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A Framework for Assessing E-Commerce Customers' Satisfaction based on Electronic Words of Mouth

Adeola O. Opesade

Department of Data and Information Science, Faculty of Multidisciplinary Studies, University of Ibadan, Ibadan, Nigeria.

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Abstract— Electronic commerce, though highly beneficial, is usually perceived by people to be riskier than its brick and mortal counterpart. The confirmation or disconfirmation of customers' perceived risk ultimately results in their dissatisfaction or satisfaction with the service. A lot of studies have been carried out on e-commerce customer satisfaction; investigation of this subject based on customers' electronic words of mouth (eWOM), is however, sparse. There is also a dearth of models or frameworks that can be used for assessing customer satisfaction, based on their eWOM. Building on the foundation of relevant empirical findings and the DeLone and McLean's IS Model for e-commerce, the present study proposed and developed a framework for assessing e-commerce customers' satisfaction based on their eWOM. The study also demonstrated the use of the model with the eWOM of customers of one of the most popular e-commerce sites in Nigeria, Jumia. These customers' e-commerce service-related communications (eWOM) were retrieved from Twitter. Tweets were analysed based on the proposed framework. It was found that customers of the examined e-commerce site expressed more dissatisfaction than satisfaction through their eWOM. The overall satisfaction index was -0.84 and all indicators, except only one, had negative satisfaction indices. It is recommended that the framework can be further tested and used to assess the performance of more e-commerce sites. It is also recommended that e-commerce service providers should be intentional about examining their customers' eWOM and improving their services by addressing the loop holes identified from the examination of the eWOM.

Keywords/Index Terms— Customer satisfaction, Electronic commerce, Electronic Word of Mouth, Perceived risks

1. Introduction

Information and Communication Technologies (ICTs) have been highly beneficial to human beings. One of the numerous dividends of ICT is electronic commerce (e-commerce) which involves the application of ICT at any or all stages of commercial transactions such as advertising and searching, ordering and payment, and the delivery (Lawal & Ogbu, 2015). E-commerce offers convenience to its adopters, nevertheless, it also has a higher level of customer risk perception, compared to its brick and mortar counterpart. E-commerce customers' perceived risks continue until they are either confirmed or disconfirmed. When the perceived risk is confirmed, the customer is said to be dissatisfied, otherwise, she/he is satisfied with the e-commerce transaction. Customer satisfaction usually leads to a stronger repurchase intention, and often also makes customers to recommend the product or service to their associates (Sharma & Bahl, 2018; Tzavlopoulos et al., 2019; Ogwueleka et al., 2012). Their dissatisfaction may harm companies' reputation by negative word-of-mouth or registration of complaints to the media or to consumer protection establishments (Tzavlopoulos et al., 2019).

A number of studies have examined e-commerce customers' behavior (Cristofaro & Giardino, 2022) and their satisfaction in particular (Omar et al. 2015; Lin et al., 2011; Nisar & Prabhakar, 2017; Sharkey et al., 2010; Mahendra et al., 2020; Dirgantari et al., 2020). These studies have provided information on factors that affect the level of satisfaction derived by e-commerce customers. It could however, be observed, in line with the observation and submission of Voorveld (2019), that these previous studies have mainly reported studies carried out with surveys.

Pervasiveness of ICTs has now made consumers to increasingly use online platforms like social media for different types of customer-related activities such as posting complaints about a product or service as well as sharing their purchase experiences (Hofacker & Belanche, 2016). The ease with which customers generate contents about products and other matters of interest on the Internet has made online platforms to be a rich source of data that could give insight on the performance of e-commerce sites based on customers' eWOM. A search through the literature however, revealed a dearth of information on assessment of customers' satisfaction based on their electronic word of mouth. There is also a dearth of framework or model that could assist in assessing customers' satisfaction based on their electronic word of mouth.

The present study in an attempt to push the frontier of scholarship in e-commerce customers' satisfaction, proposed and evaluated a framework for assessing e-commerce customer satisfaction based on their electronic words of mouth. In order to achieve the objective of the study, the proposed framework was built on the foundation of existing empirical studies on customers' e-commerce satisfaction and the DeLone and McLean's IS Model for e-commerce. The proposed framework was then used to assess an e-commerce site's customers' satisfaction indices.

Misra (2021) provides a systematic way of structuring the different components of research papers in ICT related disciplines. Accordingly, the present paper is structured in six sections. The next section of this paper presents the review of the literature. Section 3 describes the research methodology. Findings and their discussion are presented in Section 4 while conclusion and recommendations are presented in Section 5 and Section 6 respectively.

