

User Experience, Perceived Quality, and Service Quality as Determinants of E-Commerce Loyalty Mediated by Trust

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Abstract

Purpose: This study examines the effects of user experience, perceived quality, service quality, and customer engagement on customer loyalty, emphasizing the mediating role of consumer trust in e-commerce. Customer engagement is a direct driver of loyalty and an indirect factor that strengthens trust.

Research Methodology: A quantitative approach was used to collect data from 389 e-commerce users via an online survey. Structural Equation Modeling (SEM) was used to analyze the relationships among the variables.

Results: User experience, perceived quality, and service quality significantly enhance consumer trust, which positively affects customer loyalty. Customer engagement plays a dual role, directly influencing loyalty and indirectly shaping it through trust, confirming trust as a key mediator.

Conclusions: User experience, perceived quality, service quality, and customer engagement significantly affect consumer trust. User experience, perceived quality, and customer engagement significantly influenced customer loyalty, whereas service quality showed no significant direct effect.

Limitations: This study is Limited to Indonesian e-commerce and cross-sectional data. This study highlights engagement as a critical mechanism for building trust and sustaining loyalty.

Contributions: This study contributes to the literature by demonstrating that user experience, perceived quality, service quality, and customer engagement jointly influence customer loyalty through consumer trust. This indicates that e-commerce platforms should prioritize enhancing experience, quality, and engagement to build and maintain trust and loyalty.

Keywords: *Customer Engagement, Customer Loyalty, Consumer Trust, Perceived Quality, Service Quality, User Experience*

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1. Introduction

The rapid expansion and widespread adoption of e-commerce have significantly transformed business operations and customer interaction. The move towards online shopping has created both challenges and opportunities for e-retailers as they work to establish and sustain strong relationships with their customers. Existing research highlights the critical role of consumer trust in the success and sustainability of e-commerce platforms (Pereira, Cardoso, & Dionísio, 2017; Shaheen, Zeba, Chatterjee, & Krishnankutty, 2020). Without fostering and maintaining trust between consumers and e-retailers, the Internet's potential as a platform for mass-market e-commerce may not be fully realized (Bramall, Schoefer, & McKechnie, 2004; Fan, Shao, & Dong, 2022).

Building on previous studies related to e-loyalty and consumer trust in digital environments, this study seeks to provide a more in-depth understanding of the intricate relationships among the various antecedents and outcomes of consumer trust in e-commerce (Shaheen et al., 2020). The existing

literature on e-commerce and customer relationships has examined numerous factors that contribute to the establishment and maintenance of online trust, such as website design, perceived security, service quality, and the credibility and usefulness of customer reviews ([Misra & Pandey, 2022](#)).

E-commerce has transformed retail, making customer loyalty vital for online business success. Recent studies have emphasized the interconnected roles of user experience, perceived quality, service quality, and customer engagement in building loyalty in digital markets. User Experience (UX) is crucial for customer interaction with e-commerce platforms. [Khan et al. \(2023\)](#) found that intuitive website design, easy navigation, and smooth checkout processes significantly improve customer satisfaction and encourage repeat purchases. Mobile optimization is also essential, with [Al-Ayed \(2022\)](#) reporting that over 70% of e-commerce transactions occur on mobile devices.

Perceived quality, including product and website quality, shapes customers' perceptions. [Jiang, Jun, and Yang \(2016\)](#) showed that high-quality product images, detailed descriptions, and customer reviews enhance perceived quality, leading to more trust and loyalty. Additionally, [Hariharan, Sheik, Maple, Beech, and Atmaca \(2023\)](#) found that website security and data protection measures significantly affect perceived quality. Service quality in e-commerce includes timely delivery, responsive customer support, and efficient return processes ([A Sopyan et al., 2023](#)). [Jiang et al. \(2016\)](#) showed that proactive customer service, like order tracking updates and personalized recommendations, positively impacts loyalty.

Customer engagement is a powerful loyalty driver in the digital era ([Molinillo, Anaya-Sánchez, & Liébana-Cabanillas, 2020](#)). Social media integration, personalized content, and interactive features foster a sense of community and brand connections. [Ashiq and Hussain \(2024\)](#) found that engaged customers are more likely to make repeat purchases and become brand advocates. Together, these factors create a comprehensive customer experience. Research has found that optimizing user experience, perceived quality, service quality, and customer engagement together produces a synergistic effect, significantly boosting customer loyalty.

While research has focused on individual factors affecting customer loyalty in e-commerce, understanding how these factors interact is still lacking. Recent studies have suggested the need for a more comprehensive approach. Research conducted loyalty, mediated by customer satisfaction and ction, concluded that while experience itself does not directly influence loyalty, it does significantly enhance customer satisfaction. This heightened satisfaction, in turn, positively and significantly affects the customer loyalty. [Zhang \(2023\)](#), who studied customer loyalty in cross-border import e-commerce platforms, focusing on human-computer interactive user experience, revealed that customer experience has a direct impact on customer loyalty. The most significant positive influences on loyalty are service experience, website usability, product quality, logistics efficiency, and payment experience.



Figure 1. Output of Vos viewer/ Research Gap and Novelty

The VOSviewer output indicates that variables such as service quality, customer satisfaction, and trust exhibit strong and densely connected relationships within the existing body of literature, whereas constructs such as user experience and customer engagement appear to be less integrated. This pattern reveals a notable gap in the current research, particularly in the limited integration of digital user experience, perceived quality, and customer engagement within established loyalty frameworks. Specifically, there has been insufficient exploration of how user experience, perceived quality, and customer engagement jointly influence customer loyalty through the mediating role of trust.

