Evaluation of E-service Quality and its Impact on Customer Satisfactions for Mobile Commerce Applications in Egypt

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Abstract

Since the COVID-19 pandemic, mobile commerce (m-commerce) is increasing as a global phenomenon, and Egypt is no exception. The implementation of quality management practices in m-commerce applications is crucial for enhancing user satisfaction and increasing customer loyalty. However, little work introduced for evaluating the quality of e-service for m-commerce provided to consumers. In addition, the adoption of such practices is a new and emerging area that requires further research and investigation, where finding and determining the factors that should be considered for implementing quality management practices in m-commerce applications is necessary. Therefore, in this study, a proposed model to e-service quality (e-SERVQ) in m-commerce applications by using the modified SERVQUAL model has been introduced. The proposed model included six dimensions, and was empirically evaluated using online survey data collected from 421 online consumers responding about their perceptions of e-service quality provided through m-commerce applications, and the data tested by using structural equation modelling (PLS). The analytical results showed that the six dimensions namely, information quality, responsiveness, reliability, personalization, usability, and security were found to have significant influence on e-SERVQ, leading to significant influence on customer satisfaction. These findings contribute to the current insights of the existing literature on e-service quality in the m-commerce field. Besides, the results can be used by online businesses in Egypt to develop their strategies for improving e-SERVQ that meet customer expectations across multiple dimensions and enhance the satisfaction and loyalty of customers.

Keywords*: E-service Quality, SERVQUAL Model, Mobile Commerce Applications, E-satisfaction, E-loyalty.*

Introduction

M-commerce businesses worldwide, including those in Egypt, have been significantly affected by the COVID-19 pandemic. The need for social distancing measures and government restrictions on the operations of businesses has led to an increased demand for online shopping and m-commerce applications (Sardjono et al., 2021). As a result, many businesses have had to adapt quickly to meet the changing demands and behaviours of customers. Where the majority of consumers who previously shopped only in physical stores, now prefer shopping online using mobile applications (Dumanska et al., 2021). Shopping online is becoming more important, particularly with the advent of the internet and technologies of mobile which has changed the landscape of businesses (Omar et al., 2021). Moreover, there has been a notable shift towards us-

ing smartphones as the primary device for accessing the internet, in contrast to previous times when personal computers were the dominant means of online consumption (Kim et al., 2021). Thus, m-commerce applications can assist retailers with the chance to present their brand and create shopping experiences for users, even in the users is not in the physical store (Omar et al., 2021). As explained by prior research, the rapid adoption of mobile shopping behaviour using smartphones has brought about significant transformations in the market, effectively supplanting traditional online shopping as the dominant mode of e-commerce (Lee & Wong, 2015). In addition to serving as communication devices, smartphones have been equipped with a variety of applications and mobile internet features to simplify the process of online shopping (Huang et al., 2015).

Nowadays, consumers can effortlessly download mobile shopping applications from the App Store in order to access shopping services. Formerly called mobile commerce, m-commerce is derived from e-commerce and considered a branch of it, and refers to the capability to buy, sell, advertise and conduct business operations while on the move (Kim et al., 2021). Currently, m-commerce is no longer restricted to laptops but is predominantly linked to smartphones and tablets in online shopping manner (Kim et al., 2021). Furthermore, many firms have been exploring the potential of m-commerce on wearable devices, like smartwatches. Consequently, the ability to perform commercial transactions using wireless devices while on the move is a defining characteristic of m-commerce (Safeddine, 2017). There are several m-commerce applications such as Amazon, OLX, noon, Mazadat, Almowafir, B.TECH, Raneen, RayaShop, Sharwa, and more that are utilized by online users in Egypt. As Mahapatra (2017) explains, the convenience provided by mobile devices in terms of searching, evaluating, possessing, and post-purchase activities has made them the most efficient platforms for delivering optimal experiences in shopping. Also, another study (Pantano, & Priporas, 2016) observed that, online users are migrating from electronic channels to mobile channels, enticed by the possibility of more satisfying purchasing experiences. This has led merchants to incorporate mobile shopping options with physical store environments as a means of competing in the dynamic and multi-channel retail landscape.

As more customers turn to m-commerce applications to buy products and/or services, online businesses, as well as new entrants, are encountering difficulties in attracting and retaining customers due to the intensifying competition among sellers (Kim et al., 2021). Therefore, it is crucial for both brick-and-mortar and online businesses to prioritize delivering value and exceptional customer experiences. This is especially important given that some retail establishments have been forced to close their doors because of the COVID-19 epidemic. To sustain their business operations, one option available to them is to transition to an online platform (Hasanat et al., 2020). Nonetheless, transitioning to digital operations presents many challenges as businesses face numerous e-competitors worldwide. In such a scenario, a product's value proposition becomes critical in attracting online customers (Laudon & Traver, 2021). To succeed, m-commerce applications must incorporate personalization features as it is one of the most vital prerequisites for their success (Choi et al., 2017).

M-commerce applications serve as more than just a means for customers to make purchases via mobile devices. M-commerce applications also function as a tool to help identify users, delivering solutions to improve their satisfaction and promote loyalty. For that, m-commerce applications have been designed with features and functionalities that improve accessibility and user-friendliness for mobile users (Nilashi et al., 2015). However, m-commerce applications come with their own set of challenges and risks due to their virtual nature. The use of m-commerce applications raises concerns regarding their security and responsiveness (Knezevic & Delic, 2017). Given the rise in online fraudulent activities, security concerns should not be overlooked when it comes to m-commerce applications (Jalil et al., 2021). Also, (Khan et al., 2019) highlights the importance of addressing security issues effectively, despite the benefits of online platforms such as convenience and delivery. Notwithstanding the advantages of internet platforms, it is important not to discount the aspect of security, as these platforms contain confidential information of the customers. In addition, retailers should ensure transparency with their customers as there is often concern about the storage of their personal information (Jalil et

al., 2021). The concerns expressed by customers regarding information leakage policies are understandable, as data breaches can happen at any time. Therefore, retailers need to be transparent with their customers about their policies. To deliver brilliant service quality to their customers, businesses must have a clear and well-documented strategic plan (Huang et al., 2015).