2. Review of the Literature

2.1 Electronic Commerce

Electronic commerce (e-commerce), a phenomenon that enables business transactions to be carried out without a need to leave the comfort of one's preferred location, is one of the main dividends of the Information and Communication Technology. With the aid of modern communication instruments, commercial transactions can now be facilitated, executed, and concluded remotely (DeLone & McLean, 2004; Lawal & Ogbu, 2015). E-commerce offers numerous benefits to people either at the macro or micro level. E-commerce, if rightly exploited, has the capacity to bring development and sustainability to the growth of a country's economy (Lawal & Ogbu, 2015; Ajayi et al., 2021). With e-commerce, platforms are provided for businesses to enter the global market, irrespective of their locations and sizes; giving them equal opportunity to compete in the phase of world economic dynamics (Nisar & Prabhakar, 2017). Individual customers are also not left out, as it provides them an opportunity to compare, choose or switch to any e-commerce sites that meet their expectations (Sharma & Bahl, 2018).

Despite its numerous benefits, e-commerce faces a number of challenges which can impact on its wide adoption, especially by customers in the developing countries. Online shopping, unlike its offline counterpart is usually perceived to be a lot riskier, partly because most vendors have no physical store and most products cannot be physically evaluated until the customers receive them (Nisar & Prabhakar, 2017; Sharma & Bahl, 2018). Perceived risk has mostly been reported by previous studies to consist of five different types. These are the social, psychological, economic, performance, and time risks. As reviewed by Brosdahl & Almousa (2013), psychological risk refers to the danger to an individual's ego being crushed if a poor choice is made in online shopping. Social risk entails the possibility of suffering from status loss from social circle of influence if a poor choice in made. Perceived economic risk refers to perceived financial harm or loss as a result of maintenance issues and/or fraud. Performance risk entails the perception that a product or service might not perform as expected. Lastly, perceived time risk involves the potential time loss from researching on or involved in making a purchase. In addition to these five main types of customers' perceived risks, privacy risk, the potential loss of control over personal information has also been widely reported as common among e-commerce customers (Brosdahl and Almousa 2013; Ko et al., 2004). These customers' perceived risks usually persist until they are finally confirmed based on the quality of the product and service, thereby, leading either to customer

satisfaction or dissatisfaction with the e-commerce site (Ko et al., 2004).

2.2 E-commerce Customer Satisfaction

E-commerce customer satisfaction has been defined as a collective outcome of perception, evaluation, and psychological reaction to the quality of service received in an e-commerce transaction (Omar et al., 2015). It is the contentment that consumers get from their purchasing experiences with an e-commerce firm. If the perceived performance is equal or higher than their expectations, customers feel satisfied, otherwise they feel dissatisfied. Customer satisfaction could lead to a stronger repurchase intention and make customers to recommend the product or service to their associates (Sharma & Bahl, 2018; Tzavlopoulos et al., 2019). Furthermore, customer satisfaction could make customers to be more tolerant with price increase, thereby leading to greater profits to the service provider (Olajide et al., 2016). On the other hand, dissatisfied and unhappy customers may harm companies' reputation by negative word-of-mouth or by registering their complaints to the media or to consumer protection establishments (Tzavlopoulos et al., 2019).

As reported by Statista in 2015 and cited by (Nisar & Prabhakar, 2017), a survey of about two hundred senior marketing managers revealed that assessing customer satisfaction metric is very important in business management and review. Little wonder then, that there have been a lot of studies on e-commerce customer satisfaction from different parts of the world (Nisar & Prabhakar, 2017). For example, Omar et al. (2015) assessed Libyan e-commerce customers' satisfaction and investigated the influence of e-commerce service quality on Libyan customers' satisfaction. They collected data through customers' survey with the use of a questionnaire. Their study revealed that there is a very strong relationship between service quality and customers' satisfaction. Lin et al. (2011) investigated the factors that affect online consumers' satisfaction in Taiwan. Leveraging on the Delone and McLean Theory and using the survey method, they collected data from three hundred and ninety (390) Taiwan university undergraduates. Their study revealed that online consumers' satisfaction was positively and significantly related to system quality, information quality, service quality, delivery quality, perceived price and product quality; where delivery quality was found to be the most crucial factor, followed by product quality.