Prior studies have predominantly concentrated on the traditional relationships between service quality and customer satisfaction, leaving the causal pathways linking UX, perceived quality, and engagement with loyalty through trust relatively underexplored and fragmented. Therefore, an empirical investigation that examines the mediating role of customer trust in the relationships between user experience, perceived quality, service quality, customer engagement, and customer loyalty would make a significant and novel contribution to the literature. Such research would not only bridge this gap but also enrich theoretical understanding and provide practical implications for enhancing customer loyalty in digital-service environments.

Table 1. Research gap mapping

Theme / Variable	What Existing Research Has Established	Identified Gaps	Implications for Current Study
Consumer Trust in E-Commerce	Trust is essential for successful e-commerce adoption and is influenced by website design, perceived security, service quality, and reviews (Misra & Pandey, 2022 ; Pereira et al., 2017 ; Shaheen et al., 2020).	Studies have focused on individual antecedents, with a lack of models integrating multiple trust factors simultaneously. There is a limited understanding of how trust mediates loyalty in combination with UX, perceived quality, and engagement.	This study explores how trust interacts with other customer experience variables to influence loyalty, offering a holistic framework.
Perceived Quality	High-quality images, descriptions, security, and product information enhance perceived quality and trust (Hariharan et al., 2023 ; Jiang et al., 2016).	Few studies have examined perceived quality, service quality, UX, and engagement to determine their overall impact on loyalty.	This study integrates perceived quality within a broader model of loyalty antecedents, mediated by trust.
Service Quality	Timely delivery, responsive support, and return processes influence customer loyalty (Jiang et al., 2016 ; A Sopyan et al., 2023).	Service quality has rarely been examined in relation to trust as a mediator and in combination with UX and engagement.	This study will evaluate the role of service quality in shaping trust and loyalty within a multi-factor model.
Customer Engagement	Social media integration, personalization, and community building increase loyalty (Ashiq & Hussain, 2024 ; Molinillo et al., 2020).	There is limited research on how engagement interacts with UX, perceived quality, and service quality simultaneously. The relationship	This study assesses how engagement contributes to trust-building and loyalty in a holistic e-commerce environment.

		between engagement and trust has been understudied.	
Interaction Among Factors	Fan et al. (2022) found that the combined effects of UX, quality, service, and engagement produce strong loyalty outcomes.	There is a lack of comprehensive models showing the interplay among these variables and limited examination of trust as a mediating mechanism.	This study developed an integrated relationship model covering UX, perceived quality, service quality, engagement, trust, and loyalty.
Mediating Role of Trust and Satisfaction	Some studies indicate that satisfaction mediates UXloyalty (U. W. Saputra, 2021), others show direct effects (Zhang, 2023).	Trust has been understudied as a mediator linking multiple customer experience factors to loyalty. The comparative effects of satisfaction and trust remain unclear.	This study will test trust as a key mediator influencing loyalty, possibly alongside satisfaction.
Contextual Variation (e.g., local vs. cross-border e-commerce)	Cross-border and general e-commerce studies have shown different outcomes for UX, logistics, and payment experiences (Zhang, 2023).	Further research is needed to generalize the findings across different e-commerce environments and consumer segments.	This study contributes to the literature by examining factors within a broader e-commerce context to enhance applicability.

Table 1 shows study aims to fill the gaps in the existing research and contribute to the understanding of the impact of e-commerce transactions on consumer behavior and loyalty, mediated by trust, both theoretically and practically. The limitations and recommendations for future research are discussed in the following section. E-commerce has expanded rapidly, altering how consumers and firms conduct business. According to research, maintaining client loyalty depends heavily on trust. However, most research typically considers one aspect at a time, such as website design, security, or service quality, and does not examine how these elements interact. Furthermore, the relationship between trust and loyalty remains unclear. Finally, while studies frequently concentrate on certain contexts (such as cross-border e-commerce), their conclusions may not be applicable to other e-commerce platforms. Studying user experience, perceived quality, service quality, and engagement collectively is obviously necessary, as is examining the relationship between trust and customer loyalty

2. Literature Review and Hypothesis Development

2.1 Literature Review

2.1.1 User Experience in e-Commerce

Although User Experience (UX) in e-commerce has been widely studied, academic literature often treats it alongside usability, service quality, or system design rather than as a distinct construct. For example, a study applying User-Centered Design (UCD) to a mobile e-commerce application found that integrating UX through direct user involvement in design significantly improved navigation, efficiency, and overall usability ([Gusfi, Widodo, Dewi, Rubiyanti, & Silvianita, 2024](#)). Another case using a design-thinking approach on a boutique's e-commerce site showed that a UI/UX redesign (evaluated via usability testing and the User Experience Questionnaire, UEQ) made the site easy to use and boosted user satisfaction ([Prasetyo & Larasae, 2024](#)). On a practical level, research demonstrates that good UX, including intuitive navigation, fast load times, responsive design, personalization, and checkout usability, correlates with higher conversion rates ([Husna & Wibowo, 2024](#)).

Heuristic evaluation studies likewise reveal that addressing usability issues (e.g., system status visibility, real-world metaphors, help documentation) helps reduce friction and improve sales outcomes ([Andika & Renaldi, 2024](#)). Other empirical work (using UEQ) confirms that UX dimensions such as clarity, efficiency, dependability, attractiveness, and stimulation strongly predict user satisfaction, which is a key antecedent to loyalty or repurchase ([A. D. Saputra, Tarigan, & Wijaya, 2024](#)). Additionally, review-based research highlights both opportunities and challenges in e-commerce UX design, arguing that balancing usability, aesthetic appeal, and business goals is essential because a good UX can lead to greater satisfaction, loyalty, and ultimately, higher sales ([Suadamara, 2024](#)).

