

Evaluating the Impact of E-Service Quality Attributes on Customer Satisfaction and Purchase Intentions for Electronic Gadgets and Home Appliances, India

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Abstract

The objective of the study is to analyse the impact of e-service quality attributes on customer satisfaction and on purchase intention and purchase frequency of electronic gadgets and home appliances in Bangalore, India using the service quality (SERVQUAL) model. The e-service quality attributes chosen for the study are empathy, information, security, reliability, user interface, responsiveness, fulfillment, and personalization. This paper extends existing research by quantifying the impact of chosen attributes of e-service quality on customer satisfaction and purchase intentions, and on purchase frequency. 120 responses were collected for the analysis through an online questionnaire using convenience sampling. A diverse mix of respondents who are proficient in digital platform navigation and online purchases were chosen for the study. SPSS and R studio was applied to analyze the data. The techniques used for the study to test the hypothesis and to understand the relationship between the e-service quality attributes on customer satisfaction and purchase intention are descriptive statistics, chi-square, correlation, logistic regression, decision tree, SEM, and k-fold cross-validation. The results indicate that personalization, and fulfillment have a significant impact on customer purchase intention, the attributes fulfillment and information are key attributes for purchase frequency. From SEM analysis it is evident that all the chosen e-service quality attributes have a positive impact on customer satisfaction and it is significant, which in turn enhances purchase intention and purchase frequency. From decision tree analysis it is evident that customers aged 20-40 prefer buying products after verifying seller information on shopping websites. The results of the study provide valuable insights into the e-commerce sector to make better policies and strategies to enhance customer satisfaction and purchase intention.

Keywords: Empathy, Information, Security, Reliability, User Interface, Responsiveness, Fulfillment, Personalization, Customer Satisfaction, Purchase Intention, E-Commerce.

JEL Classification M31, L81 and D12.

Introduction

In the digital landscape, technology plays a critical role in transforming the business landscape. Technological advancements have significantly impacted various sectors, including banking and retail, which now face challenges to their traditional business models due to the increasing use of the Internet (Sasono et al., 2021). This shift has accelerated the transition from conventional services to e-services (Zott et al., 2011). The rise of e-commerce is closely linked to the growth of internet penetration. In 2023, India reported 820 million active internet users, representing more than 55% of the population. The country's annual base of e-retail shoppers is projected to reach 230–250 million in 2023, with over 100 million new shoppers added in the last three years (Bain & Company). A survey conducted by Rakuten Insight in June 2022 revealed that approximately 84% of consumers aged 35 to 44 in India prefer e-commerce platforms such as Shopee, Amazon, and AliExpress for online shopping. Brick-and-mortar stores are gradually declining as e-commerce grows (Quora, 2017).

The rapid advancement of technology has also led to a shift in consumer behavior, with customers increasingly opting for online shopping over visiting physical stores. Traditional businesses are now leveraging e-commerce to remain competitive and engage with customers (Lee and Lin, 2005). Online shopping offers convenience, allowing consumers to order and pay from the comfort of their homes and have products delivered to their doorstep (Business.com, 2017). For consumers, shifting between different

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online retailers is effortless and involves minimal switching costs (Mutum et al., 2014). The online business environment is characterized by low entry barriers, facilitating increased competition (Wang et al., 2016). Whether operating online or offline, businesses recognize that customer experience plays a critical role in influencing future behaviors such as repeat purchases, brand loyalty, and recommendations through word-of-mouth (Chang and Wang, 2011).

One of the primary challenges for e-commerce businesses is maintaining customer satisfaction. In a highly competitive digital marketplace, delivering exceptional services is essential for success. Superior service experiences foster customer loyalty and encourage repeat purchases (Gounaris et al., 2010). To achieve high levels of customer satisfaction, it is necessary to provide top-quality services, which lead to favorable customer behaviors (Brady and Robertson, 2001). E-commerce success is often associated with the quality of the website's system, the accuracy of information provided, and overall service quality (Sharma and Lijuan, 2015). Additionally, rising consumer expectations have driven the need for enhanced quality management to improve customer satisfaction (Santhana Jeyalakshmi et al., 2016).

Many online organizations find it difficult to maintain a strong presence due to their inability to provide high-quality e-services. While numerous research has explored the association between various e-service quality attributes on customer satisfaction in developing countries, limited research has examined this issue specifically in Bangalore, India. Very few studies have investigated the connection between customer satisfaction and the influence of e-service quality on purchase intentions. The current study focuses on identifying the essential e-service quality attributes that significantly impact customer satisfaction and influence purchase intention. The findings of the current study aim to provide valuable insights for companies, enabling them to effectively market their products by aligning their services with customer expectations and preferences.

Literature Review

In today's digital era, the shift towards virtual technology and electronic services has become increasingly prominent. E-service quality model was primarily developed to assess online services (Lubis et al., 2021). Researchers have proposed various attributes to measure e-service quality. Dabholkar (1996) studied five key attributes: ease of use, speed of delivery, enjoyment, reliability, and control. The study found that control, enjoyment, and ease of use (especially in high waiting time scenarios) were significant factors in determining service quality, whereas speed of delivery and reliability were less influential.

Over the years, many models were developed to measure e-service quality, out of which one of the most popular model is the SERVQUAL model developed by Parasuraman et al. (1985). This model identifies five core dimensions: reliability, tangibility, assurance, responsiveness, and empathy. Seth and Desh (2004) expanded the SERVQUAL model by adding competence, communication, credibility, and security as key attributes.

SERVQUAL remains a widely used model for assessing service quality across industries (Kansra and Jha, 2016; Alrubaiee & Alkaa'ida, 2011; Kitapci et al., 2014). Several editions of SERVQUAL models have been introduced in the online business context, such as eTailQ, WebQual (Wolfenbarger and Gilly, 2003), and E-S-Qual models (Parasuraman et al., 2005) to measure e-service quality, with factors like reliability, responsiveness, security, personalization, and empathy playing crucial roles in determining customer satisfaction and purchase intention. The literature highlights the evolving importance of e-service quality in online business environments and consistently emphasizes the significance of meeting consumer expectations through high-quality online service delivery.