Few studies have explored how different e-SERVQ factors relate to overall e-SERVQ, users' satisfaction, and loyalty of customers within the framework of m-commerce applications. In the context of m-commerce, not all evaluation scales for e-SERVQ are suitable for use (Desmal et al., 2019). To ensure the accuracy of the evaluation of e-SERVQ in the m-commerce context, it is important to carefully select appropriate evaluation scales, taking into consideration the unique characteristics of m-commerce. It is essential to emphasize that not all e-SERVQ scales are suitable for m-commerce, and the choice of the most suitable scales have to depend on the particular research context. Additionally, using multiple models or scales in the m-commerce context may lead to increased complexity and incorrect data evaluation (Desmal et al., 2019). Moreover, this study emphasizes the significance of establishing a comprehensive framework for evaluating e-SERVQ in the m-commerce applications context, as currently there is a lack of such a framework (Desmal et al., 2019). According to (Khan et al., 2019), the importance of the current study, as there is a lack of research on the evaluation of e-SERVQ in comparison to service quality in traditional context. Furthermore, there is a need for more research in understanding the e-SERVQ evaluation, especially for Egypt as knowledge of author, no study has been conducted for m-commerce applications. Therefore, the current study tries to bridge this knowledge gap (Nandankar et al., 2021).

The remaining part of the study is organized in the subsequent way: Section 2 explains the literature review of e-SERVQ and its significance on customer satisfaction and loyalty. Section 3 presents the research methodology, followed by Sections 4 which, displays the analysis and results of the research. Section 5 presents the Discussion. Section 6 presents implications. Finally, section 7 displays the Conclusions.

Literature Review

Service Quality

The conventional definition of service quality is the evaluation by the customer of the overall level of excellence of the service they have received (Zeithaml, 1988). As technology and social structures continue to evolve rapidly, firms are increasingly looking to gain a competitive edge by improving their service quality, which is a crucial factor that impacts customer satisfaction and behaviour (Seung, 2022; Lee & Kim, 2022).

Earlier research has suggested that the adoption of information systems (IS) is greatly influenced by service quality, which is a critical factor for its success (Aldholay et al., 2018; Jeyaraj & Anand, 2020). This research direction has been expanded to e-services, and numerous studies have investigated the connections between e-service quality and customer behaviour (Rita et al, 2019; Kalia & Paul 2021). Parasuraman et al. 1988) proposed the SERVQUAL model as a tool for measuring service quality, and it included ten dimensions. The model is based on the assumption that customers assess service quality by comparing their expectations of service with their actual experiences of the service they received, the SERVQUAL model allows organizations to identify areas where service quality is falling short and take action to improve users' satisfaction. In 1988, The ten dimensions of the SERVQUAL model were reduced into five dimensions. The model of SERVQUAL was widely used, as it is considered a useful tool for businesses to identify areas for improvement in their services (Kansra & Jha, 2016; Kitapci et al., 2014).

E-Service Quality (e-SERVQ)

The concept of e-SERVQ is a derivative of the traditional service quality model, which was adapted to the online business and e-commerce context. In the early 2000s, with the internet gaining widespread adoption, businesses operating online recognized the significance of delivering exceptional services to draw

in and maintain customers, giving rise to the concept of e-SERVQ (Santos, 2003). The term e-SERVQ refers to the level at which a website enables the smooth and successful browsing, buying, and receiving of goods and services, while also improving the consumer's faith, assurance, and dedication to both the website and its sponsors (Parasuraman et al., 2005).

It is widely acknowledged that e-SERVQ is an important aspect for the successful adoption of information systems, especially in the e-service channels context (Parasuraman et al. 1988; Kansra & Jha, 2016). Numerous studies have been conducted on e-services in relation to this research trend, for instance, (Dabholkar et al., 1996) conducted one of the earliest and most influential studies on e-SERVQ measurement resulted in identifying six key dimensions of e-SERVQ scale. Afterward, several researchers have proposed and introduced various models for assessing e-SERVQ. One of the most widely models used to evaluate the electronic service quality is derived from an adapted version of the SERVQUAL model (Li & Reima, 2009). To adapt the SERVQUAL model for the digital service landscape, Zeithaml et al. (2002) suggested a modified scale comprising seven dimensions that assess the caliber of e-services in the online retail setting. Zeithaml et al., (2002) indicated that certain factors of the conventional SERVQUAL model could be applicable in the e-service setting, but emphasized the need to incorporate supplementary dimensions, particularly those pertaining to technology (Li & Reima, 2009; Zeithaml et al., 2002). Building upon the seven-dimension scale, (Herington & Weaven, 2009) expanded and refined it to include eleven dimensions. Later, a scale to rate the quality of internet services was developed by (Zeithaml et al., 2002), which included the electronic-core service quality scale (E-S-QUAL), which measures efficiency, fulfilment, privacy and system availability, and electronic-recovery service quality scale (E-RecS-QUAL), that measures compensation, responsiveness and contact.

