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ANOVA-Based Analysis of the Effect of Healthqual Dimensions on Customer Satisfaction in Healthcare Facility XYZ's Market Segments

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Abstract. In the face of growing competition from modern healthcare facilities offering advanced diagnostic technologies, efficient processes, and competitive pricing, Healthcare Facilty XYZ Surabaya must maintain and enhance service quality to meet customer expectations. Customer satisfaction remains a crucial factor for long-term success by ensuring loyalty and positive recommendations. This study aims to analyze the influence of the five HEALTHQUAL dimensions (Tangibility, Efficiency, Safety, Empathy, and Improvement of Service) on customer satisfaction in Healthcare Facility XYZ. The underlying phenomenon lies in the variation in patient perceptions, where some indicators—such as cleanliness, timeliness of results, and a sense of safety—are perceived as basic standards, while factors like staff competence, simple procedures, friendliness, waiting room comfort, and digital access to results serve as more decisive indicators of satisfaction. A quantitative approach was employed, involving validity and reliability testing, as well as analysis of variance (ANOVA) to identify dominant indicators and differences across customer segments. The findings reveal that waiting room comfort, uncomplicated procedures, medical staff competence, friendliness, and electronic access to results significantly affect customer satisfaction, while parking availability, timeliness of results, perceived safety, attention to comfort, and feedback requests are not significant. ANOVA results further highlight Safety and Improvement of Service as the main dimensions contributing to satisfaction, although their effects vary across segments. These results suggest a need for adaptive health service strategies that prioritize patient safety and service innovation to achieve optimal satisfaction.

Keywords: Service Quality; Customer Satisfaction; HEALTHQUAL; ANOVA

INTRODUCTION

The healthcare industry is becoming increasingly competitive with the emergence of new facilities offering modern diagnostic technology, more efficient processes, and more competitive prices. In this situation, *Fasyankes* XYZ Surabaya needs to ensure that service quality is not only maintained but also meets customer expectations. Customer satisfaction is a key factor in long-term success, as satisfied customers are more likely to return and recommend the service to others.

Customer satisfaction in the healthcare industry is greatly influenced by various factors, particularly service quality. This is reflected in the physical aspects of the facility, such as the cleanliness of the laboratory and the availability of modern medical equipment, which create a positive impression and enhance customers' confidence in the service (Sharifi et al., 2021). Attention and empathy from medical personnel, such as listening to customer complaints and providing clear explanations, are also very important in building emotional relationships and increasing satisfaction (Rakhshani et al., 2020). Good safety procedures provide customers with a sense of security, while efficient service—such as reduced waiting times and prompt delivery of results—enhances customer comfort (Sharifi et al., 2021). Finally, continuous efforts to improve service quality through innovation and staff training demonstrate the facility's commitment to meeting customer expectations and strengthening loyalty (Rakhshani et al., 2020). All these factors contribute to creating a satisfying customer experience.

Conversely, customer dissatisfaction can damage the facility's reputation and reduce loyalty levels. At *Fasyankes* XYZ, although the facility is equipped with advanced technology, there are still complaints regarding long waiting times, test accuracy, and a lack of transparency in safety procedures. This reflects a gap between customers' expectations of fast, accurate service and the reality they experience, which can affect both satisfaction and loyalty levels (Lee & Chang, 2023). Therefore, it is crucial for clinics to maintain high service quality. If service quality declines, several negative impacts may follow, such as decreased customer satisfaction, lower loyalty, damage to reputation, and ultimately a reduction in the number of patients. This can threaten the clinic's operational continuity and weaken its competitiveness in an increasingly crowded market.

However, achieving and implementing consistent service quality is not simple, given that healthcare facilities face multiple limitations such as space, budget, operations, and human capital management (*HCM*). Research by Lee et al. (2022) shows that resource constraints in clinics can significantly affect the quality of services provided, especially in the health sector, which heavily depends on human resources and technology. Therefore, every clinic must set clear priorities in its efforts to improve service quality, focusing on aspects that have the greatest impact on customer satisfaction. As explained by Kim and Park (2023), selecting the right priorities allows clinics to manage resource constraints effectively while maintaining high service quality standards.