In an online business environment, customers evaluate services by comparing their expectations against the services received (Gronroos, 1984). Service quality is typically measured based on customer satisfaction, which is determined by how well the service meets or exceeds their expectations. Offering high-quality service can set a business apart from its competitors and drive greater demand for its products (Thompson, DeSouza, and Gale, 1985).

The key differences between offline and online service quality lie in safety, confidentiality, efficiency, and the lack of face-to-face interaction. Online consumers benefit from comparing costs, interacting with technical interfaces, and influencing e-service quality (Ladhari, 2010). Factors such as product variety, convenience, ease of delivery, and diverse payment options have been identified as drivers of online shopping behavior (Joshi & Achuthan, 2016).

The reviewed literature provides a strong theoretical framework for understanding the attributes of e-service quality and their effects on consumer behavior. This study expands on these foundations by exploring how various e-service quality attributes impact customer satisfaction and purchase intentions specifically in the context of buying electronic gadgets and home appliances in Bangalore, India. The research focuses on the following e-service quality attributes: empathy, information, security, reliability, user interface, responsiveness, fulfillment, and personalization. The aim is to offer valuable insights for online business platforms by identifying which e-service quality attributes enhance customer satisfaction and drive their purchase intention.

In the digital age, companies are increasingly focusing on selling products through online channels, aiming to provide faster and more reliable services. However, there is limited research evaluating the effectiveness of e-service quality attributes in the online sale of electronic gadgets and home appliances. Previous studies have primarily identified key attributes but have not thoroughly examined how these attributes affect customer purchase intentions and their purchasing frequency. This research seeks to address this gap by assessing the efficacy of e-service quality in this sector, identifying key attributes that influence consumer purchase decisions, and profiling potential consumer segments based on which companies can design their promotional strategies.

Fig. 1 illustrates the conceptual framework for the study, with corresponding research hypotheses as follows:

Website design plays a crucial role in shaping customer experiences, including factors like information quality, aesthetics, convenience, and personalization. A well-designed website should emphasize usability and brand representation while attracting customers (Díaz & Koutra, 2013). According to Kleinlercher et al. (2018), a website acts as a communication bridge between organizations and customers, with its quality reflecting the performance of online transactions (Di Fatta et al., 2016). Attractive website features have positively impacted customer satisfaction (Al-Debei et al., 2015).

H₁: Website (user interface) has a significant positive association with customer satisfaction in online shopping

Reliability refers to the technical functionality of a site and its ability to perform consistently. High reliability in online services positively impacts customer satisfaction and reduces the likelihood of customers switching to other platforms (Hadid et al., 2020).

H₂: Reliability has a significant positive impact on customer satisfaction in online shopping

Responsiveness is the promptness with which a service provider addresses customer needs. It is important in building customer satisfaction and loyalty (Endara et al., 2019). Studies have shown a positive correlation between responsiveness and customer satisfaction in various service sectors (Fida et al., 2020).

H₃: Responsiveness has a positive association with customer satisfaction

Security and privacy are crucial aspects of online transactions, particularly for credit card payments and personal information. Websites must ensure robust privacy and security measures to build credibility and protect customers from fraud (Wang et al., 2015). When customers shop on online platforms, they provide personal details like their name, address, contact information, and credit card data (Holloway and Beatty, 2008). A key concern for customers is whether the website can safeguard them from fraud post-transaction.

Therefore, privacy of customer information and website security are critical factors in evaluating e-service quality provided by e-retailers which in turn affects customer satisfaction.

H₄: Security has a significant positive association with customer satisfaction in online shopping

Fulfillment refers to the accuracy and timeliness of order delivery. In the context of online shopping, it involves ensuring that customers receive what they ordered within the expected time frame and in good condition (Blut, 2016). Companies must focus on reducing post-purchase dissonance by delivering accurate and timely orders (Liao & Keng, 2013). To deliver high-quality service, companies must prioritize timely delivery, accurate order processing, and ensuring products arrive in good condition. Effective order fulfillment is a key component in determining the overall quality of e-service and fostering customer satisfaction.

H₅: Fulfillment has positively influenced customer satisfaction in online shopping

The absence of real-time direct interaction often discourages customers from making purchases online (Yang and Jun, 2002). Personalization refers to customizing services to address specific customer needs, such as including personalized thank-you messages or offering direct communication options for inquiries in online shopping (Yang, 2001). Enhancing personalization plays a vital role in boosting service quality and enhancing customer satisfaction (Wolfenbarger & Gilly, 2003).

H₆: Personalization has a significant positive association with customer satisfaction in online shopping

In the realm of online business, information quality encompasses the relevance, accuracy, timeliness, completeness, consistency, and clarity of the content provided to customers via websites or other digital platforms (Wang, 2008). High-quality information equips consumers to make well-informed purchasing decisions. When the information is perceived as reliable and trustworthy, it significantly improves customer satisfaction with the online shopping experience (Kim & Niehm, 2009). Studies indicate that customer satisfaction mediates the link between information quality and purchase intention (Bai, 2008). By prioritizing the delivery of accurate and comprehensive information, online businesses can boost customer satisfaction, build trust, and, ultimately, drive purchase intentions.

H₇: Information quality positively influences customer satisfaction in online shopping

Empathy reflects the care and individual attention a company provides to its customers. It is considered a key factor in enhancing customer loyalty and commitment in online businesses (Butcher, 2001; Ndubisi, 2006).

H₈: Empathy has a significant positive impact on overall customer satisfaction in online shopping

Satisfaction of customers in online shopping is pivotal in building customer loyalty, as highlighted by Pham and Ahammad (2017). Kotler and Armstrong (2012) emphasize that satisfied customers are more likely to exhibit repeat buying behaviors. Their intention to repurchase is often influenced by their previous experiences, as noted by Filieri and Lin (2017) and Hellier et al. (2003). When customers are pleased with a product or service, they are more inclined to continue using the same service, which can lead to a higher frequency of purchases from that online platform in the future (Henkel et al., 2006). Superior service quality can significantly boost customer satisfaction and encourage repeat purchases (Cronin et al., 2000). Positive experiences with a service provider typically lead to repeat business, supported by various studies demonstrating a strong association between customer satisfaction and purchase intention to purchase again (Blut et al., 2015; Kitapci et al., 2014; Pham and Ahammad, 2017; Wolfenbarger and Gilly, 2003).