2.1.2 Perceived Quality

Perceived quality in e-commerce refers to a consumer's overall judgment of how well an online store's website, service delivery, and information meet or exceed their expectations. From a theoretical perspective, perceived quality is grounded in expectation–confirmation theory and signaling theory, which suggest that consumers evaluate quality by comparing actual performance with prior expectations and interpreting quality cues (e.g., website design, information accuracy, and service reliability) as signals of credibility and value.

Studies show that higher perceived quality, including good system quality, information quality, and service quality, leads to greater perceived usefulness and ease of use, which in turn boosts customer satisfaction ([Avriyanti & Handriana, 2022](#)). Research on Shopee users in Indonesia found that perceived quality significantly affects satisfaction and purchase intentions ([Widjaya & Padmoprayitno, 2022](#)). Moreover, perceived quality (via reliable website design, accurate information, and trustworthy service) builds trust, a key mediator that positively influences purchase or repurchase intention in online shopping ([Utama, Fikri, & Rini, 2022](#)). In short, perceived quality impacts not only how users evaluate an e-commerce platform but also their satisfaction, trust, and eventual buying behavior.

2.1.3 Service Quality

Service quality in e-commerce- refers to how well an online retailer meets customer expectations across dimensions such as reliability, responsiveness, security/privacy, fulfillment, ease of use, and support. Higher e-service- quality tends to increase customer satisfaction and trust, which in turn fosters loyalty and repeat purchases ([Rizal Awaluddin & Budi, 2024](#)). Empirical studies support that e-service- quality significantly affects customer satisfaction. For example, research on users found that efficiency, responsiveness, privacy/security, and accessibility were positively related to satisfaction ([Widyastuti & Tarumingkeng](#)). Another study among Tokopedia customers in Denpasar showed that service quality dimensions (such as privacy, convenience, reliability, efficiency, and responsiveness) significantly influenced satisfaction, which then positively affected loyalty ([Pradnyadewi & Giantari, 2022](#)). A broader review also indicates that good e-service- quality impacts perceived value and customer behavior in online shopping, underlining its role as a critical determinant of e-commerce- success ([Christianto, 2017](#)).

2.1.4 Customer Engagement

Customer engagement in e-commerce- refers to how actively customers interact with an online retail platform, including cognitive, emotional, and behavioral involvement that goes beyond mere purchases. Studies have shown that higher customer engagement, fostered by a good online experience and digital interactivity, strongly enhances loyalty, brand equity, and repurchase intention ([Ahmad et al., 2022](#)). In contexts where e-service- quality (site design, fulfilment, security, and interactivity) is high, engagement grows, which then increases trust and reduces perceived risk, leading to better loyalty outcomes ([Fan et al., 2022](#)). Thus, in e-commerce- settings, customer engagement acts as a key mediator between user experience/service quality and long-term- results such as loyalty, repeat purchases, and brand equity ([Ahmad et al., 2022](#)).

2.1.6 Customer Trust

Customer trust in e-commerce- describes the extent to which shoppers believe that an online retailer or platform is reliable, secure, and likely to deliver as promised, a belief shaped by service quality, website quality, security, information quality, and reputational signals. Empirical studies have shown that higher

trust significantly increases purchase intention, satisfaction, and loyalty ([Tjahyono & Mahmud, 2024](#)). For example, one study found that in a sample of online shoppers, trust positively mediated the effects of website quality and perceived risk on purchasing decisions ([Djuuna, Sayidah, & Ady, 2024](#)). Another study indicated that e-service- quality and information quality indirectly influence customer satisfaction via trust, reinforcing that trust acts as a core mechanism linking platform quality to user outcomes ([Perwira, Nugroho, & Wijaya, 2024](#)). Trust plays a critical role, especially in C2C environments: when buyers perceive high seller ability and integrity, their cognitive trust boosts purchase intention even in peer-to-peer marketplaces ([Alfina, Ero, Hidayanto, & Shihab, 2014](#)).

2.1.7 Customer Loyalty

Customer loyalty in e-commerce- refers to a consumer's repeated commitment to shop from the same online retailer, often driven by satisfaction, trust, perceived value, and service quality. Research consistently shows that higher e-service- quality (website performance, fulfilment, reliability) improves satisfaction, which in turn fosters both attitudinal and behavioral loyalty ([Utami, Yulianto, & LIF, 2024](#)). For example, one study of Indonesian e-commerce- found that e-service- quality significantly and positively impacted e-loyalty-, with satisfaction mediating that relationship ([Kristanto, 2025](#); [Ahmad Sopyan, Yuliasih, & Kamar, 2022](#)). Another analysis across different online platforms indicated that website quality, perceived value, trust, convenience, and personalization are among the most important antecedents of customer loyalty ([DV, 2025](#)). Studies have also highlighted that in platforms using recommendation systems, good recommendation quality enhances loyalty, especially when mediated by trust ([Nurdin & Abidin, 2023](#)). Moreover, empirical research shows that when customers experience good service recovery (responsiveness, compensation, support), loyalty increases even after negative events ([Shafiee & Bazargan, 2018](#)).