Nisar & Prabhakar (2017), focusing on American based e-commerce firms, investigated factors affecting electronic commerce customers' satisfaction as well as the relationship that exists between customer satisfaction and consumer spending behavior in an e-commerce service. Their study used a data sample that was collected from the American customer satisfaction index (ACSI). They reported that customer satisfaction has a positive impact on consumer spending behaviour. Sharkey et al. (2010) applied the updated IS success model proposed by DeLone and McLean in 2003 to investigate the influence of information quality and system quality on the success of an e-commerce system. Also investigated in the study were the intention to use, user satisfaction, and intention to transact. Carrying out a two-questionnaire

(pre-task and post-task) survey among twenty seven graduate students in an Irish university, they reported significant relationships among Information Quality, System Quality and three success factors, namely, intention to use, user satisfaction and intention to transact.

Mahendra et al. (2020) assessed the success of e-commerce from the perspective of the millennial generation in Indonesia. Using the DeLone and McLean Updated Information System Success Model and the survey method, data was collected with the use of copies of the questionnaire that was distributed to two hundred and ninety one (291) respondents. The study reported that quality of information and customer satisfaction have significant influence on the use of an e-commerce application. Dirgantari et al. (2020) investigated the level of use and satisfaction of Indonesian e-commerce customers in the COVID-19 pandemic period with the DeLone and McLean information system success model (ISSM). Using a survey method, data was collected from two hundred and six e-commerce customers with the use of a questionnaire. Their results revealed that system quality, information quality, and service quality affected the level of use and user satisfaction of e-commerce customers.

These previous studies have made many useful contributions to the measurement of customer satisfaction as well as to determining customer satisfaction, predicting factors and the implications of e-commerce customer satisfaction. It could however be observed that they have mostly employed the survey method to elicit data from human respondents. This observation corroborates the finding of (Voorveld, 2019) that previous scholarship identified in his search of journals that have the longest history in the field of brand communication mainly describe experiments and surveys. Survey is a very important age-long research methodology. However, with the advent of data immersed world and the ease with which customers generate contents about products and other matters of interest on the Internet, online media have become another source of data that could provide useful insights on the performance of e-commerce sites through their customers' eWOM.

2.3 Customers' Electronic Word of Mouth

Electronic Word of Mouth (eWOM) refers to any positive or negative statement made by any category of customers about a product, service or a company via the Internet (Baek et al., 2014). The Internet has improved customers' contribution to brand communications through their feedbacks and online reviews (Khan & Uwemi, 2018). Consumers increasingly use online platforms like social media for diverse consumption-related purposes (Hofacker & Belanche, 2016). This has created opportunities and potentially some negative implications for businesses since opinions posted by consumers online have been found to be one of the most trusted forms of advertising worldwide (Sotiriadis & van Zyl, 2013). Social media have become a very important part of people's lives and in an attempt to capitalise on customers' high level of usage, almost every business has its presence on social media (Voorveld, 2019). Social media,

therefore, constitute a huge and important source of data for customer recommendations, comments and reviews. This source has however been grossly understudied as a source of data on customer satisfaction.

Assessing customers' satisfaction in an online environment might require a new method of evaluation from the existing ones. Presently, there are basically two methods of evaluating customer satisfaction, otherwise known as dis/confirmation of expectations. The two methods as reviewed by (Yuksel, 2008) are the inferred and the direct approaches. The inferred approach involves the computation of the difference between expectations and perceived performance while the direct approach requires the use of summary judgmental scales to measure confirmation or disconfirmation. In this approach, the calculation of the difference scores is avoided in as much as the respondents could be asked directly about their experience with the service compared to their expectations (Yuksel, 2008). The first approach demands that information should be available on two variables; expectation or desire and then experience or perceived performance. The second approach requires the availability of respondents who can give their direct responses on the expectation and e-commerce performance (Bahru, 2009). These requirements are however, missing in customers' brand communication in an online environment.

Electronic words of mouth lack data on expectation, there are also no human respondents from which e-commerce performance rating could be elicited directly. Auspiciously, there are posted texts from which customer satisfaction could be derived. This is basically possible because user's sentiments as a result of their satisfaction or otherwise are expressible in online comments, tweets and reviews (Opesade, 2021a; Opesade, 2021b; Shaba et al., 2021).

Although, some studies have been carried out on the subject of eWOM (Cheung et al., 2008; Shi et al., 2016; Page, 2012; Breazeale, 2009; Hennig-Thurau et al., 2004; Huete-Alcocer, 2017; Lis & Neßler, 2014; Liu, 2013), a search through the literature revealed a dearth of studies on e-commerce customer satisfaction models for measuring customer satisfaction based on their electronic words of mouth. The present study seeks to cater for this gap in research by developing and testing a framework for assessing customer satisfaction based on their electronic words of mouth.