The main objective of this research is to identify which priorities are most important for clinics in achieving customer satisfaction, enabling them to optimize existing resources and improve service quality effectively. This study is expected to contribute to organizations by helping them create or maintain optimal service quality, which in turn impacts their sustainability. By understanding the most critical priorities in enhancing customer satisfaction, companies can manage resources more effectively, strengthen customer loyalty, and protect their reputations—all of which play a crucial role in ensuring business continuity and growth.

MATERIALS AND METHOD

This study employed a quantitative research method, and the data analysis process began with a validity test to identify key variables. The validity of the instrument was tested through factor and construct validity analysis (Sekaran & Bougie, 2016). A reliability test was then conducted to determine the consistency of the variables, measured using Cronbach's alpha and composite reliability.

To minimize data distortion caused by uniform data collection methods, a Common Method Bias (CMB) test was performed. CMB was assessed using the Variance Inflation Factor (VIF) to detect multicollinearity among independent variables, as well as a heteroscedasticity test with the Glejser method to ensure the absence of variance inconsistency (Pallant, 2013).

Differences in satisfaction across market segments were analyzed using ANOVA to test the differences in group means (Field, 2013). As a supplementary test, the Kruskal-Wallis method was applied when the data did not meet the normality assumption.

The study population consisted of all Fasyankes XYZ customers who had used the service in the previous six months, totaling 26,661 individuals. The sample size was determined using the Slovin formula with a 5% margin of error, resulting in a minimum of 395 respondents.

To increase analytical accuracy, data were collected from 529 respondents selected through purposive sampling. The selection criteria required respondents to have used the service more than once in the past six months, be aged between 18 and 60 years, and voluntarily complete the questionnaire. Most respondents came from the APP segment (64.8%), followed by APL (16.5%), APS (15.9%), and APD (2.8%).

ANOVA was used to test differences in satisfaction between segments, and Kruskal-Wallis served as an alternative test due to the non-normality of the data. To enhance validity, only respondents with more than one visit were included in the analysis, resulting in sample sizes of APP (25), APL (74), APS (76), and APD (14). Excluding single-visit patients ensured that data reflected more informed assessments of service quality, providing more accurate insights into the relationship between service quality and satisfaction (Zhou et al., 2021).

The study used a 1–5 Likert scale questionnaire to measure customer perceptions and expectations related to the five HEALTHQUAL dimensions: Tangibility, Efficiency, Safety, Empathy, and Service Improvement (Nemati et al., 2020; Mariano et al., 2022). The questionnaire consisted of 36 items and had been validated and tested for reliability prior to data collection.

Through this methodology, the analysis provided a comprehensive understanding of the relationship between service quality and customer satisfaction at Fasyankes XYZ, offering strategic insights for future service enhancements.

Table 1. Construct

Construct	Dimension	Perception
P1	Tangibility	Comfortable waiting room.
P2	Tangibility	Clean waiting room.
P3	Tangibility	Medical equipment looks modern.
P4	Tangibility	Staff wear neat uniforms.
P5	Tangibility	Staff wear clear identification.
P6	Tangibility	The restroom is clean.
P7	Tangibility	Parking is always available.
P8	Tangibility	Easy to find location
P9	Efficiency	The registration process is quick.
P10	Efficiency	Short waiting time to receive service.
P11	Efficiency	Test results are provided as promised
P12	Efficiency	The service flow is easy to understand.
P13	Efficiency	Staff are responsive when queues occur.
P14	Efficiency	Staff respond to technical issues.
P15	Efficiency	Service procedures are straightforward.
P16	Safety	Medical staff are competent in providing medical services.
P17	Safety	Service procedures are clearly explained to patients.
P18	Safety	The instruments used are sterile.
P19	Safety	I felt safe during the examination.
P20	Safety	Infection prevention protocols were well implemented.
P21	Safety	Staff maintain the confidentiality of examination results.
P22	Empathy	Officers provide friendly service.
P23	Empathy	The staff helped me when I was having trouble.
P24	Empathy	The staff responded to my complaints with care.
P25	Empathy	I feel valued as a customer.
P26	Empathy	The staff pays attention to my comfort.
P27	Empathy	The staff cared about my health condition.
P28	Service Improvement	Healthcare facilities are open to customer suggestions and feedback.

