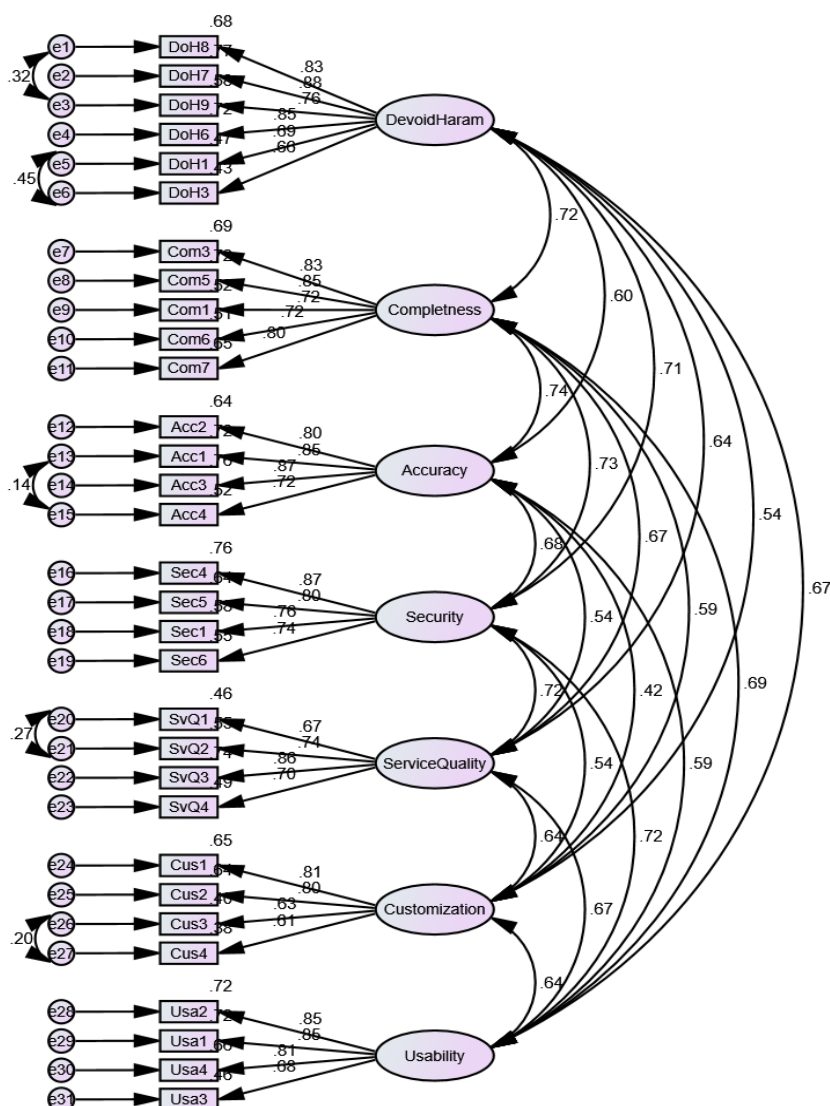


Figure 2 : First Order Confirmatory Factor Analysis of SCE-C Quality Scale

The second approach used in ascertaining the discriminant validity of the measurement model was the correlation matrix. It revealed that the correlations between the constructs were all lower than the square root of AVE of their respective constructs [22, 28]. The correlation matrix in Table 16 highlights the discriminant validity through the respective average variance extracted between any two

constructs on the diagonal which are greater than their squared correlation coefficients on the off-diagonal. Therefore, the SCE-C quality model was found to be free from redundant items and all its factors are indeed distinct. Furthermore, Table 15 also reported the convergent validity and construct reliability for each SCE-C quality factor.

Table 015: Average variance Extracted (on the Diagonal) and Squared Correlation Coefficients (on the Off-diagonal) for SCE-C Quality

SCE-C Factor	CR	AVE	Cus	DoH	Com	Acc	Sec	SvQ	Usa
Customization (Cus)	0.808	0.517	0.719						
Devoid of <i>Haram</i> (DoH)	0.903	0.611	0.541	0.782					
Information Completeness (Com)	0.889	0.617	0.591	0.723	0.785				
Information Accuracy (Acc)	0.886	0.661	0.424	0.595	0.739	0.813			
Security (Sec)	0.874	0.635	0.535	0.706	0.729	0.680	0.797		
Service Quality (SvQ)	0.834	0.558	0.643	0.638	0.671	0.542	0.721	0.747	
Usability (Usa)	0.877	0.642	0.643	0.672	0.687	0.593	0.717	0.675	0.801

Information accuracy and customization quality factors had the lowest correlations coefficient of .424. Whereas, the highest correlations were recorded between information accuracy and information completeness (.739), information completeness and devoid of *haram* (.723), and security and service quality (.721). However, the correlations were all lower than their AVE on the diagonals, within an acceptable range that buttresses discriminant validity, and theoretically justified within an e-commerce quality framework.