2.4 Theoretical Framework

The proposed framework for the present study is built upon the foundation of previous empirical findings on e-commerce customers' satisfaction and the DeLone and McLean's IS Model for e-commerce (DeLone & McLean, 2004). DeLone and McLean's IS Model for e-commerce had its root in the DeLone & McLean's IS Success Model (1992). The DeLone & McLean's IS Success Model (1992) was developed to present a more unified view of the concept of information system success while also identifying the critical information systems success factors (Chong et al., 2010). The model was later revised in 2003 by extending its application to electronic commerce in 2004 (Chong, 2010; DeLone & McLean,

2004).

DeLone & McLean (2004) identified six e-commerce success dimensions, namely, the system, information, and service quality dimensions as well as usage, user satisfaction and net benefits. According to them, System Quality assesses the desired features of an e-commerce system such as availability, usability, adaptability, reliability and response time. Information Quality determines the e-commerce content matters like personalisation, relevance, completeness, ease of understanding, and security. Service Quality encompasses all the support rendered by the service provider to the customer. Usage refers to every activity ranging from visiting a website, navigation within the site to retrieval of information and execution of a transaction. User satisfaction determines customers' views of an e-commerce system and it entails the entire customer experience cycle. Net benefits measure the balance of the positive and negative impacts of e-commerce on all, internal and external stakeholders, who are affected by the business (DeLone & McLean, 2004).

The present study adopts four of the theory's constructs, namely, System Quality, Information Quality, Service Quality and User Satisfaction. Unlike the previous studies that have used this theory, the present study seeks to generate insights from customers' eWOM data and thereby present outcomes based on the eWOM dataset.

3. Research Method

The present study employed the data-driven research approach. The study consists of two main parts namely, the model formulation and model testing stages. The first stage seeks to propose customer satisfaction indicators and develop a mathematical model that can be used to evaluate customers' satisfaction in an online environment while the second part applied the model to a set of data for the purpose of model testing. This section presents the methods employed in the two stages.

3.1 Model Formulation

Phase I: Identifying e-commerce customer satisfaction indicators

Based on the review of the literature, the proposition in the present study is built upon the foundation of DeLone and McLean model of E-commerce IS success and upon literature on e-commerce customers' satisfaction. DeLone and McLean model of E-commerce IS success has been adapted for the present study because of its popularity in the study of information systems generally and particularly to that of e-commerce. Literature on customers' satisfaction has also been considered relevant to the study because they provide empirical findings on factors that lead to customer satisfaction.

Based on these existing previous studies, the present study identifies e-commerce customer satisfaction indicators as presented in Table 1. Table 1 consists of nine customer satisfaction indicators. However, since insights from customers' eWOM datasets are paramount in the present model formulation, other indicators found in the dataset but which are not among the stated indicators are also to be included in the model.

Table 1: E-Commerce Customer Satisfaction Indicators

S/No.	Proposed Satisfaction Indicators	Source
1	System	DeLone & McLean, 2004; Sharkey et al., 2010; Lin et al., 2011; Dirgantari et al., 2020
2	Information	DeLone & McLean, 2004; Sharkey et al., 2010; Lin et al., 2011; Dirgantari et al., 2020
3	Service	DeLone & McLean, 2004; Lin et al., 2011; Omar et al., 2015; Dirgantari et al., 2020
4	Social	Brosdahl & Almousa, 2013
5	Psychological	Brosdahl & Almousa, 2013
6	Financial	Brosdahl & Almousa, 2013
7	Product Performance	Brosdahl & Almousa, 2013; Lin et al., 2011
8	Time	Brosdahl & Almousa, 2013
9	Privacy (security)	Brosdahl & Almousa, 2013
10	Other(s)	eWOM Dataset

Phase II: Mathematical Modelling of Customer Satisfaction Index

Customer satisfaction is hereby modelled and presented as follow:

$I_t = c_t w_t / N$ …….. (Eq. 1)

$I_k = \sum_{t=1}^{2} c_t w_t /$ N ……. (Eq. 2)

$S_i = \sum_{i=1}^{n} I_k / n$ ……..... (Eq. 3)

Where:

I_t is the normalised indicator index based on type t of the online review (type can be either of two polarities, that is, commendation or complaint).

c_t is the total count of online reviews on the indicator k of type *t.*

w_t is the weight based on type t of the online review (w_t can either be +1 for a positive eWOM (commendation) or -1 for a negative eWOM (complaint))

N is the total number of online reviews under consideration (Contains all reviews that are either complaints or commendations alone. Neutral contents such as advertisements are not included).