2.2 Hypothesis Development

2.2.1 The Implication of User Experience, Perceived Quality, Service Quality, Customer Engagement on Customer Trust

User Experience (UX) is crucial for mobile application design and development, requiring continuous monitoring and improvement. Identifying the experiential factors that emotionally impact users has been a challenge for UX researchers. Addressing these factors during the design phase can enhance user engagement and promote long-term use ([Dirin, Nieminen, & Laine, 2023](#)). User Experience (UX) is fundamental to how customers interact with products and services, covering all aspects of their engagement with a company ([Sauer, Sonderegger, & Schmutz, 2020](#)). A well-crafted UX directly affects Perceived Quality, which reflects a customer's evaluation of a product or service's overall excellence ([Becker, Spann, & Barrot, 2020](#)). Perceived Quality is closely linked to Service Quality, which assesses how well a service meets customer expectations. [Uzir et al. \(2021\)](#) emphasized the importance of digital service quality in today's online marketplace. High Service Quality leads to greater Customer Engagement, defined as the level of a customer's involvement and connection with a company's offerings ([Chang, Huang, Wang, & Lee, 2021](#); [Kumar & Pansari, 2016](#)).

As Customer Engagement grows, it builds Customer Trust. [Molinillo et al. \(2020\)](#) found that trust is crucial for developing and maintaining customer relationships, particularly in digital environments. This trust enhances the positive User Experience, creating a reinforcing cycle that strengthens customer relationships and loyalty ([Keiningham et al., 2017](#)). Recent research has highlighted the impact of personalization on these elements. [Steinhoff, Arli, Weaven, and Kozlenkova \(2019\)](#) showed that personalized experiences significantly enhance customer engagement and perceived quality.

Additionally, artificial intelligence and machine learning add new dimensions to this framework. [Davenport, Guha, Grewal, and Bressgott \(2020\)](#) note that AI-driven solutions are increasingly used to improve user experience, service quality, and personalize interactions, thereby influencing all aspects of the relationship cycle. This interconnected framework illustrates how each element supports and enhances the others, ultimately leading to customer satisfaction, loyalty, and long-term business success in the modern digital marketplace. The following hypotheses are proposed:

H₁: User Experience positively impact on Customer Trust

H₂: Perceived Quality positively impact on Customer Trust

- H₃: Service Quality positively impact on Customer Trust*
H₄: Customer Engagement positively impact on Customer Trust

2.2.2 The Implication of User Experience, Perceived Quality, Service Quality, Customer Engagement on Customer Loyalty

User Experience (UX) is the cornerstone of customer interactions with products and services in today's digital world. [Evelina, Kusumawati, and Nimran \(2020\)](#) highlight that UX greatly influences customer satisfaction and loyalty, particularly in e-commerce. A well-designed UX positively affects Perceived Quality, which refers to a customer's subjective assessment of a product or service's overall excellence ([Doghan & Albarq, 2022](#)). Perceived Quality is closely linked to Service Quality. [Kim, Lee, and Jung \(2020\)](#) found that in mobile shopping apps, perceived quality significantly impacts customer satisfaction and loyalty. Their study underscores the importance of both functional and emotional aspects of service quality in shaping customer perception.

Service Quality is vital for fostering Customer Engagement. [Hollebeek, Menidjel, Sarstedt, Jansson, and Urbonavicius \(2024\)](#) provide a modern understanding of customer engagement, emphasizing its cognitive, emotional and behavioral dimensions. They argue that high-quality digital services can significantly enhance customer engagement ([Lim & Rasul, 2022](#)). Deepening Customer Engagement leads to stronger Customer Loyalty. [Prentice, Wang, and Lin \(2020\)](#) show that engaged customers are more likely to make repeat purchases and spread positive word-of-mouth. Their research also highlights customer satisfaction as a key mediator of this relationship.

The interactions between these elements are cyclical and mutually reinforcing. [Rasool, Shah, and Tanveer \(2021\)](#) propose an integrated framework demonstrating how positive experiences and high engagement increase loyalty, which then influences future experiences and perceptions of quality. Emerging technologies are transforming these relationships. [Güngör \(2020\)](#) discuss how artificial intelligence and machine learning are used to enhance user experience, improve service quality, and personalize customer interactions, impacting all aspects of this relationship cycle. This interconnected framework highlights the complex and dynamic nature of customer relationships in the digital age, demonstrating how each element supports and enhances the others to drive customer loyalty and business success. The following hypotheses are proposed:

- H₅: User Experience positively impact on Customer Loyalty*
H₆: Perceived Quality positively impact on Customer Loyalty
H₇: Service Quality positively impact on Customer Loyalty
H₈: Customer Engagement positively impact on Customer Loyalty

2.2.3 The mediation of Customer Trust on Customer Loyalty

Customer trust has long been essential for developing and maintaining customer loyalty, and recent research has provided new insights into this relationship within the evolving digital landscape and shifting consumer behavior. [Iglesias, Markovic, Singh, and Sierra \(2019\)](#) found that customer trust is crucial for building brand loyalty, particularly when negative information about a brand is revealed. Their study highlights the role of trust as a buffer, helping to preserve loyalty despite unfavorable brand information. In e-commerce, that trust significantly influences customer loyalty intentions. Their research shows that trust in an online platform's ability to protect personal information and deliver quality products drives repeat purchases and positive word-of-mouth. [Jemphasized the importance of trust in loyalty programs, finding that trust in a program's fairness and value proposition directly impacts brand loyalty.](#)

This underscores the need for transparency and perceived benefits in loyalty programs and found that trust in influencers significantly affects follower loyalty, which in turn influences purchase intentions. This highlights the growing importance of trust in digital word-of-mouth and influencer marketing. In the hospitality industry, customer trust not only directly impacts loyalty but also moderates the relationship between other factors (such as perceived value and service quality) and loyalty. This suggests that trust enhances the positive effects of other customer experience elements on loyalty. [Prentice et al. \(2020\)](#) showed that in the context of AI-driven services, trust in AI technology mediates

the relationship between perceived intelligence of AI and customer loyalty. As AI becomes more prevalent in customer service, building trust in these technologies is crucial for maintaining customer loyalty and satisfaction.