H₉: Customer satisfaction has a significant positive impact on purchase intention and purchase frequency

ESQ has gained significant attention in the literature as a crucial determinant of customer behavior in the digital age (Barrutia et al., 2009). One of the central hypotheses in this domain is the impact of various e-

service quality attributes on purchase intention of customers. The conceptualization and measurement of e-service quality have been studied extensively in the literature. Researchers have identified various dimensions that contribute to the overall perception of e-service quality, including reliability, responsiveness, ease of use, security, and personalization. These attributes have been found to play a crucial role in shaping customer satisfaction and, ultimately, purchase intention

H₁₀: There is a significant positive impact of e-service quality attributes on customer purchase intention

This research will utilize a hierarchical model to evaluate e-service quality attributes and its impact on satisfaction of customers and their impact on purchase intention. As the literature suggests, these outcomes are influenced by various quality factors related to online service platforms.

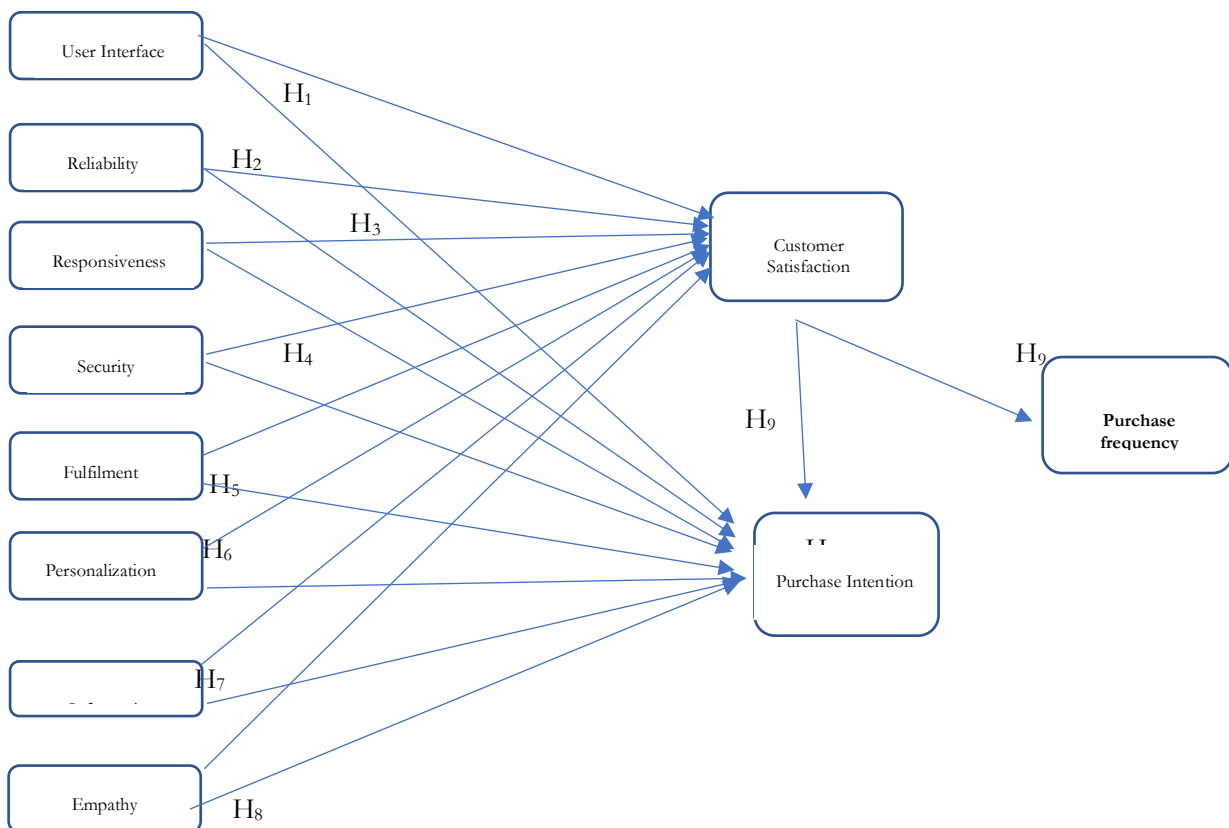


Figure 1. Conceptual model

Methodology

The main aim of this study is to establish the relationship between the attributes of e-service quality, consumer satisfaction, and purchase intention. The study also includes profiling potential consumer segments, providing companies with insights to tailor their promotional strategies effectively. This study employed both exploratory and descriptive research designs. Respondents, proficient in digital platform navigation and online shopping, were selected using convenience sampling. A sample size of 120 respondents was selected. A structured questionnaire is designed and distributed using Google Forms. The questionnaire comprises two sections: The first section aims to gather demographic and socio-economic information, along with details on Internet usage and purchase frequency. The second section is based on the revised SERVQUAL model by Parasuraman et. al. (1985), where data is collected based on e-service quality attributes using a five-point Likert scale. The validity and reliability of the instrument were tested using Cronbach's alpha. The attributes chosen for the study were website (user interface), responsiveness,

reliability, fulfillment, security, information, personalization, and empathy. The techniques used for the analysis are frequency analysis, descriptive analysis, karl pearson coefficient of correlation analysis, PCA (principal component) analysis, logistic regression, structural equation modelling, decision tree, Cronbach's alpha, and K-means clustering are used to draw meaningful insights. The tools like SPSS and R Studio were used for the analysis.