While there are several e-service quality models, this modified SERVQUAL adaptation has faced criticism as the unique features of e-service differentiate it from traditional service (Ahmad et al.,2017). E-service is characterized by the lack of physical elements and human interaction, which are typically found in traditional services. E-service enables customers to self-serve and gives them more control over how business is conducted (Herington & Weaven, 2009). Therefore, assessing e-SERVQ differs significantly from assessing service quality in physical venues, and the unsuitability of SERVQUAL scale.

Thus, the characteristics mentioned earlier do not take into account the quality of interaction between customers and mobile applications. In e-commerce, there is a two-way exchange of information between consumers and electronic retails, which distinguishes them from traditional services (Carlson & O'Cass, 2011). Customers place a high value on e-SERVQ because it provides them with an easy way to conduct a comparison of technical specifications and prices of products online, which is more difficult to do through other platforms ((Santos, 2003).

Moreover, e-service operations pose unique challenges that differ from the operations of traditional service. These differences can be viewed from different perspectives: the service quality of e-commerce involves the interaction between customers and the virtual marketplace. Also, the absence of tangible components in the virtual marketplace distinguishes it from the traditional marketplace. In addition, customers are required to learn how to serve themselves in the virtual marketplace (Oliver, 1997). Thus, measuring the quality of e-service delivered through m-commerce applications is more difficult compared to measuring the quality of traditional service provided in physical stores.

Significance of e-SERVQ to Customer Satisfaction and Loyalty

Customer satisfaction can be defined based on the study (Brent, 2013), customer's evaluation that goods or service brings about a satisfactory level of consumption-related fulfilment or enjoyment (Su et al., 2016; Amin, 2016). Numerous prior research have investigated the association between e-SERVQ and users satisfaction, and most have concluded that the perceived e-SERVQ has significant impact on customer satisfaction (Carlson & O'Cass, 2010; Amin, 2016; Blut et al., 2015; Kao & Lin, 2016). On the other hand,

some research has indicated that there is no noteworthy relationship between e-SERVQ and customer satisfaction for instance the study (Chen & Wang, 2016). Enhanced e-SERVQ leads to a notable rise in customer satisfaction, thereby fostering greater customer loyalty (Sørum et al., 2012; Swid & ElMelegy, 2012).

According to (Sørum et al., 2012), customer loyalty refers to the desire of customers to revisit a business's online marketplace and recommend it to others in a positive manner. Numerous research have demonstrated a significant relationship between users satisfaction and customer loyalty (Sørum et al., 2012; Amin, 2016; Swid & ElMelegy, 2012). Blut et al. (2015) proposed a framework for e-SERVQ based on the principles of means-end chain theory. As per this model, the recognition or assessment of e-SERVQ in its entirety results in customer satisfaction, intent to repurchase, and word-of-mouth recommendations. In later research, they developed a framework to comprehend the e-SERVQ, and validated the correlation between the overall e-SERVQ, users' satisfaction, and repurchase intention. As per this framework, the general e-SERVQ has an impact on both customer contentment and the intention to make repeat purchases.

Additionally, customer satisfaction also plays a role in affecting the intention to make repeat purchases. In the realm of m-commerce, maintaining the loyalty of customers hold great significance, as the ability to retain customers ultimately dictates the triumph and endurance of service providers, as a result of intense competition and the exorbitant expenses associated with acquiring new customers Zhang et al. (2015). It is also important to examine the connections among e-SERVQ, customer satisfaction, and customer loyalty in the m-commerce services context. A favourable experience with e-SERVQ can lead to increased levels of users' satisfaction and loyalty. Customer loyalty can be classified into two dimensions: behavioural loyalty and attitudinal loyalty. Behavioural loyalty pertains to a customer's actions in terms of making repeat purchases based on their affinity for a specific brand or service; Attitudinal loyalty refers to the emotional and psychological disposition of a customer, which manifests in a desire to make future purchases and recommend the product to others (Sørum et al., 2012).

Researchers have employed various criteria in assessing the devotion of clients. Zhang et al. (2015) gauged customer loyalty in their research by utilizing metrics that focused on the likelihood of making future purchases and recommending products or services to others, based on a Chinese market research of e-retail sector. From the standpoint of willingness to make repeat purchases and intentions to switch, the study (Aksoy et al., 2013) quantified customer loyalty in the context of m-commerce. Yet, in other studies, researchers evaluated consumer loyalty by repurchase intention (Zhang et al., 2015; Amin, 2016). In this study, the participants' inclination to suggest something to others was measured in our research by posing the following question. "I would recommend the mobile application to friends or family members." in the survey, the response was utilized as a measurement of customer loyalty. When it comes to measuring customer satisfaction, inquiring about clients' contentment with a brand or entity is the most comprehensive approach, as per (Holloway & Beatty, 2008) observations. Using a rating scale to ask customers about their level of satisfaction is a common and effective technique employed in customer satisfaction studies for instance as study (Thakur, 2018). Hence, in this study, the questionnaire item "Overall, I am content with my usage of the present mobile application" was employed as a measure of satisfaction in the m-commerce applications context.

Research Questions and Hypotheses

As a result of the internet's explosive expansion and widespread use, traditional research on service quality have been expanded in the context of e-service. In the e-commerce field, assessing e-service quality has become an increasingly common activity. Due to the significant differences between m-commerce and traditional e-commerce, e-service quality measurements for m-commerce need more investigation and determination for essential factors that should be considered for implementing quality management practices. Moreover, in e-commerce, many past studies have found positive relationships between satisfaction and

loyalty of customers with e-SERVQ, and these relationships need more examination in the m-commerce context. Therefore, the aim of the study is to develop a framework for evaluating the e-SERVQ model in the context of m-commerce applications and examining the dimensions of the model's effect on users' satisfaction and customer loyalty. To achieve the study's goal, a couple of research questions are formulated: Q1: What is the impact of m-commerce applications' e-SERVQ dimensions on users' satisfaction? and, Q2: What impact does users' satisfaction have on customer loyalty?