These studies collectively highlight the multifaceted nature of the trust-loyalty relationship in the digital age. They demonstrated that, while trust remains a fundamental element of customer loyalty, its manifestation and importance vary across different contexts and technologies. The hypotheses proposed are as follows:

H₉: Customer Trust positively impact on Customer Loyalty

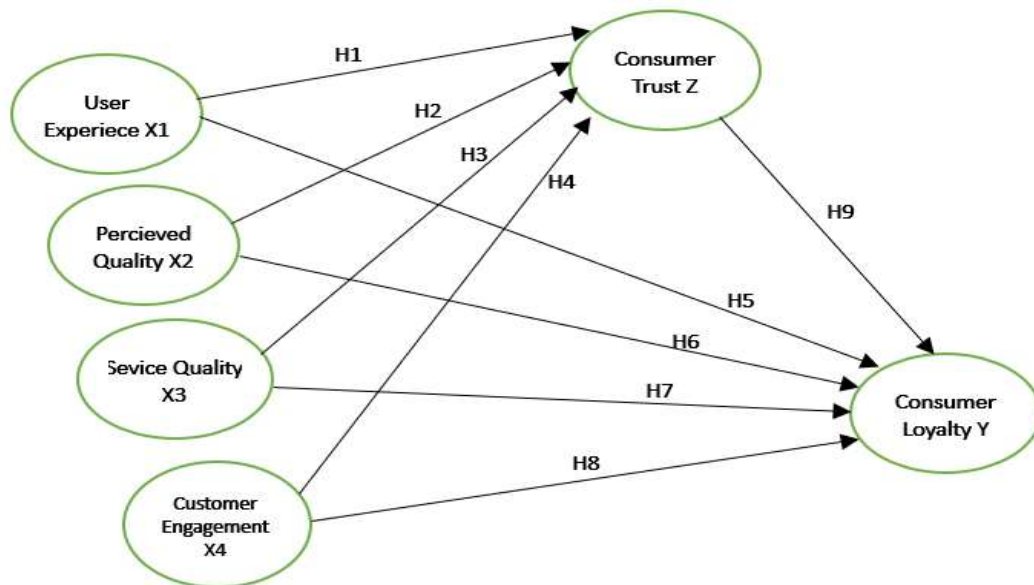


Figure 2. Framework model

3. Methodology

3.1 Respondents

The study will target consumers who have made at least one purchase from e-commerce platforms in the past six months. The sample size will be determined using Cochran's formula for sample size calculation, ensuring a confidence level of 95% and a 5% margin of error. A minimum sample size of 385 respondents will be sought to ensure the statistical validity and reliability of the results. The sample will be drawn from diverse demographics to ensure representativeness, including age, gender, income levels, and geographic locations.

3.2 Data Collection

Data will be gathered through a structured online survey distributed across various channels, including social media platforms, email lists and e-commerce websites. The survey consisted of several sections to collect detailed information. The demographic information section will gather data on age, gender, income level, geographic location, and online shopping frequency. User Experience (UX) will be evaluated using a Likert scale with items adapted from established UX measurement scales, focusing on website design, navigation, and overall usability. Perceived Quality will also be assessed using a Likert scale, measuring the perceived quality of products and the e-commerce platform itself, including product descriptions, images, and website performance. Service Quality will be measured using a Likert scale with items assessing the responsiveness of customer service, delivery times, return processes, and overall service satisfaction. Customer Engagement will be evaluated using a Likert scale, focusing on the level of interaction and engagement with the e-commerce platform, including social media interactions, personalized recommendations, and user-generated content. Consumer Trust will be assessed using a Likert scale, focusing on the trustworthiness of the e-commerce platform, particularly in terms of data security, privacy policies, and the reliability of the information provided. Finally,

Customer Loyalty was measured using a Likert scale, assessing repeat purchase intentions, willingness to recommend the platform, and overall loyalty to the e-commerce platform.

3.3 Data Analysis

Data analysis will be performed using Structural Equation Modeling (SEM) to examine the hypothesized relationships between the variables. The analysis included several steps. First, descriptive statistics will be used to summarize the respondents' demographic characteristics and provide an overview of the main variables, including the mean, standard deviation, skewness, and kurtosis. Next, a Confirmatory Factor Analysis (CFA) was conducted to validate the measurement model by assessing the reliability and validity of the constructs. This involves checking for construct, convergent, and discriminant validity. Following this, a structural model analysis was conducted to test the hypothesized structural relationships between User Experience, Perceived Quality, Service Quality, Customer Engagement, Consumer Trust, and Customer Loyalty. Path coefficients and significance levels were evaluated to determine the strength and direction of these relationships.

SmartPLS was chosen because it is well-suited for analyzing complex models with multiple relationships and mediation effects, such as the role of trust in influencing customer loyalty. It is prediction-oriented, focuses on maximizing the explained variance, and works effectively with small to medium sample sizes without requiring strict data normality. Additionally, its flexibility in handling both formative and reflective constructs make it particularly appropriate for e-commerce and behavioral research.

Mediation analysis will then be performed to examine the mediating role of Consumer Trust between the independent variables (User Experience, Perceived Quality, Service Quality, Customer Engagement) and the dependent variable (Customer Loyalty). The significance of the mediation effects was assessed using the Sobel test and bootstrapping method. Finally, the overall fit of the model was evaluated using goodness-of-fit indices such as chi-square (χ^2), Root Mean Square Error of Approximation (RMSEA), Comparative Fit Index (CFI), and Fornell Criterion. The results of this analysis provide insights into the direct and indirect effects of User Experience, Perceived Quality, Service Quality, and Customer Engagement on Customer Loyalty, mediated by Consumer Trust. These findings offer valuable insights for e-commerce platforms aiming to enhance customer loyalty through strategic improvements.