I_k is the derived quality index of an indicator *k*.

n is the total number of indicators.

S_i is the overall customer satisfaction index for an e-commerce site.

The proposed mathematical model for assessing e-commerce customer satisfaction can be applied using the following steps:

1. Select the list of e-commerce site(s) whose e-commerce customer satisfaction is to be assessed or compared.
2. Gather customer brand-related communication from selected online media for each e-commerce site.
3. Determine the type of review (commendation, complaint or neutral)
4. Remove the neutral contents
5. Determine the satisfaction indicator in each post of eWOM.
6. Count the number of reviews on each indicator based on the type of text (complaint or commendation).
7. Multiply the counts by -1 if the review counts are for complaints, otherwise multiply the counts by +1.
8. Divide the weighted counts by the total sum of positive and negative eWOM posts.
9. Determine the quality index of each indicator by summing the normalized weighted counts.
10. Determine the overall e-satisfaction index by finding the average of all quality indices of all indicators.

4. Model Evaluation and Findings

An e-commerce site (Jumia) was selected for this study. Jumia is one of the most popular e-commerce sites in Nigeria. Customer brand-related tweets (eWOM) on services received from Jumia was collected by the author on the 17th of April 2020 from Twitter, using #jumianghelp as search term on Orange data mining tool Twitter API.

Tweets were first read and annotated based on the sentiment inclination expressed and then on the satisfaction indicator being reported on in each tweet. These sentiment polarity labels were positive, negative or neutral. All neutral tweets were expunged from the dataset, leaving only the positive (commendation) and negative (complaints) tweets. Table 2 presents the satisfaction indicators contained in the collected tweets and the counts of their positive and negative contents.

Table 2: Counts of Annotated Collected Tweets

Customer Satisfaction Indicator	Positive	Negative	Total
System Satisfaction	1	17	18
Information Satisfaction	0	21	21
Service Satisfaction	16	39	55
Social Satisfaction	0	0	0
Psychological Satisfaction	1	20	21
Financial Satisfaction	0	44	44
Product Performance Satisfaction	1	14	15
Time Satisfaction	4	110	114
Privacy Security Satisfaction	0	1	1

As shown in Table 2, counts of positive tweets range from zero (0) for information satisfaction, social satisfaction and privacy security to sixteen (16) for service satisfaction. The counts of negative tweets range from zero (0) for social satisfaction to one hundred and ten (110) for time satisfaction. The total number of tweets on each satisfaction indicator are also presented ranging from zero for social satisfaction to 114 for time satisfaction.

Applying the mathematical model (Eq. 1, 2 and 3), the index of each indicator and the overall user satisfaction index for the collected data are as presented in Table 3.

Table 3: Customer Satisfaction Indices

Indicator	**Normalised Positive Score** ($I_{t=1} = c_t w_t / N$)	**Normalised Negative Score** ($I_{t=2} = c_t w_t / N$)	**Indicator Index** ($I_k = \sum_{t=1}^{2} c_t w_t \frac{1}{N}$)
System Satisfaction	0.003	-0.059	-0.055
Information Satisfaction	0.000	-0.073	-0.073
Service Satisfaction	0.055	-0.135	-0.080
Social Satisfaction	0.000	0.000	0.000
Psychological Satisfaction	0.003	-0.069	-0.066
Financial Satisfaction	0.000	-0.152	-0.152
Product Performance Satisfaction	0.003	-0.048	-0.045
Time Satisfaction	0.014	-0.381	-0.367
Privacy Security Satisfaction	0.000	-0.003	-0.003
Overall E-commerce Customer Satisfaction Index ($S_i = \sum_{i=1}^{n} I_k \frac{1}{n}$)			-0.84

As shown in Table 3, the overall customer satisfaction index of the ecommerce site, based on electronic word of mouth (tweets) is -0.84.

The customer satisfaction index of each indicator of the ecommerce sites are as shown in Fig. 1.