In the present study, the e-SERVQ proposed model has been introduced, which is adapted from the SERVQUAL model. The e-SERVQ model includes six dimensions namely; information quality, usability, reliability, responsiveness, security, and personalization variables. The factors that are not suitable for the evaluation of m-commerce applications in Egypt were excluded. Thus, these variables lead to the following hypothesizes:

- Hypothesis 1 (H1). The information quality has a positive impact on e-SERVQ.
- Hypothesis 2 (H2). The Usability has a significant impact on e-SERVQ.
- Hypothesis 3 (H3). Responsiveness has a significant impact on e-SERVQ.
- Hypothesis 4 (H4). Reliability has a positive association with e-SERVQ.
- Hypothesis 5 (H5). The personalization has significant impacts on e-SERVQ.
- Hypothesis 6 (H6). Security has positive impact on e-SERVQ.
- Hypothesis 7 (H7). e-SERVQ has significant impact on customer satisfaction.
- Hypothesis 8 (H8). customer satisfaction impacts positively customer loyalty.

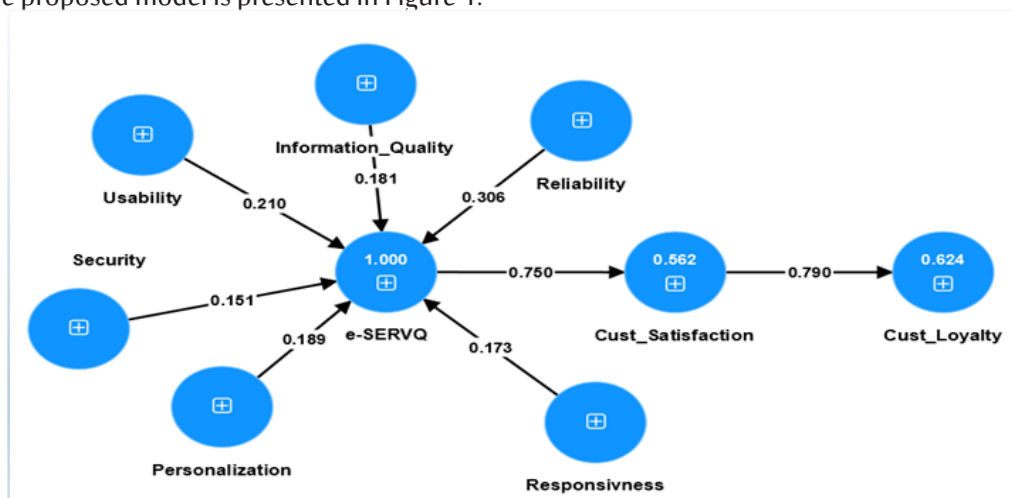The proposed model is presented in Figure 1.

Figure 1. Structural Model.

Table 1. Attributes of e-SERVQ.

Construct	Definition	References
Information Quality	Information quality pertains to how much the m-commerce apps provide excellent quality content.	(Blut et al., 2015; Holloway & Beatty, 2008)
Usability	Usability pertains to how well-organized and effortless it is to navigate the m-commerce applications	(Thakur, 2018)
Responsiveness	Responsiveness denotes the efficient management of issues and returns via the m-commerce applications	(Zemblyte, 2015)
Reliability	Reliability refers to the degree to which the m-commerce applications deliver services as pledged and the accurate technical operation of said applications	(Zhang et al., 2021)

Construct	Definition	References
Personalization	Personalization encompasses the degree to which the website can be customized to suit the individual preferences, purchasing habits, and histories of each customer, as well as how easy it is to do so	(Zhang et al., 2021; Blut et al., 2015)
Security	Security pertains to the level of confidence a customer has in the website's ability to safeguard their personal information and prevent unauthorized access	(Blut et al., 2015; Holloway & Beatty, 2008)
Customer Satisfaction	Customer satisfaction refers to the sentiment or perception a user holds towards a goods or service after utilizing it	(Fornell, 1992)
Customer Loyalty	Customer loyalty is characterized by an individual's connection to a product, along with a sense of dedication that motivates them to make repeat purchases and reduces the likelihood of them switching to a different product.	(Oliver, 1997; Ahmad et al., 2017)

Methodology

The methodology utilized in the study is described in this section. The sample used was described, explain how each variable involved in the study was transformed into a measurable quantity, and then present the statistical analysis that was conducted.

Data Collection

The research was focused on particular groups of respondents who could provide the requisite information for the study, and who can meet certain predetermined criteria. The target population was Egyptian males and females their age above 17 years old. The selection criteria for respondents were internet users, who have experience with mobile applications, have bought products/services, or used services offered by businesses through their mobile applications.

A questionnaire was developed by google forms for the purpose of testing the proposed model, and the hyperlinks were sent to participants through social networks (Facebook, and WhatsApp groups) for five weeks from (September 15, 2022, to October 22, 2022). Participants were asked to answer the questionnaire based on their experience with the last mobile application they accessed. The participants were evaluated to confirm that they recollected their most recent experience of using m-commerce applications Totally 451 respondents filled out the questionnaire. Among the 451 responses, 30 of them indicated that they have no experience or did not purchase through m-commerce applications and were excluded. The foundation of this study is the remaining 421 replies.