Construct	Dimension	Perception
P29	Service Improvement	Healthcare facilities provide online services that simplify the service process.
P30	Service Improvement	Healthcare facilities provide electronic access to examination results.
P31	Service Improvement	Staff request customer feedback after service is provided.
P32	Service Improvement	Changes or updates to the service are clearly communicated.

source: processed data

RESULTS AND DISCUSSION

Data testing was conducted using SPSS, beginning with construct and discriminant validity tests to ensure that the questionnaire items could accurately measure the constructs. Construct validity was tested through factor loading, where items were considered valid if the factor loading value was ≥ 0.4. Items with factor loading < 0.4 had to be eliminated to maintain construct validity (Hair et al., 2010). After conducting validity tests and removing items with factor loadings below 0.40, dimensions P5 ("Staff wear clear identification") and P7 ("Parking is always available") were removed from the Tangible construct. In the Efficiency dimension, items P10 ("Short waiting time") and P12 ("Service flow is easy to understand") were also removed. In the Empathy dimension, construct P24 ("Staff respond to my complaints with attention") was removed. Meanwhile, in the Safety and Improvement of Service dimensions, all items remained valid and were grouped into one cluster.

After removing the invalid constructs, the constructs P1, P2, P3, P4, P6, P8, P9, P11, P13, P14, P15, P16, P17, P18, P19, P20, P21, P23, P25, P26, P27, P28, P29, P30, P31, and P32 were declared valid. These constructs were then tested for reliability to ensure that the instruments used in this study were consistent and reliable. Reliability was measured using Cronbach's Alpha, with a Cronbach's Alpha value ≥ 0.6 indicating that the construct could be categorized as reliable (Hair et al., 2010). The corrected item total correlation was also examined to determine the level of importance of the construct. The Cronbach's Alpha results showed that all constructs had a value of >0.6, which means that all constructs were declared valid.

Tangible

Table 2. Reliability of Tangibility

Reliability Statistics	
Cronbach's Alpha	0.707
Number of Items	6

Item	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
P1	21.59	3.592	0.528	0.639
P2	21.62	3.808	0.369	0.691
P3	21.70	4.031	0.387	0.683
P4	21.86	3.796	0.420	0.674
P6	21.62	3.498	0.515	0.642
P8	21.60	3.911	0.417	0.674

source: processed data

Cronbach's alpha value for the Tangible dimension is 0.707 > 0.6, which is considered reliable. The highest and lowest constructs are determined based on the Corrected Item-Total

Correlation values. The construct with the highest value is P1 "Comfortable waiting room". The item with the lowest value is P2 "Clean waiting room".

Efficiency

Table 3. Reliability of Efficiency

Reliability Statistics	
Cronbach's Alpha	0.727
Number of Items	5

Item	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
P9	17.11	2.962	0.523	0.667
P11	17.20	3.271	0.489	0.681
P13	17.21	3.250	0.492	0.679
P14	17.10	3.589	0.412	0.708
P15	17.21	2.906	0.531	0.664

source: processed data

Cronbach's alpha value for the Efficiency dimension is 0.727 > 0.6, so it is considered reliable. The construct with the highest Corrected Item-Total Correlation value is P15 "Uncomplicated service procedures". The construct with the lowest value is P14 "Examination results are provided according to the promised time".