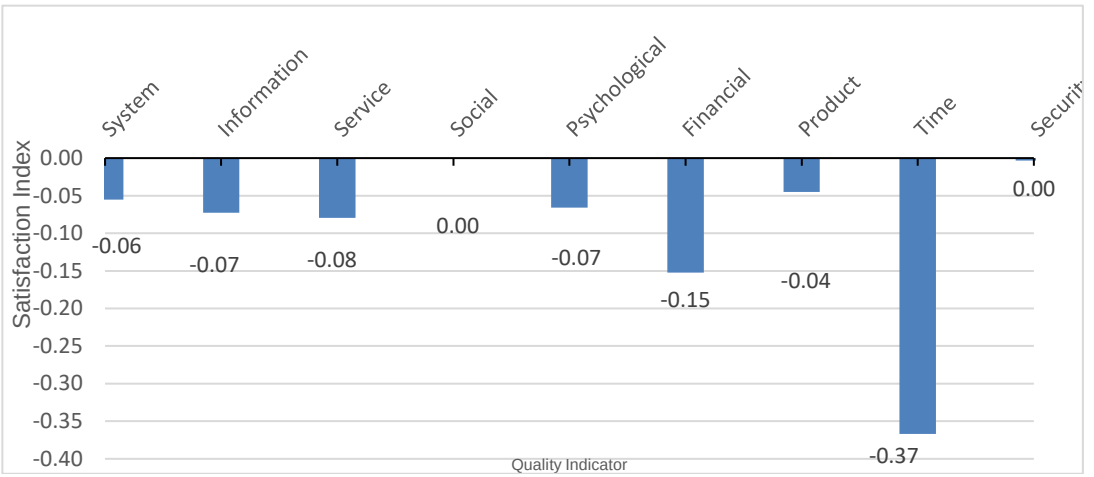

Fig 1: User Satisfaction Indices of the E-Commerce Site

As shown in Fig. 1, based on the tweets posted, customers of the e-commerce sites expressed more dissatisfaction than satisfaction on all indicators except social indicator where no eWOM (tweet) was posted. The indicator they were mostly dissatisfied with was time followed by financial and then service indicator.

4.1 Further Analysis

Based on the outcome of the analysis, the study went further to investigate more on the contents of the tweets on each of the three most dissatisfying indicators. Figures 2 - 4 present the visual representation of the twenty most frequent sentences in the negative tweets on time, financial and service satisfaction indicators.

Fig. 2: The most frequent comments on Time Indicator

Fig. 3: The most frequent comments on Financial Indicator

As shown in Fig. 2, the greatest dissatifaction was on the site's officials' delay in checking and responding to direct messages posted by customers to the ecommerce Twitter account. As shown in Fig. 3, customers have complaints on refunds and resolution of fund transfers.

As shown in Fig. 4, Many customers were reporting their dissatisfaction with the level of efficiency in service delivery by the officers of the ecommerce site.

Fig. 4: The most frequent comments on Service Indicator

4.2 Discussion of Findings

4.2.1: Proposed framework for customer satisfaction evaluation based on eWOM

Application of the proposed framework led to the identification of e-commerce satisfaction indicators and their relative weights. Eight out of nine, that is, all indicators (except Social Risk) that were in the framework, as adapted from DeLone and McLean's IS Model for e-commerce and other reviewed empirical studies, were represented in customers' eWOM of the examined ecommerce sites. There were no tweets on any indicator that is not in the proposed framework, although this would not have been a challenge since provision has been made for newly identified indicators based on data. The ability of the model to address all the satisfaction indicators commented on by the customers of the e-commerce site examined in the study shows that the proposed framework has performed precisely for the purpose of evaluating customers' satisfaction based on their eWOM.

4.2.2: Levels of customers' satisfaction with the studied ecommerce site, based on eWOM

The overall customer satisfaction index of the ecommerce site, based on electronic word of mouth (tweets) is -0.84. Furthermore, all the eight indicators tweeted on by customers of the site had negative satisfaction indices. This result might not necessarily mean that the e-commerce site is so bad. It might be that people would more likely use the eWOM when dissatisfied rather than when they are satisfied with their e-commerce transactions. It might also be an indication of the fact that the e-commerce industry in Nigeria is still falling short of satisfying the dynamic and challenging needs of its customers (Olajide et al., 2016; Ajayi et al., 2021). Whichever the case may be, eWOM is very important because of the possibility of reaching wider audience very easily.

5. Conclusion

The present study has proposed a framework for assessing e-commerce Customers' Satisfaction Index based on electronic words of mouth. The framework enables the measurement of user satisfaction index such that the range -1 to 0 depicts customers' dissatisfaction while 0 to 1 depicts customers' satisfaction. This framework can be used to assess the performance of an e-commerce site or to compare the performances of a number of sites. It can also be used to identify how e-commerce site's performance vary across different indicators. What constitutes Other Indicators is a function of the particular dataset in a particular study.

The study also tested the framework with an existing ecommerce site data. The overall customer satisfaction index was -0.84. All the eight indicators tweeted on also had negative indices.

6. Recommendation

Based on the outcome of the study, the following recommendations are made:

1. The framework can be further tested and improved by researchers for suitability in assessing customer satisfaction based on eWOM.