To determine the necessary sample size for models with multiple variables, a power analysis was employed (Henseler et al., 2015). To ensure that the collected sample and proposed setting were adequate (Hew et al., 2016), a G* power analysis was conducted (Yan et al., 2021), utilizing an (effect size of 0.15, α of 0.05, β of 0.95), and the 8 variables proposed in the model. At a 95% confidence level and 0.05 error probability, the findings indicated that a minimum sample size of 170 was necessary. Thus, the total sample of over 400 respondents was adequate.

Measurement

Drawing from the proposed e-SERVQ model, this study measured six factors and two endogenous factors. The phrasing of the questions in the online survey was altered to align with the current research. A five-point Likert scale was employed to measure all items, ranging from 1 for strongly disagree to 5 for strongly agree.

Information quality: Information quality was adopted from (Blut et al., 2015) and (Holloway & Beatty, 2008) and was measured using three items. The items were "The mobile commerce applications provide me with the necessary information to complete my tasks", "The mobile commerce applications sufficiently

fulfil my requirements for information", and "The information provided by the mobile commerce applications are efficient".

Usability: Usability assessed using four items used by Thakur (2018). The items were "The mobile commerce applications well organized", "The navigation of mobile commerce applications is consistent and standardized", "In the mobile commerce applications, the scrolling and pages kept to minimum", and "the graphics and animation used in mobile commerce applications do not detract from use".

Responsiveness: Responsiveness were measured using three items borrowed from Zemblyte (2015). The items were "The mobile commerce applications perform service processing with precision.", "The mobile commerce applications provide prompt responses when I inquire", and "The mobile commerce applications fulfil orders or transactions in accordance with its commitments".

Reliability: Five items regarding reliability toward m-commerce applications were cited from (Zhang et al., 2021). The items were "mobile commerce applications deliver what promised", "mobile commerce applications have relevant order confirmation details", "The order cancellation in mobile commerce applications return confirm", "mobile commerce applications provide order tracking available until delivery", and "The mobile commerce applications can be accessed all the time".

Personalization: Three items on personalization about m-commerce application were derived from (Zhang et al., 2021) and (Blut et al., 2015). The items were "The mobile commerce applications enable me to engage with it and obtain personalized information", "The mobile commerce applications have interactive features, which help me accomplish my task", and "I am able to engage with mobile commerce applications to receive customized information that caters to my specific requirements".

Security: Three items on security about m-commerce applications were adopted from (Blut et al., 2015) and (Holloway & Beatty, 2008). The items were "I experience a sense of security when conducting transactions through mobile commerce applications", "The security features of the mobile commerce applications are sufficient.", and "The mobile commerce applications safeguard my credit card information".

Customer satisfaction: In customer satisfaction three items on m-commerce applications were derived from (Fornell 1997). The items were "I am content with these mobile commerce applications", "The mobile commerce applications are approaching the status of an ideal online retailer", and "My needs are consistently fulfilled by the mobile commerce applications".

Customer loyalty: Three items regarding customer loyalty were cited from (Hsu & Lin, 2010) and (Oliver, 1997). The items were "I intend to keep using mobile commerce applications", "I would like to continue using mobile commerce applications", and "I would recommend mobile commerce applications to family, and/or colleges".

Data Analysis

The examination of the data commenced by scrutinizing the profile of the respondents by utilizing the Statistical Package (SPSS) for IBM. Data cleansing and normality testing were also conducted using the package (SPSS). To evaluate the validity and reliability of the proposed model, Partial Least Squares (PLS) software was employed to test both the measurement and structural model. The reason for choosing (PLS) is that the focus of the study is on theory development and prediction rather than theory confirmation (Hair et al., 1995). In addition, (PLS) exhibits greater statistical power, is particularly advantageous in exploratory research, and provides more accurate forecasts for key driver constructs (Hair et al., 1995). Also, PLS is advantageous in cases where the research includes intricate models like hierarchical modelling and the analysis of mediation and moderation effects (Henseler et al., 2015; Hew et al., 2016). Furthermore, (PLS) reduces the need for a large sample size, strict measurement model, and assumptions about the data, which are often considered impractical for social science research.

Results

Sample Characteristics

From the analysis of the data, the gender ratio of 68.1% of females, and 30.8% of the respondents are male. The respondents' age ranged from 18 to more than 45 years. The age group from 26 to 35 represents the most respondents 36.3% compared to the age group from 36 to 45 of respondents by 31.1%. This means that most online users are people who have working experience. In terms of the level of education, the most prevalent educational level among respondents is a Bachelor's degree 68.8% followed by high school 22.5%, and post-grade 8.5%. In terms of the most m-commerce applications usually used by the respondents, it found that most of them are using OLX Egypt 52.9%. This is perhaps due to the different varieties of categories of products, quick responses to inquiries, and fast delivery. The details of the demographic information of the respondents are presented in Table 2.

Table 2. Sample Demographics Analysis (N = 421).

Characteristics	Categories	Frequency	Percent (%)
Gender	Male	134	31.8
	Female	287	68.1
Age	18-25	50	11.8
	26-35	153	36.3
	36-45	131	31.1
	>45	87	20.6
Education	High school	95	22.5
	Bachelor's degree	290	68.8
	Post-graduate	36	8.5
Preferred Mobile app for online shopping	OLX Egypt	223	52.9
	Amazon	91	21.6
	Noon	37	8.7
	Alibaba	27	6.4
	Defacto	23	5.4
	Others	20	4.7

Measurement Model

For examining the accuracy and reliability of the measurement, this study used (PLS) software to evaluate the empirical strength of the relationships in the suggested model. Factor loading, composite reliability (CR), and average variance extracted (AVE) were used to assess the convergent validity (Yan et al., 2021). According to Faul et al. (2007), these tests are considered valid if each item has a factor loading greater than 0.7, the CR is greater than 0.7, and the AVE is greater than 0.5. As shown in Table 3, factor loading ranged from 0.729 to 0.909 and all items are greater than 0.7 (Yan et al., 202), which indicating strong evidence of internal consistency of convergent validity (Faul et al., 2007). For (CR) all the values exceeded 0.6 which recommended by (Ng et al., 2022). For (AVE), all the constructs also exceeded the value of 0.5 ranging from 0.517 to 0.684 which is consistent with the recommendation of (Kock & Hadaya, 2018), and indicated that most of the variance of each indicator was explained by its own construct. Convergent reliability was confirmed because all tests (factor loading, CR, and AVE) exceeded the

Table 3. Measurement Model Validity (N = 421).

