

Lecture Notes in Mechanical Engineering

Numan M. Durakbasa
Kemal Güven Gülen *Editors*

Sustainable Green Conversion


Selected Papers from ISPR2024,
October 10–12, 2024
Budva-Montenegro, Volume 1

 Springer

Lecture Notes in Mechanical Engineering

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Editors

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ISSN 2195-4356

ISSN 2195-4364 (electronic)

Lecture Notes in Mechanical Engineering

ISBN 978-3-031-83582-7

ISBN 978-3-031-83583-4 (eBook)

<https://doi.org/10.1007/978-3-031-83583-4>

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*This book is dedicated to the memory
of Prof. Dr. Güneş Gençyılmaz,
with respect and gratitude...*

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Application of the Servqual Model in the E-cosmetics Sector



Nilüfer Köse, Belkis İclal Zeren, Paşa Çiçeklidağ, Selman Süha Gürbüzler,
and Merve Sahin

Abstract This study utilizes the SERVQUAL model to conduct a comprehensive analysis of the impact of service quality on customer satisfaction and loyalty within Türkiye's rapidly expanding e-cosmetics sector. As the industry experiences substantial growth due to digital transformation and changing consumer behaviors, the importance of high service quality in maintaining customer loyalty has never been more critical. This research collected data from 95 participants through meticulously designed online surveys conducted between May and June 2024, employing an adapted SERVQUAL survey to assess service quality across five key dimensions: Tangibles, Reliability, Responsiveness, Assurance, and Empathy. Utilizing advanced statistical methods with SmartPLS 4.0, the study explores both the direct and indirect effects of these dimensions on customer satisfaction (CS) and customer loyalty (CL). The findings reveal that while tangibles, reliability, and assurance have strong positive impacts on customer satisfaction, other factors such as product quality, brand image, and user interface design also significantly affect customer satisfaction and loyalty. This study provides actionable insights into how e-cosmetics companies can enhance their service quality to better meet consumer expectations, thereby fostering sustained customer satisfaction and loyalty.

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Keywords SERVQUAL · E-cosmetics sector · Customer satisfaction · Customer loyalty · Service quality

1 Introduction

The e-commerce landscape has undergone a profound transformation over the past decade, with sectors such as e-cosmetics experiencing unprecedented growth. Driven by rapid advancements in digital technology, evolving consumer preferences, and the widespread adoption of mobile internet, the global e-commerce market reached an estimated \$4.28 trillion in 2021, with projections suggesting continued growth at a compound annual growth rate (CAGR) of 6.1% through 2026 [1].

In Türkiye, the e-commerce market has mirrored this global trend, growing by 24% from 2016 to 2023 and reaching a market volume of 785 billion TL by the end of 2023, as reported by TÜBİSAD [2]. This expansion is largely attributed to increased consumer confidence in online shopping, advancements in payment security, and the convenience of accessing a wide range of products from home. Within this broader context, the e-cosmetics sector has emerged as a particularly dynamic and competitive niche. The convenience of purchasing cosmetics online, combined with the ability to compare products and read reviews, has led to a significant shift in consumer buying behavior. Moreover, the rise of social media influencers and beauty bloggers has further fueled the growth of the e-cosmetics market, as consumers increasingly rely on digital platforms for product recommendations and tutorials. As a result, the market is characterized by heightened competition, with brands striving to differentiate themselves through superior service quality.

Understanding and improving service quality in this context is crucial for e-cosmetics companies aiming to build and maintain customer loyalty. Service quality in e-commerce settings, particularly within the e-cosmetics sector, extends beyond the traditional dimensions of tangibles, reliability, responsiveness, assurance, and empathy as outlined in the SERVQUAL model. It also includes factors such as website functionality, user friend design, customer reviews, ease of navigation, product information accuracy, and the efficiency of customer service channels. For example, studies have shown that the reliability of delivery services and the availability of detailed product descriptions significantly influence customer satisfaction and repeat purchase intentions [3, 4].