4. Result and Discussion

4.1 Result

Table 2. Respondent demographic

Demographic Variable	Category / Range	Frequency (n 389)	Percentage (%)
Gender	Male	192	49.4 %
	Female	197	50.6 %
Age	18–24 years	78	20.1 %
	25–34 years	165	42.4 %
	35–44 years	98	25.2 %
	45 years or older	48	12.3 %
Education Level	High school or equivalent	70	18.0 %
	Diploma / Associate degree (D-level)	95	24.4 %
	Bachelor degree	185	47.6 %
	Postgraduate / Graduate (master/doctoral)	39	10.0 %
Monthly income	< minimum threshold	105	27.0 %
	middle income band	180	46.3 %
	above middle income	104	26.7 %

The sample of 389 respondents showed a balanced gender composition (49.4 % male, 50.6 % female), suggesting that the study outcomes were unlikely to be biased by the over-representation of either gender. The age distribution is skewed toward younger and middle-aged adults: the largest share (42.4 %) is between 25 and 34 years, followed by 35 and 44 (25.2 %) and 18 and 24 (20.1 %), while only 12.3 % are 45 years or older, implying that the findings will mostly reflect the perspectives of younger and working-age consumers. The education profile is relatively high: nearly half of the respondents (47.6 %) hold a bachelor's degree, 10.0 % have postgraduate degrees, and the remainder have diploma (24.4 %) or high school (18.0 %) credentials.

This suggests that respondents likely have sufficient literacy and digital familiarity to meaningfully evaluate aspects such as the user experience, service quality, and online trust. Income distribution is also fairly varied: 46.3 % are in the middle-income band, around a quarter (27.0 %) are below the threshold, and 26.7 % are above middle income, providing a moderate socioeconomic spread. Overall, the demographic profile indicates a reasonably diverse sample in terms of gender, age, education, and income, which enhances the potential generalizability of the results, particularly among typical online shoppers. However, because the sample is concentrated in younger and relatively educated groups, caution is needed in generalizing the findings to older, less educated, or lower-income populations; such limitations should be acknowledged when discussing the external validity of the study.

Table 3. Reflective measurement model

Construct	Questionnaire Statements (Items)	Outer Loading	α	Composite Reliability (CR)	AVE
User Experience (UX)	UX1: The site/app is easy to navigate.	0.784	0.822	0.842	0.736
	UX2: The site/app's layout and design are visually appealing.	0.815			
	UX3: Finding products or information on the site/app is straightforward	0.700			
Perceived Quality (PQ)	PQ1: The product information (description and images) is accurate and detailed.	0.795	0.861	0.886	0.706
	PQ2: The product delivered matches the description on the website/app.	0.842			
	PQ3: Packaging and physical quality of the product meet my expectations." PQ4: "Overall, the products from this platform feel high quality for the price.	0.766			
Service Quality (SQ)	SQ1: Orders are delivered on time.	0.836	0.895	0.839	0.759
	SQ2: The checkout/payment process was smooth.	0.749			
	SQ3: Customer support promptly responds to issues.	0.810			
	SQ4: The return/refund process (if needed) is handled efficiently, if required.	0.782			
	SQ5: The platform ensures secure payment and protection of my personal data	0.826			

Customer Engagement (CE)	CE1: I frequently visit/browse the site/app even when I do not plan to buy.	0.818	0.915	0.972	0.880
	CE2: I participate in reviews, ratings, or provide feedback.	0.788			
	CE3: I follow/promote the platform (e.g., share products, refer friends).	0.747			
	CE4: I feel involved and connected to the platform's community/updates.	0.859			
Consumer Trust (CT)	CT1: I trust this platform to deliver products as it promises.	0.885	0.902	0.883	0.784
	CT2: I feel safe providing my payment information on this site/app.	0.813			
	CT3: The platform is honest and transparent about its products and policies.	0.747			
	CT4: I feel confident that my personal data will be protected.	0.834			
	CT5: I trust that the platform will handle problems (e.g., returns, complaints) fairly.	0.792			
Consumer Loyalty (CL)	CL1: I prefer to shop on this platform rather than others.	0.740	0.877	0.895	0.847
	CL2: I will recommend this platform to others.	0.814			
	CL3: I intend to continue using this platform in the future.	0.808			
	CL4: I have a high willingness to repurchase from this platform.	0.739			

The measurement model for e-commerce research shows strong psychometric quality: for all latent constructs (User Experience, Perceived Quality, Service Quality, Customer Engagement, Consumer Trust, Customer Loyalty), indicator loadings are at or above 0.700 (ranging from 0.700 to 0.885), which satisfies recommended thresholds for indicator reliability in reflective models. Internal consistency is likewise solid: Cronbach's alpha values range from 0.822 (for UX) to 0.915 (for Customer Engagement), indicating reliable and cohesive constructs. Composite Reliability (CR) values ranged between 0.839 (for Service Quality) and 0.972 (for Customer Engagement), confirming that each construct reliably measured its underlying concept. Convergent validity is demonstrated since the Average Variance Extracted (AVE) for every construct is well above the 0.50 benchmark (for example, AVE = 0.736 for UX and 0.784 for Consumer Trust), implying that a substantial portion of the variance in item responses is captured by their intended latent construct. Collectively, these results suggest that the survey instrument is valid and reliable in capturing e-commerce-relevant constructs such as user experience, perceived service/product quality, engagement, trust, and loyalty, thereby supporting confidence in subsequent structural model analysis (e.g., examining how UX, Service Quality or Engagement influences loyalty mediated by trust).