Results

The current study targeted respondents who are proficient in digital platforms and have experience in purchasing goods and services in online platforms in Bangalore, India. A total of around 120 respondents were chosen, it was found that 66.7% were between 20 and 40 years old, while 16.7% were between 40 and 60 years old. The remaining respondents were under 20 years of age. In terms of gender distribution, 70% of respondents were men, and 30% were women. Regarding education, 33.4% of respondents were postgraduate students, while the remaining were employed in private or public sectors.

Income levels among salaried individuals ranged from 0 to above 10 lakhs per annum, with the majority falling within the range of 6 to 10 lakhs range, 63.3% of respondents were salaried corporate workers with less than 10 years of experience, and only 3.3% had between 10 and 20 years of experience. All participants owned a personal computer, and all employed respondents had access to a computer at work.

Regarding online trading experience, approximately 80% of respondents began trading between 1 and 10 years ago, while the remaining 20% started more than 10 years ago. 40% of respondents shop in online mode once a month, 16.7% traded twice a week, 20% traded once a week, and the rest traded once every three months.

As for computer usage, 23.3% of respondents spent about 3 hours a day on computers, whereas 66.7% spent between 6 to 8 hours daily. In their recent online purchases, the majority of respondents bought mobiles, followed by TVs and refrigerators. Only a small number of respondents purchased computers and washing machines online.

In evaluating the research instrument, the scale's reliability was determined by assessing the internal consistency among its 43 items. A model is said to be reliable when Cronbach's alpha scores for all study variables remain consistent when tested under the same conditions and sample size. Table 1 indicates that all variables of e-service quality attributes achieved acceptable Cronbach's alpha scores, exceeding 0.70. This demonstrates that the current model is reliable and the data is a good fit.

Table 1. Reliability Test For E-Service Quality Attributes

	Cronbach's alpha	Number of items	Total No. of Responses
Website	.785	7	120
Reliability	.794	7	120
Responsiveness	.832	6	120
Security	.759	4	120
Fulfillment	.714	5	120
Personalization	.717	4	120
Information	.833	6	120
Empathy	.794	4	120

From the descriptive statistics Table 2, the majority of respondents' mean perceptions towards each attribute are on a scale of Agree to Strongly Agree. The response rate to attribute fulfillment has the highest mean value, followed by Personalization. Whereas, attribute Reliability has the lowest mean followed by Empathy. The Fulfillment has the highest standard deviation, whereas the attribute Website has the lowest deviation, which indicates the majority of the respondents' responses are closer to the mean.

Table 2. Descriptive Statistics Of E-Service Quality Attributes

	Mean	Std. Deviation	N
Frequency	4.73	1.300	120
Empathy	4.3	.83514	120
Information	4.4	.6099126	120
Personalization	4.1	.60716	120
Fulfillment	4.8	1.1249809	120
Security	4.5	.50708	120
Responsiveness	4.7	.6237605	120
Reliability	4.1	.6012124	120
Website	4.35	.4304773	120

Table 3, presents the output analysis of PCA. The analysis extracted five components, with the first two components accounting for 65.5% of the total variance. The loadings in the rotated component matrix reveal the extent to which each e-service quality attribute contributes to each component.

Table 3. Principal Component Analysis of E-Service Quality Attributes with Varimax Rotation

Component	Initial Eigenvalues		
	Total	% of Variance	Cumulative %
1	4.213	52.657	52.657
2	1.027	12.841	65.498
3	.901	11.262	76.761
4	.599	7.489	84.249
5	.518	6.480	90.729
6	.301	3.761	94.491
7	.244	3.046	97.537
8	.197	2.463	100.000

	Component				
	1	2	3	4	5
EMPATHY				.922	
INFORMATION		.860			
PERSONALIZATION		.741			
FULFILMENT					.979
SECURITY			.903		
RESPONSIVENESS	.708				
RELIABILITY	.845				
WEBSITE	.844				

From the above analysis, it is evident that the total variance explained by the e-service quality attributes of five components is 90.729%. Responsiveness, reliability, and website user interface fall under component 1, explaining 52.557% of the total variance in e-service quality, this indicates that these attributes form a primary dimension of service quality. Component 2, where information and personalization explain an additional 12.8% resulting in a cumulative variance of 65.498%. These two components appear to capture most of the e-service quality attributes influencing customer satisfaction and purchase intention.

Attributes such as security (component 3), empathy (component 4), and fulfilment (component 5) explain altogether 25.23% of the total variance in e-service quality resulting in a cumulative variance of 90.729%. These show moderate loadings on other components, implying their relevance across multiple e-service quality dimensions.

This analysis highlights the key attributes contributing to customer satisfaction and purchase intention, with responsiveness, reliability, and information emerging as critical factors. Companies can focus on enhancing these attributes to improve overall e-service quality which in turn can enhance customer satisfaction.

From the above analysis, data was proved to be normally distributed. The analysis is carried out to measure the strength and direction of the relationship between e-service quality attributes using correlation. Table 4, shows the results of the relationship between adopted e-service quality attributes in the study. All of the study attributes exhibit a linear positive relationship and are statistically significant except for Reliability vs Fulfilment. In addition, all attributes associated with fulfilment were statistically insignificant based on the obtained p-value.

Table 4. Correlation Analysis of E-Service Quality Attributes

	EMPATHY RESPONSES	INFORMATION REUSABILITY	PERSONALIZATION WEBSITE	FULFILMENT	SECURITY
EMPATHY Pearson's r	-				
p-value	0.468 <0.001	-	-		
INFORMATION Pearson's r	0.372	0.557	-		
p-value	0.003	<0.001	-		
PERSONALIZATION Pearson's r					
p-value	0.245 0.059	0.026 0.846	0.172 0.190	-	-
FULFILMENT Pearson's r	0.322	0.377	0.431	0.104	-
p-value	0.012	0.003	<0.001	0.430	-
SECURITY Pearson's r	0.315	0.501	0.502	0.007	0.614
p-value	0.014	<0.001	<0.001	0.960	<0.001
RESPONSES Pearson's r	0.230	0.385	0.457	-0.039	0.465
p-value	0.635 0.077	- 0.002	<0.001	0.768	<0.001
REUSABILITY Pearson's r	0.212	0.207	0.370	0.283	0.224
p-value	0.439 0.104	0.400 0.113	- 0.004	0.029	0.085
WEBSITE Pearson's r					
p-value	<0.001	0.002	-		

WEBSITE	
Pearson's r	
p-value	

After evaluating the degree of association between each of the e-service quality attributes, further analysis was carried out to measure the association of other variables that have an impact on their frequency of purchase and purchase intention. Table 5, presents the correlation analysis between the frequency of purchases and the number of hours spent online per day. Pearson's correlation coefficient was used to determine whether spending more time online influences the frequency of purchases. From the analysis, it is evident that there is a positive relationship between the number of hours customers spend online and their frequency of purchase, but this relationship is statistically insignificant based on the obtained p-value.