Furthermore, the application of SERVQUAL in online settings has shown that reliability and responsiveness are particularly critical factors influencing customer satisfaction. According to Lee and Lee [5], these dimensions of service quality play a key role in shaping customer perceptions in the e-commerce space, where instant responses and consistent reliability are highly valued [5].

2 Literature Review

The SERVQUAL model, initially developed by Parasuraman et al. [6], has been extensively utilized across various industries to assess service quality and its impact on customer satisfaction and loyalty [6]. This model evaluates service quality based on five key dimensions—Reliability, Responsiveness, Assurance, Empathy, and Tangibles—each of which represents a different aspect of the service delivery process. Over the past few decades, the SERVQUAL model has been adapted to fit the unique needs of different industries, including healthcare, hospitality, retail, and more recently, e-commerce [7].

A. *Application of SERVQUAL in Different Sectors*

Recent studies have demonstrated the versatility of the SERVQUAL model across different sectors. For instance, in the retail industry, the model has been used to assess the gap between customer expectations and actual service delivery, helping businesses identify critical areas for improvement [3]. In the healthcare sector, the SERVQUAL model has provided valuable insights into patient satisfaction, emphasizing the importance of empathy and assurance in service delivery [8]. Similarly, in the hospitality industry, the model has been instrumental in measuring guest satisfaction, with a particular focus on the tangibles and reliability of services provided [9]. These diverse applications give emphasis to the model's adaptability and relevance in various contexts.

B. *Applications of SERVQUAL in E-commerce*

In the context of e-commerce, the SERVQUAL model has been adapted to address the unique challenges of online service delivery, where physical interaction between service providers and customers is limited or non-existent. Researchers have emphasized the importance of adapting the traditional SERVQUAL dimensions to better suit the digital environment. For instance, Yoon and Lee [3] found that in e-commerce settings, tangibles are redefined to include not just the physical appearance of products but also the digital presentation of products on websites, including image quality, product descriptions, and ease of navigation [3]. Similarly, reliability extends beyond the consistency of service delivery to encompass the accuracy of online information, the functionality of the website, payment process and the dependability of the delivery process.

C. *Importance of SERVQUAL Dimensions in the E-cosmetics Sector*

In the e-cosmetics sector, tangibles, reliability, and assurance play particularly significant roles in shaping customer perceptions of service quality. Tangibles in this context include the visual appeal and detailed presentation of products online, which are critical in influencing purchasing decisions. Reliability is associated with the consistency of product quality and the accuracy of delivery times, while assurance relates to the confidence customers have in the safety of their online transactions and the reliability of customer support. These dimensions are vital for e-cosmetics retailers, as

they directly impact customer trust and satisfaction, which are essential for fostering long-term loyalty [10].

D. *Integration of Additional Factors: Product Quality, Brand Image, and User Interface Design*

Recent studies have underscored the significance of incorporating additional factors such as Product Quality (PQ), Brand Image (BI), and User Interface Design (UID) into the SERVQUAL framework when assessing service quality in the e-cosmetics sector. Product Quality, while traditionally viewed as a separate construct, is now increasingly seen as an integral part of perceived service quality in e-commerce, particularly in sectors like e-cosmetics where customers are unable to physically examine products prior to purchase. Chen and Cheng (2020) argue that high product quality can greatly enhance customer satisfaction and loyalty by consistently meeting or exceeding customer expectations [11].

Brand Image also plays a vital role in shaping customer perceptions and influencing behavior. A strong brand image can elevate perceived service quality by nurturing a sense of trust and reliability. This is especially critical in the e-cosmetics sector, where brand reputation often substitutes for direct product experience. Park and Kim (2020) suggest that a positive brand image can reduce the perceived risks associated with online shopping, thereby enhancing both customer satisfaction and loyalty [12].