Table 4. Structural Model of Direct Effect

Path (Hypotheses)		B	t-value	p-value	Result
H_1	User Experience → Consumer Trust	0.323	3.684	0.000	Supported
H_2	Perceived Quality → Consumer Trust	0.451	6.000	0.000	Supported

H_3	Service Quality $\rightarrow$ Consumer Trust	0.280	3.119	0.002	Supported
H_4	Customer Engagement $\rightarrow$ Consumer Trust	0.253	2.631	0.009	Supported
H_5	User Experience $\rightarrow$ Customer Loyalty	0.187	2.257	0.024	Supported
H_6	Perceived Quality $\rightarrow$ Customer Loyalty	0.226	2.862	0.004	Supported
H_7	Service Quality $\rightarrow$ Customer Loyalty	0.150	1.839	0.068	Not Supported
H_8	Customer Engagement $\rightarrow$ Customer Loyalty	0.274	3.070	0.002	Supported
H_9	Consumer Trust $\rightarrow$ Customer Loyalty	0.532	8.154	0.000	Supported

The results of the structural model support most hypothesized direct relationships: our data show that better User Experience ($\beta = 0.323$, $t = 3.684$, $p < 0.001$), higher Perceived Quality ($\beta = 0.451$, $t = 6.000$, $p < 0.001$), stronger Service Quality ($\beta = 0.280$, $t = 3.119$, $p = 0.002$), and greater Customer Engagement ($\beta = 0.253$, $t = 2.631$, $p = 0.009$) all significantly increase Consumer Trust in the e-commerce platform. This aligns with earlier studies that found that user or customer experience and e-service- quality strongly predict trust in online settings (Susanto, 2024). Meanwhile, for direct effects on Customer Loyalty, User Experience ($\beta = 0.187$, $p = 0.024$), Perceived Quality ($\beta = 0.226$, $p = 0.004$), and Customer Engagement ($\beta = 0.274$, $p = 0.002$) significantly improve loyalty, whereas Service Quality's direct path to loyalty ($\beta = 0.150$, $p = 0.068$) is not significant.

Service quality often shows no significant direct effect on customer loyalty in e-commerce because its influence is largely indirect, operating through mediating variables such as trust and satisfaction. Several empirical studies have supported this finding. For instance, research on Indonesian marketplaces found that service quality does not directly affect loyalty but significantly influences satisfaction and trust, which in turn drive loyalty (Suhail & Srinivasulu, 2021). Similarly, another study revealed that service quality has no significant direct impact on loyalty, with trust acting as a key mediator of the relationship (Setyaningsih, 2015). Recent evidence also confirms that e-service quality does not directly influence customer loyalty but instead affects it indirectly through e-trust and e-satisfaction (Cuandra et al., 2026). This is because, in highly competitive e-commerce environments, service quality is often perceived as a basic requirement rather than a differentiating factor, whereas elements such as product quality, delivery speed, and user experience play a more decisive role in shaping loyalty.

The strong effect of Consumer Trust on Customer Loyalty ($\beta = 0.532$, $t = 8.154$, $p < 0.001$) emphasizes trust's mediating or central role supporting prior findings that trust is often the dominant predictor of loyalty in e-commerce (PK, 2025). Together, these results suggest that while aspects such as UX, perceived quality, and engagement may directly influence loyalty, much of the impact of service-related- variables operates by building trust first, echoing studies highlighting trust as the foundation for long-term- customer retention in online contexts.

Table 5. Structural model of direct effect

Indirect Path Hypothesis	Indirect Effect (β)	t-value	p-value	Mediation Result
User Experience $\rightarrow$ Trust $\rightarrow$ Loyalty	0.171	2.948	0.003	Supported
Perceived Quality $\rightarrow$ Trust $\rightarrow$ Loyalty	0.240	3.692	0.000	Supported
Service Quality $\rightarrow$ Trust $\rightarrow$ Loyalty	0.149	1.863	0.063	Not Supported
Customer Engagement $\rightarrow$ Trust $\rightarrow$ Loyalty	0.135	2.177	0.030	Supported

The indirect effect- results show that Consumer Trust significantly mediates the impact of User Experience, Perceived Quality, and Customer Engagement on Customer Loyalty, while mediation via Service Quality $\rightarrow$ trust $\rightarrow$ loyalty is not supported. This pattern aligns with prior studies showing that

user experience and perceived/service quality strongly influence trust, which, in turn, drives loyalty in e-commerce- contexts. For instance, research on online shopping platforms found that service and website quality affect purchase intention via trust ([Utama et al., 2022](#)).

Specifically, the significant indirect effect from User Experience $\rightarrow$ trust $\rightarrow$ loyalty ($\beta = 0.171$, $p = 0.003$) echoes the findings that a smooth, intuitive online shopping experience encourages trust and ultimately fosters repurchase intention ([Dewi & Giantari, 2022](#)). Similarly, the strong mediation from Perceived Quality $\rightarrow$ trust $\rightarrow$ loyalty ($\beta = 0.240$, $p < 0.001$) supports prior conclusions that high product/website quality builds confidence, which then encourages loyalty ([Anita, 2019](#)). The Customer Engagement $\rightarrow$ Trust $\rightarrow$ Loyalty mediation ($\beta = 0.135$, $p = 0.030$) also resonates with studies highlighting customer engagement (e.g., reviews, feedback, platform interaction) as a key contributor to trust and long-term- loyalty ([Aliifa & Rofiaty, 2023](#)).