Construct	Item	Factor Loading	VIF	Cronbach alfa	CR	AVE
Information Quality	INFQ1	0.888	2.179	0.829	0.830	0.618
	INFQ2	0.858	1.951			
	INFQ3	0.844	1.723			
Usability	USB1	0.863	2.206	0.856	0.860	0.600
	USB2	0.840	2.002			
	USB3	0.851	2.195			
	USB4	0.787	1.664			
Responsiveness	RES1	0.830	1.596	0.758	0.770	0.517
	RES2	0.780	1.436			
	RES3	0.851	1.599			
Reliability	RLB1	0.844	2.336	0.893	0.896	0.628
	RLB2	0.791	1.982			
	RLB3	0.869	2.730			
	RLB4	0.888	2.935			
	RLB5	0.797	1.918			
Personalization	PER1	0.861	1.925	0.866	0.867	0.684
	PER2	0.901	2.553			
	PER3	0.902	2.562			
Security	SEC1	0.909	2.289	0.857	0.861	0.751
	SEC2	0.928	2.176			
	SEC3	0.729	1.942			
Customer Satisfaction	CSF1	0.753	1.984	0.856	0.861	0.668
	CSF2	0.836	2.167			
	CSF3	0.859	2.345			
Customer Loyalty	LOY1	0.839	2.242	0.860	0.863	0.673
	LOY2	0.850	2.146			
	LOY3	0.770	2.154			

suggested thresholds. Additionally, the variance inflation factor (VIF) for each construct was evaluated in order to determine the level of multicollinearity. According to Hair et al. (2017), all VIF values are well below 10, ranging from 1.436 to 2.935, and as a result, there is no discernible multicollinearity issue with the data.

In addition, the Heterotrait-Monotrait (HTMT) ratio criterion was utilized to evaluate discriminant validity (Yan et al., 2021), and upon examination, all HTMT ratios were below the threshold of 0.90, signifying that discriminant validity had been established (Ng et al., 2022; Kock & Hadaya, 2018) as shown in Table 4.

Table 4. Fornell–Larcker Criterion and Heterotrait-Monotrait (HTMT)

	Cust_ Loy	Cust_ Sat	E_ Serv_Q	Info_ Qual	PER	REL	RES	SEC	USB
Cust_Loy									
Cust_Sat	0.891								
E_Serv_Q	0.766	0.834							
Info_Qual	0.658	0.723	0.843						
PER	0.65	0.711	0.887	0.65					
REL	0.684	0.781	0.841	0.713	0.823				
RES	0.775	0.801	0.803	0.827	0.781	0.854			
SEC	0.675	0.73	0.794	0.583	0.617	0.588	0.705		
USB	0.575	0.605	0.895	0.887	0.59	0.642	0.879	0.526	

Notes: Info_Q, Information_Quality; FF, PER, Personalization; REL, Reliability; RES, Responsibility; SEC, Security; USB, Usability; Cust_SAT, Customer_Satisfaction; Cust_LOY, Customer_ Loyalty.
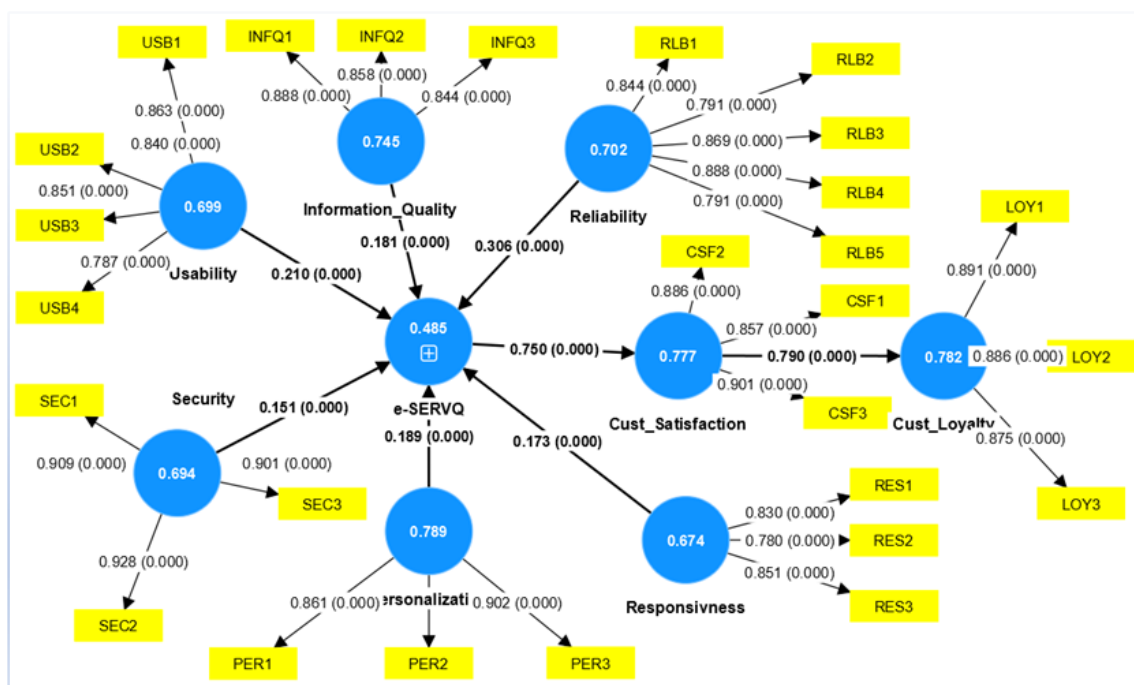