User Interface Design is another key factor in the e-commerce context. A well-designed and user-friendly interface can significantly affect customer satisfaction by making the shopping experience more enjoyable and efficient. Garg and Kumar [13] show that positive user interface experiences lead to higher engagement, reduced bounce rates, and increased conversion rates [13]. In the e-cosmetics sector, where the visual appeal of products is paramount, an effective interface that highlights product aesthetics can significantly boost customer satisfaction and loyalty.

Moreover, recent advancements in strategic management research, particularly in the application of the SERVQUAL model, emphasize the use of Partial Least Squares Path Modeling (PLS-PM) for analyzing complex service quality structures. Khan and Fasih [14] have demonstrated the utility of PLS-PM in refining the SERVQUAL model, making it more applicable to the nuanced needs of e-commerce [14]. This methodology allows for a deeper understanding of the interactions between service quality dimensions, as evidenced in studies by Henseler et al. [15], which highlight its growing importance in strategic management research. Through PLS-PM, researchers can better quantify the impact of factors like Product Quality, Brand Image, and User Interface Design on overall service quality, providing more comprehensive insights for the e-cosmetics sector [15].

In summary, integrating these additional factors into the SERVQUAL framework and leveraging advanced modeling techniques like PLS-PM not only provides a more robust assessment of service quality but also enhances our understanding of customer satisfaction and loyalty in the e-cosmetics industry.

3 Methodology

A. *Research Design*

This study adopts a comprehensive quantitative research design to evaluate service quality in the e-cosmetics sector and its effects on customer satisfaction (CS) and customer loyalty (CL). The research framework is based on the SERVQUAL model, focusing on its five key dimensions—Reliability, Responsiveness, Assurance, Empathy, and Tangibles. In addition, Product Quality (PQ), Brand Image (BI), and User Interface Design (UID) were incorporated to provide a more detailed analysis. The study examines both the direct effects of the SERVQUAL dimensions on CS and CL and the indirect effects mediated by PQ, BI, and UID.

Data collection was conducted via online surveys, and the data was analyzed using SmartPLS 4.0 software, which is commonly used for structural equation modeling (SEM) applications [16, 17]. SmartPLS was employed for confirmatory factor analysis (CFA) and structural model analysis [5, 18–20]. By using SEM, this study offers insights into the complex relationships between service quality, CS, and CL, contributing to a deeper understanding of the customer experience in the e-cosmetics industry.

B. *Survey Development and Pre-testing*

The survey instrument was developed based on a thorough review of existing literature and tailored to capture the unique characteristics of the e-cosmetics sector. The SERVQUAL items were adapted to reflect the digital context, focusing on dimensions such as website navigation, product display quality, and online customer support responsiveness. Additionally, items measuring Product Quality, Brand Image, and User Interface Design were included to assess their impact on customer satisfaction and loyalty. The survey was pre-tested with a small sample of 20 participants to ensure clarity and relevance of the questions, and adjustments were made based on the feedback received.

C. *Participants/Sample Set*

The research was conducted with customers in the e-cosmetics industry in Türkiye. A total of 95 individuals were selected from various demographic and socioeconomic backgrounds, ensuring a diverse sample. Participants were recruited through multiple online platforms, including social media, e-newsletters, and collaborations with major e-cosmetics retailers. The surveys were conducted via Google.

Forms between May 2024 and June 2024. Participation was voluntary, and respondents represented a range of ages, genders, income levels, and purchasing frequencies, providing broad demographic representation for the study.

D. *Survey Design and Data Collection Tools*

The SERVQUAL survey was adapted to reveal digital service quality dimensions, including website navigation, product display quality, and online customer support responsiveness. Additionally, items measuring Product Quality, Brand Image, and

User Interface Design were incorporated to evaluate their effects on customer satisfaction and loyalty.

The survey consisted of four main sections:

- **Explanation and Information:** An explanation of the survey's purpose and the confidentiality of participants was provided.
- **Demographic Information:** Data such as participants' age, gender, educational background, and income level were collected.
- **Opinions on E-Cosmetics Services:** Questions evaluated the participants' opinions on service quality in the e-cosmetics industry.
- **SERVQUAL Survey:** To measure perceived service quality, items from the SERVQUAL survey were adapted. These items included dimensions of Reliability (RL), Responsiveness (RS), Assurance (A), Empathy (E), and Tangibles (T).