However, the non-significant indirect effect of Service Quality $\rightarrow$ trust $\rightarrow$ loyalty ($p = 0.063$) suggests that, in your context, service-related- aspects (such as delivery or payment processes) may not independently contribute to loyalty through trust. This aligns with some studies that find that e-service- quality has a limited direct effect on loyalty unless mediated by factors like satisfaction ([Wulandari & Thabrani, 2023](#)). Overall, our findings reinforce the idea that trust acts as a central mechanism linking user experience, perceived quality, and engagement to customer loyalty, consistent with the established e-commerce- literature emphasizing trust's mediating role in converting positive online experiences into long-term- customer commitment.

4.2 Discussion

The findings from both the direct effect- and mediation analyses provide strong support that in an e-commerce- context, factors such as user experience, perceived quality, and customer engagement substantially contribute to building consumer trust, and that trust, in turn, plays a central role in strengthening customer loyalty. Specifically, in your model, the paths from User Experience (UX), Perceived Quality (PQ), Service Quality (SQ), and Customer Engagement (CE) to Consumer Trust (CT) are all positive and significant (direct effects). These results align with earlier studies; for example, research shows that e-service- quality, including aspects of website functionality, security, and reliability, positively influences e-trust- among online shoppers ([Susanta, Vinandara, Sadeli, & Sugiarto, 2024](#)). Similarly, other studies have reported that consumer experience (similar to UX) significantly affects trust in e-commerce- platforms ([Susanto, 2024](#)).

Furthermore, the strong and significant effect of Consumer Trust on Customer Loyalty, as observed in your structural model, reinforces the widely documented role of trust as a key determinant of loyalty in online retail ([Martio & Moko, 2023](#)). Turning to the mediation (indirect effect) results, three of the four hypothesized mediated paths (UX $\rightarrow$ Trust $\rightarrow$ Loyalty; PQ $\rightarrow$ Trust $\rightarrow$ Loyalty; CE $\rightarrow$ Trust $\rightarrow$ Loyalty) are supported, while the path via SQ was not. The finding that trust mediates the effects of UX, perceived quality, and engagement on loyalty suggests that these variables do not simply influence loyalty directly; rather, they build trust first, which then translates into loyalty. This pattern mirrors the theoretical propositions and empirical findings in the literature. For instance, studies have argued that website usability, information quality, and interactivity foster trust, which leads to repeat purchase intentions and loyalty ([Utama et al., 2022](#)).

The fact that SQ $\rightarrow$ Trust $\rightarrow$ Loyalty mediation was not significant in your model is interesting and has a plausible interpretation. While service quality (delivery reliability, customer support, secure payment) significantly influences trust directly, its indirect translation to loyalty via trust may be weaker or insufficient. This may suggest that in e-commerce-, some service quality- aspects are perceived as baseline expectations: meeting them maintains trust but may not strongly differentiate the loyalty outcome. This resonates with findings from studies where e-service- quality alone did not always produce strong e-loyalty- unless mediated by additional factors like satisfaction or trust ([McGuire & Rosary, 2022](#)).

From a practical perspective, these results imply that e-commerce platforms seeking to enhance customer loyalty should not only focus on service reliability and delivery (service quality), but also invest in user-friendly design UX, clear and honest presentation of product quality (perceived quality), and features that foster engagement (e.g., feedback/review systems, community interaction). By doing so, they strengthen consumer trust, which seems to be the “engine” driving consumer loyalty.

Finally, our findings contribute to the broader empirical literature by reinforcing the mediating role of trust and showing the variation in how different antecedents transmit their effects on loyalty. This suggests that future research should continue to determine which dimensions (UX, quality, engagement, or service) are more effective via trust, satisfaction, or other mediators depending on platform type, market, or user demographics.

5. Conclusions

5.1 Conclusion

This study highlights the significant impact of user experience, perceived quality, customer engagement, and service quality on trust and loyalty in e-commerce. The findings indicate that trust acts as a critical mediator in translating positive experiences and product quality into customer loyalty. Moreover, the research confirms that a strong user interface, reliable product descriptions, and engaging features foster trust, which in turn drives customer retention. E-commerce platforms must focus on enhancing the user experience, maintaining product quality, and promoting customer engagement to build a foundation of trust that ultimately supports long-term loyalty.

5.2 Research Limitations

Despite its contributions, this study has several limitations. First, the research design is cross-sectional, which limits the ability to draw causal conclusions. Second, the study relies on self-reported data, which may be subject to biases such as social desirability or recall bias. Third, common method bias could have influenced the findings, as all constructs were measured using the same instrument at a single point in time. Additionally, the sample may not fully represent the broader e-commerce population, as it is likely biased toward younger, more digitally savvy consumers. Lastly, the study focuses on a limited set of antecedents and does not account for other potentially important factors such as perceived risk, pricing, or brand reputation.

5.3 Suggestions and Directions for Future Research

Future research should employ longitudinal or panel studies to better understand causal relationships and how improvements in user experience or perceived quality led to sustained increases in trust and loyalty over time. It is also recommended to incorporate objective behavioral data, such as actual purchase history or clickstream data, to minimize the biases associated with self-reports. Additionally, mixed-methods research combining quantitative and qualitative approaches could provide deeper insights into consumer emotions, perceived risks, and contextual factors influencing trust and loyalty. Expanding the sample to include diverse demographics and geographic locations would enhance the generalizability of the findings. Finally, future studies could explore the inclusion of other mediators or moderators to further enrich the understanding of customer loyalty in e-commerce.

Author Contributions

AS conceptualized the study, developed the research design, and methodology. NPP and NFG contributed to the interpretation of the findings and the preparation of the results. AF and SS were responsible for data acquisition, data curation, and statistical analysis (Investigation, Data curation, Formal analysis). All authors have approved the final manuscript and accept responsibility for its content.

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