5. Conclusion

This study also determined the SCE-C quality factors and their measurement scales in order to support the development and evaluation of SCE-C systems. SCE-C quality implied the integration of Sharia compliance attributes with e-commerce best practices. They are devoid of *haram*, information accuracy, information completeness, usability, security, customization, and service quality. These seven factors were found to be essential for Muslim consumers to perceive the SCE-C quality of an e-commerce system. Their measurement scales comprising of thirty-one items can be used in assessing the SCE-C quality of e-commerce systems. This brings to providence, the SCE-C quality factors that Muslim consumer's desire and the instrument to evaluate them.

The SCE-C quality factors and scales proffered in this study were based on Sharia compliance and generic e-commerce quality features that Muslim consumer's desire. While the SCE-C quality measurement scales provides a tool for evaluating SCE-C quality. It comprised of information accuracy and completeness, devoid of *haram*, usability, security, customization, and service quality factors and scales.

Recommendations

The SCE-C quality factors and scales should be adopted or scrutinized by future researchers in order to enrich knowledge in the SCE-C domain. The SCE-C quality factors and their features are very important in attracting religious centric Muslim consumers to patronize an e-commerce platform. Therefore, e-commerce developers and vendors should ensure that SCE-C quality features are a provided in their platforms. The vendors can use the SCE-C quality scales to evaluate and ascertain the SCE-C quality status of their platforms. Similarly, consumers can also use the SCE-C quality scale to measure the SCE-C quality of an e-commerce platform. Furthermore, the SCE-C quality scales provides an evaluation apparatus for SCE-C quality measurement as a whole or to assess factors individually using the factor scales. Therefore, future studies should replicate the validation process carried out in this study under different settings to further refine and determine its efficacy.

References

- [1]. Azam, A., (2015). Investigation of psychological dimensions of trust on e-loyalty: A case of Saudi Arabia consumers. *Journal of Islamic Marketing*, 6(2), 224-249.
- [2]. Brown, I., and Jayakody, R., (2008). B2C e-commerce success: A test and validation of a revised conceptual model. *The Electronic Journal Information Systems Evaluation*, 11(3), 167-184.
- [3]. Choi, J., and Nazareth, D. L., (2014). Repairing trust in an e-commerce and security context: an agent-based modelling approach. *Information Management and Computer Security*, 22(5), 490–512. Retrieved from <http://dx.doi.org/10.1108/IMCS-09-2013-0069>
- [4]. Fang, Y., Qureshi, I., Sun, H., McCole, P., Ramsey, E., and Lim, K. H., (2014). Trust, Satisfaction, and Online Repurchase Intention: The Moderating Role of Perceived Effectiveness of E-Commerce Institutional Mechanisms. *MIS Quarterly*, 38(2), 407-427.
- [5]. Molla, A., and Licker, P. S., (2001). E-Commerce Systems Success: An Attempt to Extend and Respecify the Delone and McClean Model of IS Success. *Journal of Electronic Commerce Research*, 2(4), 131-141.
- [6]. Petter, S., Delone, W. H. and Mclean, E., (2008) Measuring information systems success: models, dimensions, measures, and interrelationships, *European Journal of Information Systems*, 17, 236–263.
- [7]. Sharma, G. and Lijuan, W., (2015), The effects of online service quality of e-commerce Websites on user satisfaction, *Electronic Library*, 33(3), 161–176.
- [8]. Amboala, T., Mokhtar, A. H. A., Muhammad, M. Z., Noordin, M. F., and Othman, R., (2015). Development Method for Shariah Compliant e-Commerce Payment Processing. *International Journal of Computer Theory and Engineering*, 7(5), 408-415.
- [9]. Delone, W. H., and Mclean, E. R., (2004). Measuring e-commerce success: Applying the DeLone and McLean information systems success model. *International Journal of Electronic Commerce*, 9(1), 31-47.
- [10]. Amboala, T., Mokhtar, A. H. A., Muhammad, M. Z., Noordin, M. F., and Othman, R., (2015). Development Method for Shariah Compliant e-Commerce Payment Processing. *International Journal of Computer Theory and Engineering*, 7(5), 408-415.
- [11]. Muhammad, M., Muhammad, M. R., and Khalil, K. M., (2013b). Towards shari'ah compliant ecommerce transactions: A review of Amazon. com. *Middle-East Journal of Scientific Research*, 15(9), 1229-1236.
- [12]. Suhaimi, M. A., Razi, M. J. M., Hussin, H., Muhammad, M. R., Muhammad, M., and Abdullah, K., (2013, March). Conceptualizing trust-based online behavior model for Muslim consumers. In *Information and Communication Technology for the Muslim World (ICT4M)*, 2013 5th International Conference on (pp. 1-6). IEEE.
- [13]. Zainul, N., Osman, F., and Mazlan, S. H., (2004). E-Commerce from an Islamic perspective. *Electronic*