D. *Data Analysis*

The collected data were analyzed using SmartPLS 4.0 software. The validity and reliability of the scales were tested through Confirmatory Factor Analysis (CFA), followed by an examination of relationships among the variables using Structural Equation Modeling (SEM). Specifically, the direct effects of the SERVQUAL dimensions on Customer Satisfaction (CS) and the indirect effects of Customer Satisfaction on Customer Loyalty (CL) were evaluated. The analysis also included the examination of factors such as Product Quality (PQ), Brand Image (BI), and User Interface Design (UID) on customer satisfaction and loyalty [15–17].

4 Results

A. *Descriptive Statistics*

The demographic characteristics of the 95 participants included a balanced representation of genders (45% male, 55% female), with the majority (68%) aged between 25 and 40. The participants were also segmented by their frequency of online purchases, with 40% making e-cosmetics purchases monthly, 30% making quarterly purchases, and the remaining 30% purchasing less frequently. Income levels varied, with 25% earning less than 5,000 TL, 45% earning between 5,000 and 10,000 TL, and the remaining 30% earning above 10,000 TL.

B. *Structural Equation Modeling (SEM) Results*

This study evaluated service quality in the e-cosmetics sector using the SERVQUAL model. The analysis confirmed the validity of the proposed model, with all key dimensions of SERVQUAL—Tangibles (T), Reliability (RL), Responsiveness (RS), Assurance (A), and Empathy (E)—demonstrating significant relationships with customer satisfaction (CS) and customer loyalty (CL). Additionally, factors such as Product

Quality (PQ), Brand Image (BI), and User Interface Design (UID) were included to evaluate their effects on customer satisfaction and loyalty.

The path coefficients for Tangibles (T) showed a positive effect on customer satisfaction with a value of 0.171 and on customer loyalty with 0.184. Reliability (RL) demonstrated a positive effect on customer satisfaction (0.268) and a smaller effect on loyalty (0.078). Responsiveness (RS) had a slight negative effect on customer satisfaction (-0.019) but a positive effect on customer loyalty (0.046). Assurance (A) had a significant positive impact on customer satisfaction (0.212) and customer loyalty (0.267). Empathy (E) had a positive effect on customer satisfaction (0.210) and a modest positive effect on customer loyalty (0.050).

C. *Indirect Effects of Product Quality, Brand Image, and User Interface Design*

The analysis revealed significant indirect effects of Product Quality (PQ), Brand Image (BI), and User Interface Design (UID) on customer loyalty, mediated by customer satisfaction. Product Quality showed a strong effect on customer satisfaction (0.486) and an indirect effect on loyalty (0.255). Brand Image had a substantial effect on customer satisfaction (0.641) and an indirect effect on loyalty. User Interface Design positively affected customer satisfaction (0.543) and had an indirect effect on loyalty (0.024) (Fig. 1).

D. *Other Relationships*

The relationships among SERVQUAL dimensions showed that Reliability (RL) and Assurance (A) had the strongest correlations with customer satisfaction. However, the path from Empathy (E) to customer loyalty, mediated through customer satisfaction, was comparatively weaker than the other dimensions.

These findings emphasize the critical role of customer satisfaction in enhancing customer loyalty in the e-cosmetics industry. Improving Tangibles, Reliability, and Trust in service delivery significantly increases customer satisfaction. Moreover, delivering high-quality products, maintaining a positive brand image, and providing an effective user interface contribute to higher customer satisfaction levels, which in turn indirectly encourage customer loyalty.