Figure 1. Total model

Structural Model

The significance of the path coefficients using the bootstrapping technique with 5,000 subsamples was examined. The results were summarized in Table 5. The first dimension in the e-SERVQ model is Information quality (β = 0.181, p < 0.05) is found to have a positive influence on e-SERVQ; thus, H1 is supported. The second dimension; reliability (β = 0.306, p < 0.05) is also found to influence e-SERVQ positively; thus, H2 is supported. The third-factor usability (β = 0.210, p < 0.05) has a positive impact on e-SERVQ, which means H3 is accepted. Responsiveness (β = 0.173, p < 0.05), has a positive impact on e-SERVQ, thus, H4 is supported. The fifth-factor reliability (β = 0.306, p < 0.05) is found to have a positive impact on

e-SERVQ, thus, H5 is accepted. The last factor is security, and its results (β = 0.151, p < 0.05) which means, it has a positive influence on e-SERVQ, and H6 is supported. From the above results, all the dimensions were the significant predictors of e-SERVQ (β = 0.750, p < 0.05), which significantly influences user satisfaction. On the other hand, the results turned out that customer satisfaction (β = 0.790, p < 0.05) had a significant positive impact

Table 5 Hypothesis Testing

Dependent variable	R-square	R-square adjusted
Customer_Loyalty	0.624	0.623
Customer_Satisfaction	0.562	0.561

	Hypothesis Relationship	Beta	STDEV	T statistics	P values	Path Cof.	Supported
(H1)	Info_Qual-> e-SERVQ	0.181	0.006	29.529	0	0.181	Yes
(H2)	USB -> e-SERVQ	0.21	0.008	26.323	0	0.210	Yes
(H3)	RES -> e-SERVQ	0.173	0.006	28.892	0	0.173	Yes
(H4)	REL -> e-SERVQ	0.306	0.01	30.339	0	0.306	Yes
(H5)	PER -> e-SERVQ	0.189	0.008	23.632	0	0.189	Yes
(H6)	Security -> e-SERVQ	0.151	0.008	19.677	0	0.151	Yes
(H7)	E-SERVQ -> Cust_Sat	0.75	0.029	26.157	0	0.750	Yes
(H8)	Cust_Sat -> Cust_Loy	0.79	0.026	30.488	0	0.790	yes

on customer loyalty (p > 0.05). Overall, the model explained 62.4% of the variance in continuance to shop using m-commerce applications.

Discussion

The study's objectives were to assess e-SERVQ in mobile commerce applications in Egypt and look into key factors that affect customers' satisfaction and brand loyalty. Drawing from the findings of the study, reliability is the strongest variable in the e-SERVQ model that influences user satisfaction with m-commerce applications. In addition, usability, personalization, information quality, responsiveness, and security also have a positive impact on customer satisfaction. The study's finding regarding the contribution of reliability aligns with research (Alarif & Husain, 2021) suggesting that reliability has the strongest impact on user satisfaction in an online setting, and align with previous research (Egala et al., 2021; Raza et al., 2020) indicating that reliability is a significant factor in enhancing user satisfaction in online business context. In addition, reliability is considered essential in the m-commerce context as it confirms the smoothness of the transaction with no or minimal errors. A positive experience will undoubtedly persuade users to return to the same online platform in the future. So, as mentioned in the above previous research, reliability was identified as an important dimension in e-SERVQ that can significantly impact customer satisfaction.

The study's findings showed that most participants agreed that the responsiveness and personalization features of the online shopping platform were important in raising their satisfaction with m-commerce applications. Consequently, this will encourage them to make future purchases from the same platform that they have previously used. Felix's (2017) research demonstrated a significant correlation between responsiveness and customer satisfaction. According to (Kim et al., 2021) study, intrinsic information quality and contextual information quality have a notable impact on consumers' perception of information quality, which subsequently affects their satisfaction with the product or service. The current research investigated the impact of information quality as a first-order variable and revealed a noteworthy association with e-SERVQ model, which influence customer satisfaction. Thus, it is crucial for platform providers and retailers to provide comprehensive descriptions of their products or services on m-commerce applications, including information such as country of origin, manufacturing process, and the origin of materials.

The results of the present study indicate that customers who express satisfaction with m-commerce applications are more likely to exhibit loyalty. In other words, satisfied users are likely to exhibit positive behaviours such as showing an intention to make repeat purchases and may also spread positive word-of-mouth recommendations to others. This result is consistent with previous research conducted by (Chang & Chen. 2009; Reichheld & Schefter, 2000) which suggested that customers' satisfaction with their previous purchasing experience is a key factor in establishing loyalty.

Additional research has shown that when customers are satisfied with the services provided by a company, they are likely to engage in repeat purchasing, recommend the platforms to others, and make comparisons between its offerings and those of its competitors (Rizan et al., 2014). As such, it's crucial that providers adhere to particular criteria or standards for the online services offered via m-commerce applications in order to entice customers to use these applications for their shopping needs in the long term. Likewise, the present findings have verified that customer satisfaction serves as a mediator in the connection between certain aspects of e-SERVQ dimensions and customer loyalty. This suggests that it is important for providers of m-commerce applications and retailers to take steps to enhance their online services in the future. It is crucial to carefully consider ways to improve certain features of m-commerce applications in order to ensure the ongoing viability of online businesses.