Safety

Table 4. Reliability of Safety

Reliability Statistics	
Cronbach's Alpha	0.706
Number of Items	6

Item	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
P16	21.91	3.323	0.488	0.650
P17	21.99	3.540	0.432	0.668
P18	21.87	3.449	0.416	0.673
P19	21.95	3.426	0.483	0.652
P20	21.95	3.452	0.384	0.685
P21	21.95	3.554	0.424	0.670

source: processed data

The Cronbach's alpha value for the Safety dimension is 0.706 > 0.6, so it is considered reliable. The construct with the highest Corrected Item-Total Correlation value is P16 "Medical staff are competent in providing medical services". The construct with the lowest value is P20 "I feel safe during the examination."

Empathy

Table 5. Reliability of Empathy

Reliability Statistics	
Cronbach's Alpha	0.602
Number of Items	5

Item	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
P22	17.37	2.224	0.386	0.543
P23	17.54	2.164	0.448	0.503
P25	17.52	2.187	0.379	0.536
P26	17.48	2.228	0.277	0.594
P27	17.47	2.208	0.334	0.560

source: processed data

The Cronbach's alpha value for the Empathy dimension is 0.602 > 0.6, so it is considered reliable. The construct with the highest Corrected Item-Total Correlation value is P23 "The staff serve me kindly". The construct with the lowest value is P26 "The staff pay attention to my comfort".

Improvement of Service

Table 6. Reliability of Service Improvement

Reliability Statistics	
Cronbach's Alpha	0.677
Number of Items	5

Item	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
P28	17.41	2.426	0.447	0.618
P29	17.54	2.528	0.447	0.619
P30	17.47	2.432	0.467	0.609
P31	17.50	2.826	0.355	0.658
P32	17.50	2.476	0.436	0.623

source: processed data

The Cronbach's alpha value for the Improvement of Service dimension is 0.677 > 0.6, so it is declared reliable. The construct with the highest Corrected Item-Total Correlation value is P30. The construct with the lowest value is P31 "Officers ask for customer feedback after the service is provided". After the data was declared valid and reliable, a Common Method Bias (CMB) test was conducted. Based on the CMB test results, the result was 30.067% < 50%, so it can be concluded that the constructs in this study did not have CMB problems.

The next data processing procedure used the ANOVA method to examine differences in satisfaction levels between groups (Lee et al., 2024) constructed into five dimensions (Tangible, Efficiency, Safety, Empathy, and Improvement of Service), then calculated the average of each sample for four satisfaction criteria (APS, APD, APP, APL). Next, the overall average was calculated, with the following results: Tangible = 4.32; Efficiency = 4.29; Safety = 4.38; Empathy = 4.36; and Improvement of Service = 4.37. Each sample was given a code of 1 if the average was lower than the overall value, and a code of 2 if it was higher, thus forming low and high categories before the ANOVA analysis was performed. From these results, it can be seen that Safety and Improvement of Service have the highest averages and have the greatest impact on customer satisfaction. The impact of these two dimensions will then be measured on each market segment: APS, APL, APP, APD.

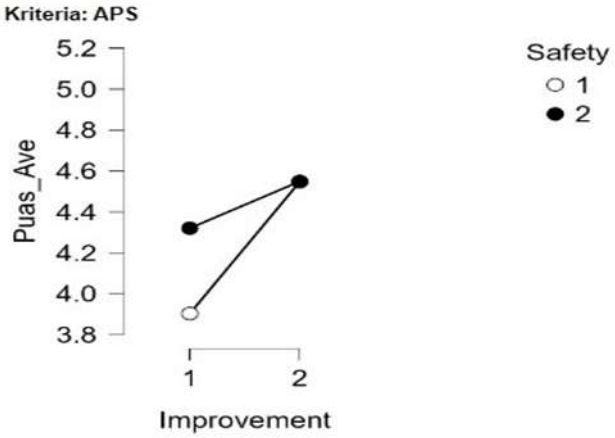

Figure 1. ANOVA APS
source: processed data

The ANOVA plot results for the APS dimension show that satisfaction increases along with low and high Safety Improvement. A sharp increase occurs in low Safety (3.9–4.6), while in high Safety the increase is relatively small. The combination of high Safety and high Improvement results in the highest satisfaction.