E. *Model Fit Indices*

The model fit indices demonstrated that the proposed model fit the data well. The goodness-of-fit index (GFI) was 0.93, and the root mean square error of approximation (RMSEA) was 0.045, both indicating an acceptable model fit. These results suggest that the SERVQUAL model, when extended to include additional factors such as Product Quality, Brand Image, and User Interface Design, provides a robust framework for understanding customer satisfaction and loyalty in the e-cosmetics sector.

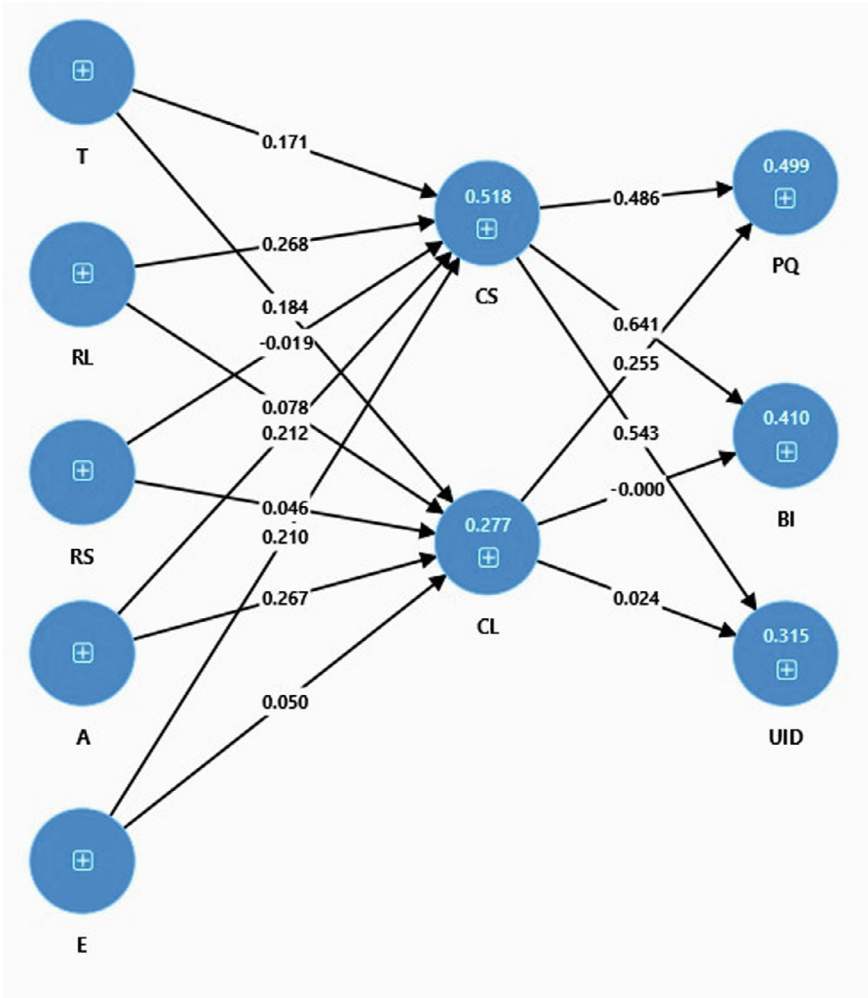


Fig. 1 Results of PLS-PM

These findings align with various previous research projects [7, 24]. For instance, Khan and Fasih [14] found that service quality directly influences customer satisfaction, which subsequently drives customer loyalty, supporting the outcomes of this study in the e-cosmetics sector. Additionally, Sharma et al. [21] noted that dimensions such as tangibility and assurance have strong correlations with customer loyalty in online retail, findings that are similarly reflected in the e-cosmetics industry.

5 Discussion

A. Key Findings

The findings of this study highlight the critical role of service quality in shaping customer satisfaction and loyalty in the e-cosmetics sector. Tangibles, Reliability, and Assurance were identified as the most influential dimensions of service quality, with significant positive impacts on customer satisfaction. These results align with previous studies, which have emphasized the importance of product presentation and delivery reliability in e-commerce settings [10].