2. Organisations and researchers can apply the proposed framework to assess customers' satisfaction indices based on online reviews or other posts either on social media and other platforms on the Internet.
3. Organisations should take conscious efforts in reviewing and addressing their brand-related customer eWOM in order to improve their services and minimise the number of negative comments posted by their customers.

References

Ajayi LK., Azeta A, Misra S, Odun-ayo I, Ajayi TP, Azeta V, Agrawal A (2021) Enhancing the Low Adoption Rate of M-commerce in Nigeria Through Yorùbá Voice Technology *International Conference on Hybrid Intelligent Systems, April*, 516–524. https://doi.org/10.1007/978-3-030-73050-5

Baek H, Oh S, Yang HD, Ahn JH (2014) Chronological analysis of the electronic word-of-mouth effect of four social media channels on movie sales: Comparing Twitter, Yahoo!Movies, YouTube, and blogs. Proceedings - Pacific Asia Conference on Information Systems, PACIS 2014.

Bahru J (2009) Review on expectancy disconfirmation theory (EDT) in B2C E-Commerce. Journal of Research and Innovation in Information Systems, 1–13.

Breazeale M (2009) Word of mouse: An assessment of electronic word-of-mouth research. International Journal of Market Research, 51(3), 297–318. https://doi.org/10.2501/S1470785309200566

Brosdahl DJC, Almousa M (2013) Risk Perception and Internet Shopping : Comparing United States and Saudi Arabian Consumers. Journal of Management and Marketing Research, 1–17.

Cheung CMK, Lee MKO, Rabjohn N (2008) The impact of electronic word-of-mouth: The adoption of online opinions in online customer communities. Internet Research, 18(3), 229–247. https://doi.org/10.1108/10662240810883290

Chong H, Cates D, Rauniar R (2010) Validity of Delone and Mclean ' s E-Commerce Model in B2C Student Loan Industry. Journal of International Technology and Information Management, 19(1). http://scholarworks.lib.csusb.edu/jitim/vol19/iss1/3

Cristofaro M, Giardino PL, Misra S, Pham QT (2022) Behavior or culture ? Investigating the use of cryptocurrencies for electronic commerce across the USA and China Electronic commerce. Management Research Review, https://doi.org/10.1108/MRR-06-2021-0493

DeLone WH, McLean ER (2004) Measuring e-commerce success: Applying the DeLone and McLean Information Systems Success Model. International Journal of Electronic Commerce, 9(1), 31–47. https://doi.org/10.1080/10864415.2004.11044317

Dirgantari PD, Hidayat YM, Mahphoth MH, Nugraheni R (2020) Level of Use and Satisfaction of E-Commerce Customers in Covid-19 Pandemic Period : An Information System Success Model (ISSM) Approach. Indonesian Journal of Science & Technology, 5(2).

Hennig-Thurau T, Gwinner KP, Walsh G, Gremler DD (2004) Electronic word-of-mouth via consumer-opinion platforms: What motivates consumers to articulate themselves on the Internet? Journal of Interactive Marketing, 18(1), 38–52. https://doi.org/10.1002/dir.10073

Hofacker CF, Belanche D (2016) Ocho retos de los medios sociales para los Directores de Marketing. Spanish Journal of Marketing - ESIC, 20(2), 73–80. https://doi.org/10.1016/j.sjme.2016.07.003

Huete-Alcocer N (2017) A literature review of word of mouth and electronic word of mouth: Implications for consumer behavior. Frontiers in Psychology, 8(JUL), 1–4. https://doi.org/10.3389/fpsyg.2017.01256

Khan HU, Uwemi S (2018) Possible impact of e-commerce strategies on the utilisation of e-commerce in Nigeria. International Journal of Business Innovation and Research, 15(2), 231. https://doi.org/10.1504/ijbir.2018.10009762

Ko H, Jung J, Kim J, Shim SW (2004) Cross-Cultural Differences in Perceived Risk of Online Shopping. In Journal of Interactive Advertising (Vol. 4, Issue 2, pp. 20–29). https://doi.org/10.1080/15252019.2004.10722084

Lawal A, Ogbu RC (2015) E-Commerce , Problems and Prospect in Nigeria. International Journal of Scientific Engineering and Applied Science, 1(3), 230–236.