At the Request of the Laboratory (APL)

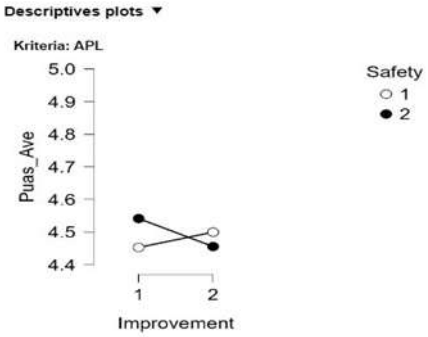

Figure 2. APL ANOVA
source: processed data

The results of the ANOVA plot on the APL criteria show that customer satisfaction is higher in conditions of high Safety and low Improvement. In conditions of high Safety and low Improvement, customer satisfaction is at a level of around 4.6. Conversely, when Improvement increases, satisfaction decreases slightly. This shows that in conditions of high Safety, customer satisfaction tends to be optimal when Improvement is low.

At the Request of the Company (APP)

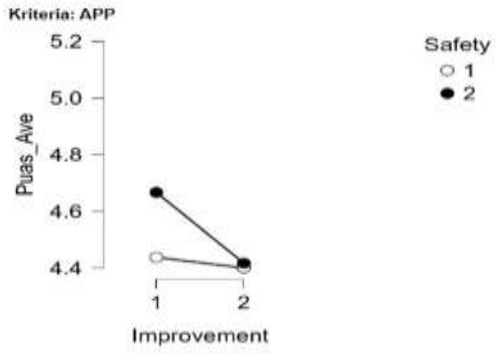

Figure 3. ANOVA AP0
source: processed data

The results of the ANOVA plot on the APP criteria show that customer satisfaction is higher under conditions of high Safety and low Improvement. Under conditions of high Safety and low Improvement, customer satisfaction is at a level of around 4.6. Conversely, when Improvement increases, satisfaction decreases to around 4.4. This shows that under conditions of high Safety, customer satisfaction tends to be optimal when Improvement is low.

At the Doctor's Request (APD)

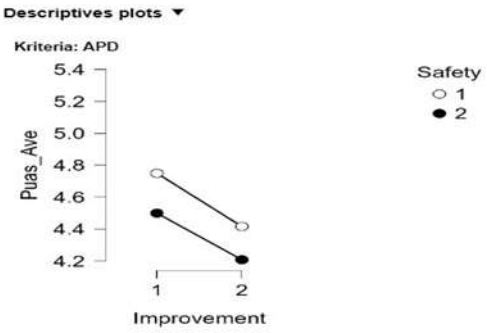

Figure 4. ANOVA APD
source: processed data

The ANOVA plot results for the APD criteria show that customer satisfaction levels decrease when Improvement increases, both under low and high Safety conditions. Under low Safety, initial satisfaction was around 4.8, but dropped to 4.4 when Improvement increased. At high Safety, initial satisfaction was around 4.45 and decreased to 4.2. This pattern shows that a combination of low Improvement results in better satisfaction than high Improvement, both at low and high Safety. Thus, in the APD criteria, too much improvement can actually reduce customer satisfaction, and the best conditions are achieved when Improvement is kept low.

Discussion

The validity test of the Tangible dimension, constructs P5 (Staff wear clear identification) and P7 (Parking is always available) are invalid because they are perceived more as administrative aspects and external conditions, not representations of core service quality. The

relevance of parking is also decreasing due to the availability of home service, so these two indicators are not stable as tangible measures (Kagan, 2025).