Table 5. Correlation Between Frequency of Purchase and Daily Hours Spent Online & Online Purchase

		Number of hours spent	Online purchase
Frequency of purchase	Pearson Correlation	.165	-0.284
	Sig. (2-tailed)	.209	0.08
	N	120	120

Table 4, provides the correlation analysis between the frequency of purchases and the length of time customers have been purchasing through online channels, this analysis examines whether a relationship exists between how long customers have engaged in online shopping and how frequently they make purchases. It is evident from the analysis that there is a significant relationship between the frequency of purchases and experience in online purchases.

To examine the relationship between demographic factors (gender, income, and age) on consumer behavior in online purchases, the chi-square test is used, the results were presented in Table 6. Specifically, the analysis explores the association of these factors with the frequency of purchases and the types of products purchased (Mobile, TV, Fridge, Washing Machine, and Computers) through online platforms. The null hypothesis (H0) suggests that there is no significant association between gender, income, and age with the frequency of purchase and the type of product purchased, while the alternative hypothesis (H1) posits a significant association. The results indicate that both gender and age significantly influence purchase frequency, with a p-value below 0.05. Furthermore, income has a notable effect on the type of product purchased, particularly mobiles and TVs, at a 5% and 10% level of significance, respectively. These insights provide valuable implications for understanding consumer purchasing patterns based on demographic characteristics.

Table 6. Chi-Square Analysis of Gender, Income, And Age on Purchase Intention and Type of Product Purchased

Impact on purchase intention	Chi-square value	Df	Asymp. Sig. (2-sided)
Gender	13.968 ^a	4	.007
Income	11.389 ^a	8	.181
Age	21.750 ^a	8	.005
Impact of income on type of product purchase			
Mobile	6.454 ^a	2	.040
TV	5.000 ^a	2	.082
Fridge	2.750 ^a	2	.253
Washing Machine	1.379 ^a	2	.502
Computers	5.690 ^a	2	.058

Table 7, presents the results of a logistic regression analysis examining the impact of various e-service quality attributes on purchase intention. The analysis explores the relationship between service quality attributes like empathy, information, personalization, fulfillment, security, responsiveness, reliability, and website quality on the likelihood of consumers making a purchase.

Table 7. Model Summary - Logistic Regression Analysis of E-Service Quality Attributes on Purchase Frequency

Call:				
Glm(formula=myformula,family="binomial", data=traindata)				
Deviance Residuals:				
Min	1Q	Median	3Q	Max
-1.8944	-0.4415	0.3062	0.6240	1.9112
Coefficients				
	Estimate	Std.Error	z value	Pr(> z)
(Intercept)	-10.3499	5.6256	-1.840	0.0658
EMPATHY	-0.3687	0.5627	-0.655	0.5123
INFORMATION	-0.5391	0.8159	-0.661	0.088
PERSONALIZAITON	1.0862	0.9889	1.098	0.0720
FULFILMENT	0.3482	0.9452	0.368	0.07126
SECURITY	-0.6260	1.0802	-0.580	0.05622
RESPONSIVENESS	0.5623	1.3315	0.422	0.6728
RELIABILITY	-1.7541	1.0290	-1.705	0.0882
WEBSITE	4.2768	1.9124	2.236	0.025

Signif.codes:	0 '***'	0.001 '**'	0.01 '*'	0.05 '.' 0.1 ' ' 1
>error<-1-sum(diag(confmat))/sum(confmat)				
>error				
[1] 0.2				

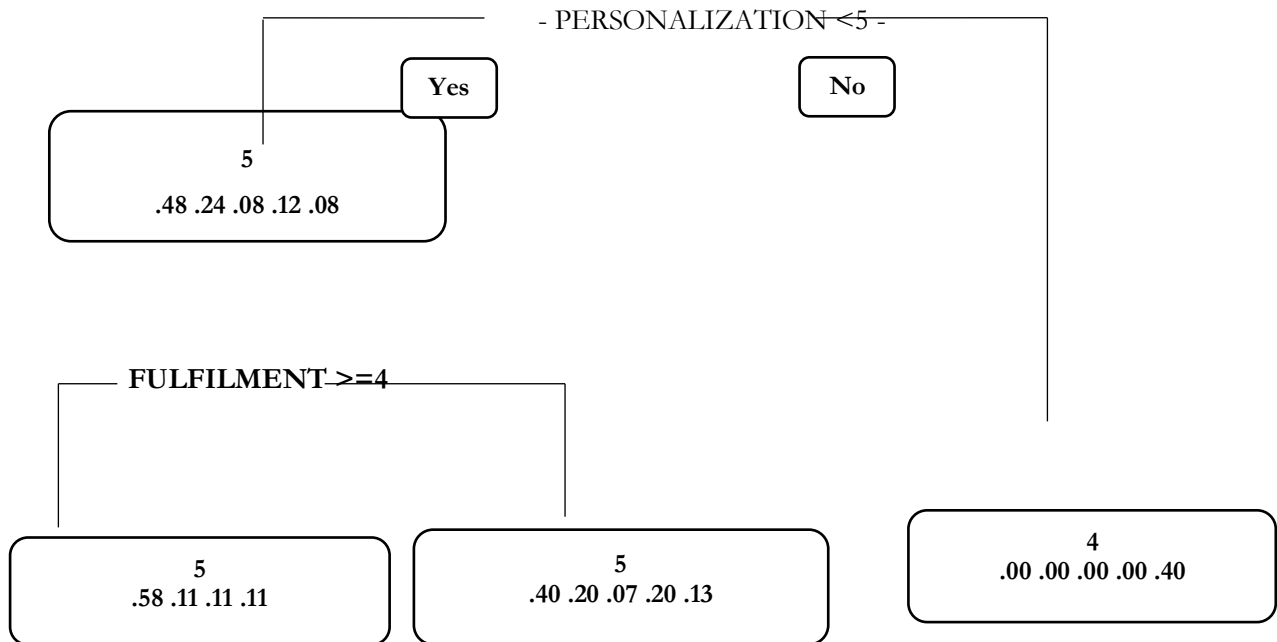
Based on the above analysis, purchase frequency is calculated as:

$$Y = \frac{1}{1 + e^{-10.3499 - 0.3687X_1 - 0.5391X_2 + 1.0862X_3 + 0.3482X_4 - 0.6260X_5 + 0.5623X_6 - 1.7541X_7 + 4.2768X_8}}$$

where, Y = purchase frequency, X₁=empathy, X₂=information, X₃=personalization, X₄=fulfilment, X₅=security, X₆=responsiveness, X₇=reliability, X₈=website or user interface

From the above exponent matrix, it is clear that customers' purchase frequency in online channels increases for every unit level increase in their level of satisfaction towards e-service quality attributes. The attributes that are significant at the 5% level are user interface whereas the attributes information, personalization, fulfillment, security, reliability and are significant at the 10% level. The accuracy of the generated model was 80%.

The analysis continues to identify major e-service quality attributes on purchase intention using decision tree analysis. The analysis of the decision tree supported the logistic regression, based on the generated output as shown in Figure 2, two e-service quality attributes that are significant are personalization and fulfillment.

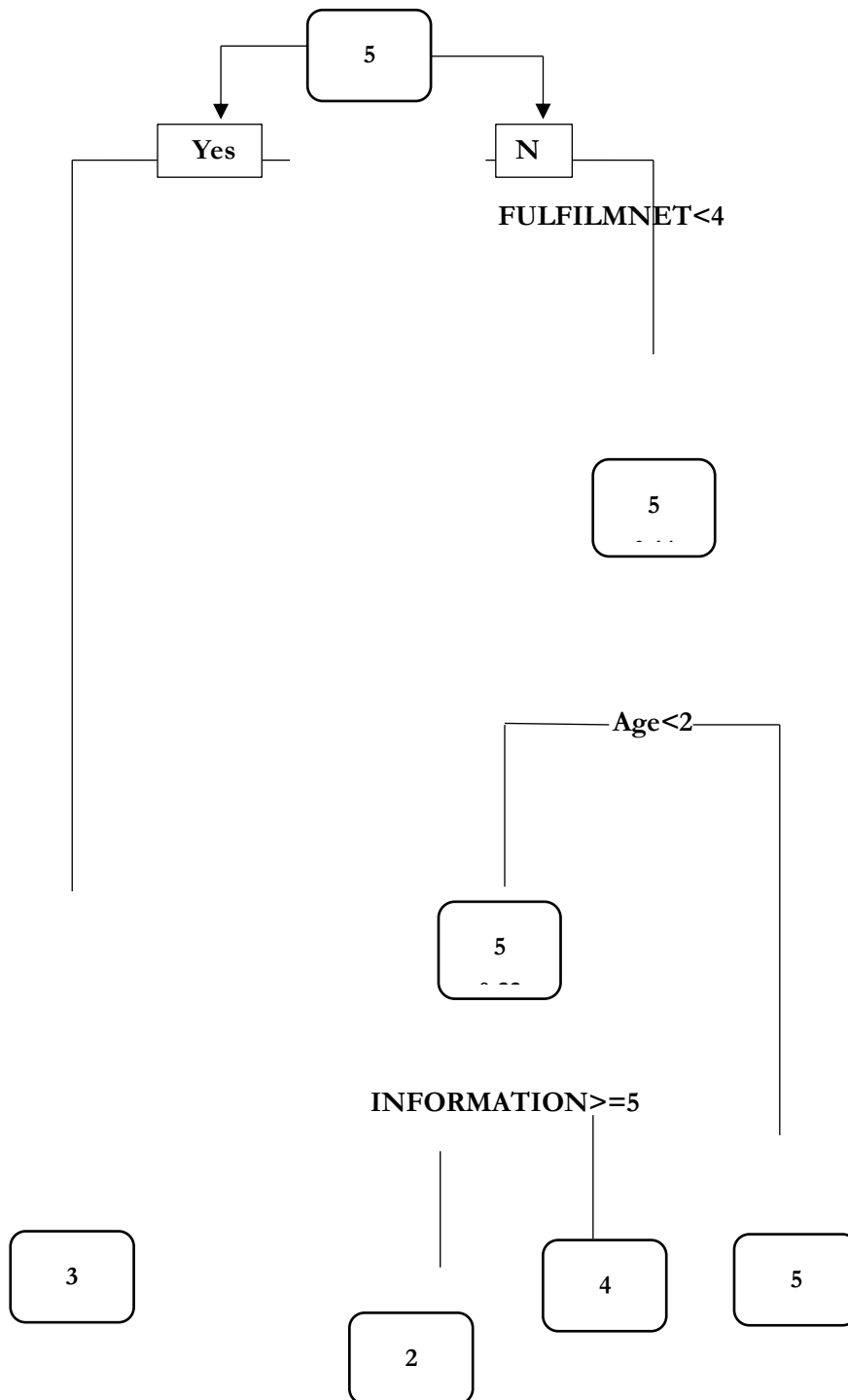
Figure 2. Decision Tree Analysis – E-Service Quality Attributes on Purchase Intention

The first split occurs at personalization. When the level of personalization is below 5, it negatively affects purchase intention. This suggests that customers are less likely to make a purchase when their experience feels generic or lacks tailored features. So, Personalization plays a crucial role in enhancing the customer's engagement and their likelihood to buy.