Lin CC, Wu HY, Chang, YF (2011) The critical factors impact on online customer satisfaction. Procedia Computer Science, 3, 276–281. https://doi.org/10.1016/j.procs.2010.12.047

Lis B, Neßler C (2014) Electronic word of mouth. Business and Information Systems Engineering, 6(1), 63–65. https://doi.org/10.1007/s12599-013-0306-0

Litvin SW, Goldsmith RE, Pan B (2012) Electronic Word-of-Mouth in Hospitality and Tourism Management. Tourism Management, 33(3), 724–725. https://doi.org/10.1016/j.tourman.2011.06.012

Liu X (2013) Full-Text Citation Analysis : A New Method to Enhance. Journal of the American Society for Information Science and Technology, 64(July), 1852–1863. https://doi.org/10.1002/asi

Mahendra I, Sulistianto SW, Mulyani A, Wiyatn A, Rosanto, O (2020) Assessing E-Commerce Success from a Millennial Perspective in Indonesia Assessing E-Commerce Success from a Millennial Perspective in Indonesia. Journal of Physics: Conference Series, 1641(012073). https://doi.org/10.1088/1742-6596/1641/1/012073

Misra S (2021). *A Step by Step Guide for Choosing Project Topics and Writing Research Papers in ICT* (Vol. 2). Springer International Publishing. https://doi.org/10.1007/978-3-030-69143-1

Nisar TM, Prabhakar G (2017) What factors determine e-satisfaction and consumer spending in e-commerce retailing? Journal of Retailing and Consumer Services, 39, 135–144. https://doi.org/10.1016/j.jretconser.2017.07.010

Ogwueleka F, Misra S, Colomo-palacios R, Fernandez-sanz L (2012) Neural Network and Classification Approach in Identifying Customer Behaviour in the Banking Sector : A Case Study of an International Bank. Human Factors and Ergonomics in Manufacturing, https://doi.org/10.1002/hfm.20398

Olajide F, Kolawole A, Misra S, Ayo C (2016) On the investigation of social network analysis fore-commerce transaction in south-west region of Nigeria. International Journal of Pharmacy and Technology.

Omar HFH, Saadan KB, & Seman KB (2015) Determining the Influence of the Reliability of Service Quality on Customer Satisfaction: The Case of Libyan E-Commerce Customers. International Journal of Learning and Development, 5(1), 86. https://doi.org/10.5296/ijld.v5i1.6649

Opesade AO (2021a) Comparison of Sentiment-Lexicon-based and Topic-based Sentiment Analysis Approaches on E-Commerce Datasets. *International Conference on Advanced Engineering, Technology and Applications (ICAETA)*.

Opesade AO (2021b) *Twitter-Mediated Enterprise – Customer Communication : Case of Electricity Distribution Services in a Developing Country*. *6*, 1–17. https://doi.org/10.1177/089443932110 19571

Shaba M, Roland A, Simon J, Misra S, Ayeni F (2021) A Real-Time Sentimental Analysis on E-Commerce Sites in Nigeria Using Machine Learning. *International Conference on Hybrid Intelligent Systems*, 452–462.

Sharkey U, Scott M, Acton T (2010) The influence of quality on e-commerce success: an empirical application of the Delone and Mclean IS success model. International Journal of E-Business Research, 6(1).

Sharma A, Bahl S (2018) Influence of Service Quality of E-Commerce Websites on Customers ' Trust , Commitment and Loyalty : A Case of Indian Customers. International Journal of Research in Engineering, IT and Social Sciences, 08(09), 75–84.

Shi W, Tang L, Zhang X, Gao Y, Zhu Y (2016) How does word of mouth affect customer satisfaction? Journal of Business and Industrial Marketing, 31(3), 393–403. https://doi.org/10.1108/JBIM-07-2014-0139

Sotiriadis MD, van Zyl C (2013) Electronic word-of-mouth and online reviews in tourism services: The use of twitter

by tourists. Electronic Commerce Research, 13(1), 103–124. https://doi.org/10.1007/s10660-013-9108-1

Tzavlopoulos I, Gotzamani K, Andronikidis A, Vassiliadis C (2019) Determining the impact of e-commerce quality on customers ' perceived risk , satisfaction , value and loyalty. International Journal of Quality and Service Science, 11(4), 576–587. https://doi.org/10.1108/IJQSS-03-2019-0047

Voorveld HAM (2019) Brand Communication in Social Media: A Research Agenda. Journal of Advertising, 48(1), 14–26. https://doi.org/10.1080/00913367.2019.1588808

Yuksel A (2008) Consumer Satisfaction Theories : A Critical Review. In Tourist Satisfaction and Complaining Behavior: Measurement, and Management Issues in the Tourism and Hospitality Industry. Nova Science Publishers. https://www.researchgate.net/publication/258224400_Consumer_Satisfaction_Theories_A_Critical_Review