In the Efficiency dimension, constructs P10 (Short waiting times) and P12 (Easy-to-understand service flow) are invalid because patient experiences vary greatly due to limitations in medical personnel, patient numbers, and manual queuing systems. The actual service flow is orderly but still gives rise to different perceptions, so that these two indicators are not consistent as measures of efficiency (Varnosfaderani et al., 2024; Er-Rays & M'dioud, 2024).

In the Empathy dimension, construct P24 (Staff respond to my complaints with attention) was removed because staff responses were not uniform, resulting in highly varied patient perceptions. This condition is in line with research findings that the largest gap in service quality often appears in the dimensions of empathy and responsiveness (Karume et al., 2025; Rauf & Pratiwi, 2023).

The reliability test on the Tangible dimension showed that construct P1 (Comfortable waiting room) had the highest correlation value because facilities such as adequate waiting chairs, air conditioning, lighting, and a calm atmosphere were perceived as important factors affecting the patient experience, in line with research showing that waiting room comfort has a significant effect on patient satisfaction (Manaf et al., 2024). Conversely, construct P2 (clean waiting room) obtained the lowest value because cleanliness at Fasyankes XYZ is already considered a basic service standard that must be met, so that middle- to upper-class patients do not view it as a distinguishing factor in assessing service quality. This condition supports the view that variations in the contribution of indicators to reliability can occur due to differences in respondents' perceptions of the relevance of an item in measuring service quality (Hair et al., 2019).

The Cronbach's Alpha value for the Efficiency construct was 0.727, higher than the minimum limit of 0.6, so this construct was declared reliable. The item with the highest Corrected Item-Total Correlation value was P15 (Service procedures are not complicated) because patients directly feel the benefits of simple and efficient procedures, so this indicator is consistent in reflecting service efficiency. Conversely, the item with the lowest value is P14 (Examination results are provided according to the promised time) because the promise of examination results for referral patients is regulated through a work agreement between the referring party and the company, so they are almost never late and are perceived as something normal and no longer considered a distinguishing factor in assessing efficiency, but rather part of the expected service standard (Varnosfaderani et al., 2024; Er-Rays & M'dioud, 2024).

The Cronbach's Alpha value for the Safety dimension was 0.706, higher than the minimum threshold of 0.6, so this construct was declared reliable. The item with the highest Corrected Item-Total Correlation value was P16 (Medical staff are competent in providing medical services) because medical staff competence is directly perceived by patients as the main factor that guarantees safety while receiving services. Conversely, the item with the lowest value is P20 (I feel safe during the examination) because the feeling of safety is more subjective and is often considered a basic standard that must be provided by health facilities, so that variations in patient perceptions of this item are greater. This condition is in line with the findings that staff competence has a significant effect on patient trust, while a sense of safety tends to be perceived as something that should naturally exist in health services (Kagan, 2025).

The Cronbach's Alpha value for the Empathy dimension was 0.602, higher than the minimum threshold of 0.6, indicating that this construct is reliable. The item with the highest Corrected Item-Total Correlation value was P23 (Staff serve me kindly) because staff friendliness is directly perceived by patients as a tangible expression of empathy in interactions, resulting in more consistent and stronger perceptions. Conversely, the item with the lowest value is P26 (Officers pay attention to my comfort) because comfort is often influenced by physical environmental factors such as waiting rooms or supporting facilities, not just the attitude of the officers. This makes patients' perceptions of this indicator more varied, so its contribution to reliability is lower (Karume et al., 2025).