Further down the tree, the next key e-service quality attribute becomes an influential factor when personalization is not met is fulfillment. When fulfillment is rated at 4 or above, have a positive impact on purchase intention. The generated decision tree highlights that both personalization and fulfillment are key drivers of purchase intention. Companies should focus on offering personalized services while ensuring strong fulfillment performance to improve customer satisfaction and increase purchase intentions.

The study is further extended to explore whether customers' intention to purchase products online influences the frequency of their purchases, and how e-service quality attributes impact their behavior of frequency. After analyzing purchase intention, it becomes crucial to understand how these same e-service quality attributes—such as personalization and fulfillment—affect how often customers return to make purchases. By examining both the intention to purchase and the frequency of purchases, we aim to gain deeper insights into which service factors are most effective in encouraging consistent online buying behavior. The Decision Tree Analysis in Figure 3, examines how e-service quality attributes impact the frequency of purchase. The analysis reveals that certain attributes significantly influence customer behavior, such as fulfillment and information.

Figure 3. Decision Tree Analysis on Frequency of Purchase



The attribute fulfillment serves as a critical factor. When fulfillment levels are less than 4, customer purchase frequency decreases, highlighting that timely and accurate delivery of products is essential for encouraging repeat purchases. The next split of the tree is based on age. The decision tree shows that customers below a certain age threshold (Age < 2, representing a younger segment) are more sensitive to variations in e-service quality.

Finally, information plays a crucial role when fulfillment is adequate. For customers receiving sufficient information (Information \geq 5), the frequency of purchases tends to increase. This indicates that providing clear, relevant, and accessible information can positively influence customers to purchase more frequently.

The analysis demonstrates that fulfillment, information, and younger customer demographics (age) are pivotal in influencing the frequency of purchases. Companies can use these insights to optimize their services, ensuring that these attributes meet customer expectations to drive higher purchase rates.

The structural equation modelling analysis is conducted to explore the relationships between e-service quality (ESQ), customer satisfaction, purchase intention, and frequency of purchase. The model examines direct, indirect, and total effects, with perceived value acting as a mediator to support the hypotheses.

The latent variable of customer satisfaction was measured using e-service quality attributes - empathy, information, personalization, fulfillment, security, responsiveness, reliability, and website (user interface). The standardized results for these indicators are as follows:

- **Empathy** (Estimate = 1.000, Std.all = 0.518)
- **Information** (Estimate = 1.040, z-value = 5.322, $p < 0.001$, Std.all = 0.723)
- **Personalization** (Estimate = 0.915, z-value = 5.244, $p < 0.001$, Std.all = 0.702)
- **Fulfillment** (Estimate = 0.242, z-value = 0.986, $p = 0.0324$, Std.all = 0.097)
- **Security** (Estimate = 0.536, z-value = 4.233, $p < 0.001$, Std.all = 0.495)
- **Responsiveness** (Estimate = 1.064, z-value = 5.737, $p < 0.001$, Std.all = 0.863)
- **Reliability** (Estimate = 0.795, z-value = 5.313, $p < 0.001$, Std.all = 0.720)
- **Website** (Estimate = 0.559, z-value = 4.358, $p < 0.001$, Std.all = 0.516)

These results indicate that all the e-service quality attributes have a significantly positive impact on customer satisfaction, except the attribute fulfillment ($p = 0.324$), which was not statistically significant. The study extended to test the direct effect of customer satisfaction on purchase intention and purchase frequency.

Customer Satisfaction \rightarrow Purchase Intention

- Estimate: 0.104, z-value: 1.244, $p = 0.0214$

This path was not statistically significant, indicating that customer satisfaction may not have a direct impact on purchase intention.

Customer Satisfaction \rightarrow Frequency of Purchase

- Estimate: 0.831, z-value: -2.895, $p = 0.004$

This relationship was statistically significant, suggesting that customer satisfaction has a significant impact frequency of purchases.

Purchase Intention $\sim\sim$ Frequency of Purchase

- Estimate: -0.166, z-value: -3.510, $p < 0.001$

The negative and significant covariance suggests a possible trade-off between these two outcomes, where a change in purchase intention affects the purchase frequency.

From the analysis, it can be concluded that the direct effect of e-service quality attributes on customer satisfaction was positive and significant except for fulfillment, and also customer satisfaction had a significant impact on purchase frequency.

In the previous analysis, the structural equation modeling (SEM) framework was utilized to examine the relationship between e-service quality attributes and customer satisfaction, as well as the subsequent impact of customer satisfaction on purchase intention and frequency of purchase. Building upon this, the current phase of analysis seeks to extend the understanding by segmenting customers into distinct clusters based on e-service quality attributes, on purchase intention, and purchase frequency. This segmentation not only provides insights into the impact of service attributes but also uncovers patterns in customer behavior, offering a more nuanced understanding of the factors driving purchase decisions across different customer groups.

Clusters	Empathy	Information	Personalization	Fulfillment	Security	Responsiveness	Reliability	Website
Cluster I	3.9487	4.3846	4.2051	4.0512	4.6153	4.0769	4.0512	4.051
Cluster II	2.6000	3.800	3.4	3.7	4.2	3.7	4.1	3.70
Cluster III	4.0	3.0	4.0	2.0	4.0	3.0	3.0	4.0

Table 8. K-Means Clustering With 3 Clusters of Sizes 78, 40, And 2

Cluster 1 represents consumers who display a strong affinity for personalized, reliable, and secure e-services. Their higher ratings across empathy, information, personalization, fulfillment, security, responsiveness, and reliability suggest that these customers value a well-rounded, customized service experience. This group is likely to exhibit higher purchase intention due to their satisfaction with the comprehensive service quality provided. Their focus on detailed information and efficient service delivery, coupled with a secure transaction environment, underscores their expectations of consistent and tailored e-service offerings. Consumers in Cluster 2, also value security and reliability, and exhibit lower to moderate ratings across Cluster 2, in contrast, places emphasis on essential service features such as transaction efficiency and security. Although they exhibit moderate ratings across the same service dimensions, these consumers prioritize basic service reliability and security over personalization or detailed information. Their purchase intention is influenced more by the efficiency and security of the service, rather than extensive customization. While still engaged, their lower satisfaction levels relative to Cluster 1 suggest that their purchase intention is more contingent on basic service fulfillment.