- Commerce Research and Applications, 3(3), 280-293
- [14]. Muhammad, M., Muhammad, M. R., Suhaimi, M. A., Hussin, H., Razi, M. J. M., and Abdullah, K., (2013). Building trust in e-commerce from an Islamic perspective: A literature review. *American Academic and Scholarly Research Journal*, 5(5), 161.
- [15]. Mokhtar, A. H. A., Amboala, T., Muhammad, M. Z. and E-Alam, M. S., (2013). Bai As-salam and E-commerce: A Comparative Analysis from Sharia Perspective. Proceedings of the 2nd Applied International Business Conference (AIBC2013) December 2013, Labuan.
- [16]. Muhammad, M. R. and Muhammad, M., (2013). Building Trust in E-Commerce: A Proposed Shari'ah Compliant Model. *Journal of Internet Banking and Commerce*, 18(3), 1-13.
- [17]. Wang, Y. S. (2008). Assessing e-commerce systems success: A re-specification and validation of the DeLone and McLean model of IS success, *Information Systems Journal*, vol. 18, pp. 529-557
- [18]. Jamshidi, D., and Hussin, N., (2012). A conceptual framework for adoption of Islamic Credit Card in Malaysia. *Kuwait Chapter of the Arabian Journal of Business and Management Review*, 2(3), 102.
- [19]. Huang, E. Y., Lin, S. W. and Fan, Y. C., (2015). MS-QUAL: mobile service quality measurement. *Electronic Commerce Research and Applications*, 14(2), 126-142.
- [20]. Stockdale, R. and Borovicka, M., (2006). Using Quality Dimensions in the Evaluation of Website. Information and Communication Technologies in Tourism. Vienna: Springer.
- [21]. Hair, J. F., Anderson, R. E., Tatham, R. L. and Black W. C., (2010). *Multivariate Data Analysis: A Global Perspective* (7th Edition). Upper Saddle River, New Jersey: Pearson Prentice Hall.
- [22]. Tabachnick, B. G., and Fidell, L. S., (2007). *Using Multivariate Statistics* (5th ed.). New York: Allyn and Bacon.
- [23]. Elshaer, I. A., (2012). The Relationship between Quality Management and Competitive Advantage An empirical study of the Egyptian hotel industry (Doctoral thesis). University of Hull, United Kingdom.
- [24]. Sharma, G. and Lijuan, W., (2015), The effects of online service quality of e-commerce Websites on user satisfaction, *Electronic Library*, 33(3), 161–176.
- [25]. Nunnally, J. C., and Bernstein, I. H., (1994). *Psychometric Theory*. New York; Sydney: McGraw-Hill.
- [26]. Byrne, B. M., (2010). *Structural Equation Modeling with AMOS: Basic concepts, application and programing*. London: Lawrence Erlbaum Associates.
- [27]. Fornell, C. G., and Larcker, D. F. (1981). Evaluating structural equation models with unobservable variables and measurement error. *Journal of Marketing Research*, 18(1), 39–50.
- [28]. Suzuki, Y., (2013). A Post-Keynesian perspective on Islamic prohibition of Gharar. *International Journal of Islamic and Middle Eastern Finance and Management*, 6(3), 200-210.
- [29]. Tabachnick, B. G., and Fidell, L. S., (2007). *Using Multivariate Statistics* (5th ed.). New York: Allyn and Bacon.