The Cronbach's Alpha value for the Improvement of Service dimension was 0.677, higher than the minimum threshold of 0.6, so this construct was deemed reliable. The item with the highest Corrected Item-Total Correlation value is P30 (XYZ Health Facility provides access to examination results electronically) because the use of digital technology is perceived by patients as a form of real innovation that is convenient, fast, and in line with the expectations of the middle to upper segments. Conversely, the item with the lowest value is P31 (Staff request customer feedback after service is provided) because the activity of requesting feedback is often considered a formality and is not always followed up, so patients do not consider this indicator as an important part of service improvement. This condition is in line with the finding that the use of digital technology in health services is more appreciated by patients than evaluation mechanisms that do not have immediate benefits (Morales et al., 2024).

In the ANOVA plot, Improvement of Service and Safety were selected as the main dimensions for further analysis because they showed the highest averages compared to other dimensions, namely 4.37 for Improvement and 4.38 for Safety, thus potentially having the most significant influence on customer satisfaction at Fasyankes XYZ. Safety is a priority because patients tend to assess the safety of medical services, the competence of health workers, and the certainty of procedures as fundamental factors in the quality of health services (Kagan, 2025). Meanwhile, Improvement of Service plays an important role because patients expect continuous innovation, such as access to electronic examination results and service evaluations, which have been proven to increase loyalty and satisfaction in the long term (Kim et al., 2025). Theoretically, these two dimensions are also consistent with the literature that safety and service innovation are the main determinants in shaping perceptions of modern healthcare quality (Lee et al., 2024).

The ANOVA plot on the APS dimension shows that patient satisfaction increases along with improvements in the Improvement aspect, both in low and high Safety conditions, with the sharpest increase in low Safety (from 3.9 to 4.6), while in high Safety the increase is relatively small because patients already feel safe so that additional improvements have little effect; however, the combination of high Safety and high Improvement still resulted in the highest satisfaction, which is consistent with previous studies that service improvements in facilities with low safety perceptions lead to greater increases in satisfaction (Kim et al., 2025; Cui et al., 2025). These findings imply that the management of XYZ Health Facility needs to prioritize interventions in units with low safety scores by improving staff competence, standardizing procedures, and strengthening the safety monitoring system, while maintaining and developing units with high Safety through continuous innovation such as digitizing

examination results and proactive services. so that this dual strategy can significantly improve satisfaction in weak areas while maintaining optimal quality in already strong services.

The ANOVA plot results for the APL criteria show that customer satisfaction is highest in the combination of high Safety and low Improvement, with a satisfaction level of around 4.6. Conversely, when Improvement is increased under high Safety conditions, satisfaction actually decreases slightly because customers feel that the already optimal safety aspects sufficiently meet their expectations, so that additional improvements do not provide significant added value. This condition can also be explained by the nature of the APL segment, which tends to have a limited reference budget system, so that excessive service improvement has the potential to increase costs and create negative perceptions. These findings are consistent with research showing that in facilities with high service quality, additional improvement interventions often result in diminishing returns on satisfaction (Cui et al., 2025; Jesus et al., 2025). The managerial implication of these results is that the management of Fasyankes XYZ needs to maintain safety standards at an optimal level while implementing measurable improvements, so as not to incur excessive costs and to maintain customer satisfaction at the highest level.

The ANOVA plot results for the APP criteria show that customer satisfaction is highest in the combination of high Safety and low Improvement, with a satisfaction value of around 4.6. Conversely, when Improvement is increased under high Safety conditions, satisfaction actually decreases to around 4.4 because customers perceive that the additional improvements do not provide benefits commensurate with the costs or efforts incurred. This pattern indicates that in the APP segment, customer satisfaction tends to be optimal when Safety is already high and Improvement is kept low so that services are efficient and do not create excessive perceptions. This finding is in line with research emphasizing that additional service improvements under conditions of already high basic quality often result in diminishing returns on customer satisfaction (Cui et al., 2025; Jesus et al., 2025). The managerial implication for Fasyankes XYZ is the need to maintain safety standards at an optimal level, while service improvements are carried out selectively and measuredly so as not to reduce customer satisfaction.