Table 9. Summary of Hypotheses Results

S.No	Hypothesis	Results
1	H₁ to H₈: e-service quality attributes (website, reliability, responsiveness, security, fulfillment, personalization, information and empathy) have a positive impact on overall customer satisfaction (from SEM analysis)	Supported
2	H₉: Customer satisfaction has a positive association with purchase intention and frequency of purchase (from SEM analysis)	Supported
3	H₁₀: There is a significant impact of e-service quality attributes on purchase intention (from logistic regression)	Supported except for the attribute empathy

Discussion

The study targeted respondents proficient in digital platforms and experienced in purchasing electronic gadgets and home appliances online in Bangalore, India using the SERVQUAL model. The attributes considered for the analysis are empathy, information, personalization, fulfillment, security, responsiveness, reliability, and website (user interface). The majority of respondents agreed or strongly agreed with each attribute, with fulfillment showing the highest mean value and standard deviation, while reliability and empathy had the lowest means. The key e-service quality attributes, that explain around 66% of variance are responsiveness, reliability, website, information, and personalization.

The study continued with a correlation analysis to measure the strength and direction of the relationships between the e-service quality attributes. All variables, except for reliability and fulfillment, exhibited significant linear positive relationships. Fulfillment's correlations with other variables were statistically insignificant based on the p-values obtained. A further analysis explored the association between the frequency of purchases and the number of hours spent online per day, revealing a positive relationship, although it was statistically insignificant. However, a significant relationship was found between the frequency of purchase and customers' experience with online purchasing.

To assess the impact of these attributes, on purchase intention and purchase frequency, the study extended the analysis by using a decision tree, logistic regression, and sem. The attributes that are significant in terms of frequency of purchase are fulfillment, and information, from the analysis of the decision tree, it is also evident that customers whose age falls within the range of 20-40 have high purchase frequency. The attributes that have a significant impact on purchase intention are personalization and fulfillment. The common e-service quality attribute that has a significant impact on purchase intention and purchase frequency from decision tree and logistic regression is fulfillment.

Logistic regression was then used to assess the impact of e-service quality attributes on purchase intention. The analysis revealed that the user interface (website quality) was significant at the 5% level, while attributes like information, personalization, fulfillment, security, and reliability were significant at the 10% level. The model achieved 80% accuracy, and the findings suggested that improvements in these attributes could lead to increased purchase frequency in online shopping channels.

Decision tree analysis supported the logistic regression findings, highlighting personalization and fulfillment as key attributes influencing purchase intention. Personalization had the greatest impact when rated below five, negatively affecting purchase intention. Fulfillment emerged as an essential factor when personalization needs were not met, influencing customer decisions positively when rated four or higher. A further decision tree analysis examined the factors influencing purchase frequency, finding that fulfillment, age, and information were critical. When fulfillment ratings were below four, customers purchased less frequently, indicating the importance of timely delivery. Younger customers, represented by the age threshold of two, were more sensitive to variations in e-service quality, and sufficient information provision also increased purchase frequency.

Finally, the study employed structural equation modeling (SEM) to explore relationships between e-service quality (ESQ), customer satisfaction, purchase intention, and purchase frequency, with perceived value acting as a mediator. The results confirmed that all the e-service quality attributes were significant contributors to customer satisfaction. The study emphasized the importance of focusing on the above-mentioned e-service quality attributes to enhance customer satisfaction, which could positively influence both purchase intention and frequency in online shopping environments of purchasing electronic gadgets and home appliances.

Conclusion

Businesses must constantly improve both the quality of their client interactions and the services they provide to stay afloat in the market. Although there is no consensus on how to define service quality, it has

sparked attention and discussion in the literature. Service quality research frequently assesses the degree to which services satisfy customer needs/expectations.

The existence of online businesses will be ensured by providing high-quality services, exceeding consumers' expectations, and being pioneers in creating new services to help customers with their affairs. Management should pay attention to these significant e-service quality attributes because satisfaction variables either directly or indirectly influence behavioral intentions through overall satisfaction.

The current research highlights the critical role of e-service quality attributes in determining customer satisfaction, purchase intention, and purchase frequency within the context of online shopping for electronic gadgets and home appliances in Bangalore. The findings underscore that attributes such as responsiveness, reliability, website interface, and personalization significantly contribute to customer satisfaction, which, in turn, influences purchase behavior. The results also emphasize that demographic factors like age, gender, and income play a crucial role in influencing purchasing decisions, indicating that tailored strategies based on demographic segmentation could enhance engagement and conversion rates.

The study's key contribution lies in identifying fulfillment and personalization as dominant drivers of both satisfaction and purchase intention. These insights have practical implications for e-commerce platforms aiming to enhance customer experience, suggesting that improving website functionality, responsiveness, and fulfillment processes should be prioritized to foster long-term customer relationships and repeat purchases. Furthermore, the positive association between customer satisfaction and purchase frequency points to the importance of sustained service excellence in maintaining customer loyalty.

In conclusion, this research provides empirical evidence that e-service quality directly influences customer behavior in the online retail sector. By leveraging these insights, businesses can refine their digital strategies to meet evolving customer expectations, ultimately leading to improved satisfaction, increased purchase frequency, and a competitive edge in the marketplace. This study also opens avenues for future research to explore the dynamic nature of e-service quality across different product categories and geographical regions, enriching the understanding of its broader implications on consumer behavior.

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- Annexure: Questionnaire Google drive link : <https://forms.gle/QKTZw3a9ZcxhTQPc6>.