Implications

This study makes significant contributions in both theory and practice by broadening our understanding of the dimensions of e-SERVQ in m-commerce applications. It also explores the indirect influence of these dimensions on customer loyalty, mediated by customer satisfaction with the services offered through m-commerce applications. As a result, the study anticipates that its findings will be valuable to future researchers and providers of m-commerce applications. Additionally, the study's conclusions are expected to assist business owners in formulating and improving online business strategies in the future. This study has important theoretical implications as it enhances our understanding of m-commerce and customer service research by examining the predictive capacity of e-SERVQ dimensions, such as reliability, usability, responsiveness, personalization, and information quality, on customer satisfaction and loyalty intentions towards m-commerce applications. The inclusion of a mediating analysis of customer satisfaction in m-commerce applications is particularly valuable, as previous m-commerce studies have not extensively investigated the indirect impact of customer satisfaction on the relationship between service quality dimensions and customer loyalty intentions. These findings provide valuable insights for academics interested in studying e-SERVQ variables and customer loyalty intentions in the context of m-commerce.

From a practical standpoint, this study presents three key implications for m-commerce application providers and online retailers to improve their online services and ensure the sustainability of e-commerce. Firstly, given the increasing number of customers utilizing m-commerce applications for their online shopping needs, it becomes essential for providers to deliver exceptional online services. This entails focusing on aspects such as information quality, responsiveness, and personalization within the online shopping platform. The platform for m-commerce applications differs significantly from the traditional physical store environment. There are notable distinctions in terms of communication, shopping experiences, and problem-solving methods. Hsin Chang and Wang (2011) argue that these differences are evident in the context of customer shopping experiences, which subsequently impact their future behavior in terms of repurchasing, revisiting, and engaging in word-of-mouth recommendations, regardless of whether they are positive or negative. Furthermore, providing excellent online services to customers enhances their satisfaction levels and greatly increases the likelihood of customer loyalty. This viewpoint is also supported by Gounaris et al. (2010), who emphasize the importance for online sellers to deliver superior online service experiences to customers, as this influences their intention to repurchase and maintain loyalty towards the shops or businesses.

Moreover, enhancing the m-commerce applications platform with value-added services is an effective approach to satisfy users, ultimately leading to increased loyalty. Consequently, loyal customers contribute significantly to the value and profitability of businesses. This perspective is supported by Shafiee and Bazargan (2018), who suggest that companies operating in the m-commerce applications platform should offer intriguing and appealing incentives and services to encourage customer return. There are numerous offers and services that can delight customers on the m-commerce applications platform, including first-time sign-up discounts,

birthday coupons, free shipping, and exclusive membership prices. These initiatives should not be underestimated, as they serve as powerful tools for fostering customer satisfaction and cultivating loyalty.

Conclusion

This study provides both practical and theoretical contributions by enhancing current comprehension of the dimensions of e-SERVQ in m-commerce applications and examining how these dimensions affect customer loyalty through customer satisfaction with the service provided. According to the study, the conclusions will be useful to both m-commerce application developers and future researchers. The study's results would aid business owners in the future by assisting them in developing and improving their online business strategies.

In relation to the theoretical implications, this study enhances the field of m-commerce and customer service research by shedding light on the predictive capacity of e-SERVQ dimensions, specifically reliability, usability, responsiveness, personalization, security, and information quality, with regard to user satisfaction and customer loyalty toward m-commerce applications.

In relation to the practical implications, this study identifies many implications for m- commerce application providers and online retailers to improve their online services and ensure m-commerce sustainability. As a significant number of customers now use m-commerce applications for their online shopping, it is essential for providers of such applications to provide excellent online services. Excellent online services could pertain to the reliability, usability, security, responsiveness, personalization, and information quality of the online shopping platform. The platform for m-commerce applications differs entirely from that of a physical store setting. It varies in its communication approach, shopping encounters, and methods for addressing problems. According to (Hsin & Wang, 2011), this idea is substantiated by the fact that the dissimilarity between the brick-and-mortar store and the online store can be observed through the lens of the customer's shopping experience. This experience, in turn, can affect their future actions of making repeat purchases, returning to the store, and engaging in word-of-mouth communication, regardless of whether it is positive or negative. Furthermore, providing excellent online service to users will result in their satisfaction and increase the likelihood of their loyalty. Gounaris et al., (2010) also supports this perspective by indicating that online vendors ought to deliver exceptional online service experiences to their customers. As a result, these customers are more likely to intend to make repeat purchases and remain loyal to the shops or businesses.

Moreover, one approach to promoting loyalty among m-commerce application users is to offer value-added services that increase their satisfaction. Consequently, businesses will earn more value and profit from their loyal customers. Shafee et al., (2018) supports this idea by suggesting that companies offering m-commerce applications should provide enticing and compelling offers and services that motivate customers to return. Various offers and services can please customers using m-commerce applications, including discounts for first-time sign-ups, birthday coupons, free shipping, early-bird pricing, free gifts, and special membership prices. These efforts should not be disregarded, as they are among the most effective tools for promoting customer satisfaction and loyalty. Overall, the study is a valuable contribution to the field of m-commerce in Egypt. It provides insights into the importance of e-SERVQ and identifies the key dimensions that drive customer satisfaction and loyalty. The findings of this study have implications for m-commerce businesses in Egypt and can be used to inform the development of strategies for improving e-SERVQ and enhancing satisfaction and loyalty of customers that leading to increased sales and long-term success.

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