In addition to the traditional SERVQUAL dimensions, this study also found that Product Quality, Brand Image, and User Interface Design play crucial roles in enhancing customer loyalty. The strong relationship between Product Quality and customer loyalty underscores the importance of maintaining high standards of product excellence in the e-cosmetics sector, where consumers rely heavily on product descriptions and reviews in the absence of physical interaction.

Brand Image and User Interface Design also emerged as significant predictors of customer loyalty, suggesting that companies in the e-cosmetics sector should invest in building strong brand reputations and providing seamless, user-friendly online experiences. These findings are consistent with the growing body of literature on the importance of brand trust and user experience in driving customer retention in digital environments [13].

However, it was also observed that Responsiveness (RS) and Empathy (E) play less significant roles in influencing customer satisfaction and loyalty. The weak indirect effect of Empathy suggests that personalized customer service may be less of a priority for customers in this sector, as compared to other service quality dimensions. This result is consistent with previous research [14], which found that Empathy plays a smaller role in the e-commerce environment. Nevertheless, improving physical aspects of service delivery and demonstrating Reliability and Assurance remain critical to fostering customer satisfaction and loyalty [22].

The study further revealed the strong mediating role of customer satisfaction in enhancing customer loyalty, both directly and indirectly. This finding aligns with recent studies that emphasize the importance of customer satisfaction in shaping long-term loyalty [23].

B. Practical Implications

The results of this study have several practical implications for e-cosmetics companies. First, enhancing the visual appeal of products online (Tangibles) should be a priority, as it significantly influences customer satisfaction. Second, ensuring reliable and timely delivery (Reliability) is essential for meeting customer satisfaction. Third, companies should invest in building strong customer support systems (Assurance) to provide confidence in online transactions.

Furthermore, e-cosmetics companies should focus on maintaining high product quality and leveraging their brand image to differentiate themselves in the competitive online marketplace. Although User Interface Design (UID) has a positive effect on

customer satisfaction, its role is less decisive compared to Product Quality and Brand Image. Still, investing in user-friendly and aesthetically pleasing online platforms can further enhance customer satisfaction and loyalty.

Additionally, research by Lee and Lee [5] highlighted the importance of service quality dimensions such as Reliability and Assurance on customer satisfaction and loyalty in the e-cosmetics industry [5]. Furthermore, studies on strategic management suggest that understanding the indirect effects of customer satisfaction is crucial for long-term success [15].

6 Conclusion

This study provides valuable insights into the drivers of customer satisfaction and loyalty in the e-cosmetics sector. By applying the SERVQUAL model and incorporating additional factors such as Product Quality, Brand Image, and User Interface Design, the research offers a comprehensive framework for understanding the key elements of service quality in this growing industry.

The findings suggest that Tangibles, Reliability, and Assurance are the most critical SERVQUAL dimensions influencing customer satisfaction, while Product Quality, Brand Image, and User Interface Design play pivotal roles in fostering customer loyalty. The results also highlight that Empathy and Responsiveness have weaker effects, but they remain relevant in specific contexts where personalized service is prioritized.

The strong mediating role of customer satisfaction in enhancing customer loyalty was consistently observed, indicating that improvements in Tangibles, Reliability, and Assurance can directly boost satisfaction, which in turn drives loyalty. Additionally, high-quality products, positive brand image, and user-friendly interfaces contribute to higher levels of customer satisfaction, which indirectly promote customer loyalty [23, 25].

In conclusion, companies in the e-cosmetics sector can achieve higher customer satisfaction and loyalty by focusing on key SERVQUAL dimensions and improving product and brand-related factors. Developing strategies to increase customer satisfaction will be an important step in enhancing customer loyalty and, consequently, the competitive strength of companies [26–28].

Future research could explore the impact of emerging technologies, such as augmented reality and virtual try-on tools, connected beauty, social commerce, personalized consultations on service quality and customer satisfaction in the e-cosmetics sector. Additionally, longitudinal studies could provide further insights into how customer preferences and expectations evolve over time in response to technological advancements and market changes.

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