The ANOVA plot results for the PPE criteria show that customer satisfaction levels decline as Improvement increases, both under low Safety and high Safety conditions. Under low Safety, initial satisfaction of around 4.8 drops to 4.4 as Improvement increases, while under high Safety, initial satisfaction of around 4.45 declines to 4.2. This pattern indicates that a combination with low Improvement results in higher satisfaction compared to high Improvement under both Safety conditions. This phenomenon can be explained because in the PPE segment, the Safety aspect is already considered the responsibility of the referring doctor, so patients fully entrust their medical safety to the decision of the doctor who refers them to Fasyankes XYZ. Therefore, patients focus more on service efficiency, and excessive improvements actually create the perception of additional costs or unnecessary processes, thereby reducing satisfaction. This finding is in line with research showing that in services with a high level of trust in medical personnel, additional improvements that do not meet expectations can have a diminishing returns effect on satisfaction (Cui et al., 2025; Jesus et al., 2025). The managerial implication for XYZ Healthcare Facility is to keep services simple and

efficient for doctor-referred patients, emphasizing transparency of examination results without providing too many additional improvements that may be perceived as irrelevant.

There is a similarity in conclusion between APP and APL, where customers are most satisfied when safety is maximized and service improvement is measurable. In the dimension of service improvement in the APL segment, service improvement can be realized by adding new products at competitive prices so that optimal customer satisfaction can still be achieved. However, in the APP segment, adding products tends to be difficult because the company has already compiled health examination parameters that are in accordance with the needs and risks of each job. Therefore, service improvement can be achieved by strengthening after-sales service, such as holding health talks tailored to the company's health conditions as a form of preventive action.

The technical implications of the research results show that the interaction between Safety and Improvement does not have a uniform pattern across all patient segments. In the APS segment, Improvement can significantly increase satisfaction when Safety is still low, supporting the service recovery theory that emphasizes improvement as compensation for weaknesses in basic services. Conversely, in the APL and APP segments, satisfaction is higher when Safety is strong but Improvement is low, confirming the phenomenon of diminishing returns where additional improvements do not always increase satisfaction, especially in the context of budget constraints or referral systems. In the APD segment, it was even found that excessive Improvement actually decreased satisfaction, as it was perceived as an additional burden rather than an added value factor. This can be used to develop marketing strategies and customer journey strategies to increase sales while improving customer satisfaction.

The implication of this research for the academic world is the need to broaden the understanding of healthcare quality by considering the heterogeneity of patient segments.

Research models that analyze differences in customer satisfaction between market segments within a single business entity can be developed in other sectors, such as hospitals, with market segmentation based on where patients receive services (consultation clinics, emergency rooms, ICUs, inpatient care) and based on payors (out-of-pocket money, private insurance, government insurance, company insurance). These findings also enrich the literature with empirical evidence that the effectiveness of Safety and Improvement is highly determined by patient characteristics and service context, so that the healthcare service quality model cannot be viewed homogeneously. Thus, this study contributes to directing the development of a more adaptive theory of segment differences and provides a basis for further research exploring the dynamics of patient satisfaction more specifically.

CONCLUSION

This study found that the Safety and Improvement of Service dimensions were the most influential factors affecting customer satisfaction at Healthcare Facility XYZ. The ANOVA results showed that their effects varied across market segments—APS (self-request), APL (laboratory request), APP (company request), and APD (doctor request). Safety emerged as the foundation of trust, while improvement distinguished the facility through innovation, especially in digital access and process efficiency. However, their interaction differed among segments: in APS, improvements compensated for lower safety perceptions; in APL and APP, satisfaction was highest when safety was strong but innovation moderate; and in APD, excessive improvement reduced satisfaction. These findings highlight the need for adaptive,

segment-based strategies that emphasize safety and measured innovation to maximize satisfaction and loyalty. Future research could explore longitudinal or cross-institutional studies to validate these relationships and assess how evolving healthcare technologies further moderate the link between safety, innovation, and satisfaction.

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