Antecedent Factors of Orthodontic's Patients Satisfaction and Its Impact on Positive Word of Mouth at Private Specialist Dental Clinic X in Tangerang Selatan

Benita Novitasari Priyanto*[1], Margaretha Pink Berlianto[2]

*[1,2] Hospital Administration, Universitas Pelita Harapan, Tangerang, Indonesia

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Email Correspondence
benita.novitasari@gmail.com

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ABSTRACT

The purpose of this study was to determine the antecedent of orthodontic patient satisfaction and analyze its impact on positive word of mouth recommendations (PWOM) related to orthodontic treatment. This is a quantitative survey study with a cross-sectional data collection method. The questionnaire questions with likert scale 5 points were used and adjusted to questions that already exist in previous literature. Data collection was carried out purposively with a non-probability sampling technique on the population of orthodontic patients who came to the Private Specialist Dental Clinic X in South Tangerang in the period March - April 2025. The total respondents obtained were 140 respondents that were undergoing orthodontic treatment at the clinic. PLS SEM method is used to analyze the collected data and test the hypothesis. The results of this study indicate a significant positive relationship between the variables of Facilities, Cleanliness, Dental Equipment, Dental Supplies, Orthodontist's Technical Skills, Doctor-Patient Relationship, Staff, Treatment Duration, Location Accessibility, Appointment Scheduling, and Organization Administration and Positive Word of Mouth, mediated by Orthodontic Patient Satisfaction at the Private Specialist Dental Clinic X in South Tangerang. The five variables with the greatest influence on orthodontic patient satisfaction, in order of importance, are Dental Equipment, Organization Administration, Doctor-Patient Relationship, Treatment Duration, and Staff. The results of this study provide managerial implications for every Private Dental Clinic in identifying the antecedent factors of orthodontic patient satisfaction that can enhance word-of-mouth recommendations and ultimately increase the number of new orthodontic patients. However, this study has several limitations, which are followed by recommendations for future research.

INTRODUCTION

Public and private healthcare providers are required to deliver high-quality services to patients. Patient satisfaction is a key indicator of the success of healthcare services, including dental care. According to Fannya et al. (2022), patient satisfaction is one of the main factors influencing the emergence of the Word of Mouth (WOM) in healthcare services. WOM refers to informal communication between individuals regarding their personal experiences with a product or service. Satisfied patients tend to voluntarily share positive experiences, or Positive Word of Mouth (PWOM), with those around them, such as family or friends. As a result, PWOM indirectly serves as a form of recommendation or promotion. Therefore, understanding the relationship between factors affecting patient satisfaction and their impact on the occurrence of PWOM is crucial for healthcare providers in improving service quality, enhancing the reputation of clinics or hospitals, and attracting new prospective patients.

Malocclusion, or the misalignment of teeth outside the normal dental arch, can have negative effects on an individual's growth and development, facial appearance, and self-confidence (Krisnawati et al., 2023). Individuals with malocclusion are also more likely to experience other dental problems, such as caries, periodontal disease, trauma, temporomandibular joint disorders, and aesthetic concerns. A systematic review by Lombardo G, et al. (2020) reported that the global prevalence of malocclusion is 56%, with a prevalence of 48% in Asia. Several studies in Indonesia have found that the need for orthodontic treatment among Indonesian adolescents ranges from 53% to 68% (Krisnawati et al., 2023). The high prevalence of malocclusion reflects the considerable potential need for orthodontic care both globally and in Indonesia.

Given the high prevalence of malocclusion in Indonesia, the need for orthodontic treatment serves as a strong justification for focusing this research on orthodontic patients. The untreated malocclusion

population represents a large potential market for orthodontic services. One approach to fulfilling this need is to utilize the secondary effects of patient satisfaction—whereby patients who are satisfied with their orthodontic treatment encourage others to seek similar care through Positive Word of Mouth. Understanding the factors that influence orthodontic patient satisfaction can help providers, such as private specialist dental clinics, to identify areas for service improvement, thereby attracting more new patients.

Orthodontic treatment is closely linked to patient satisfaction due to its lengthy duration, high cost treatment, and its aesthetic nature. A patient's decision to undergo orthodontic treatment is also heavily influenced by the reputation and recommendations (word of mouth) from individuals who have previously received such treatment. Research on orthodontic patients will provide insights into strategies for improving service quality in the healthcare industry, as orthodontic care is elective and places a strong emphasis on service quality, with the ultimate goal of achieving higher patient satisfaction. Positive word of mouth from satisfied patients is considered one of the most trusted sources of information for prospective patients, surpassing traditional advertising. Previous research by Jung et al. (2018) has demonstrated that word of mouth in the dental healthcare industry has a significant influence in attracting new clients. Moreover, studies specifically examining the factors associated with orthodontic patient satisfaction and PWOM, both globally and in Indonesia, remain limited (Krisnawati et al., 2023; Souki et al., 2022). Most studies on patient satisfaction in dentistry, especially those focusing on orthodontic patients in Indonesia, primarily address overall satisfaction with service quality or clinical outcomes, but do not assess its subsequent impact on PWOM.

Private Specialist Dental Clinic X is a Dental Clinic specializing in orthodontic and implant treatments, established in 2019 in South Tangerang, Banten. The clinic employs 13 dentists, consisting of 8 dental specialists and 5 general dentists, as well as 4 dental nurses. It is equipped with 3 dental units and diagnostic radiology equipment.

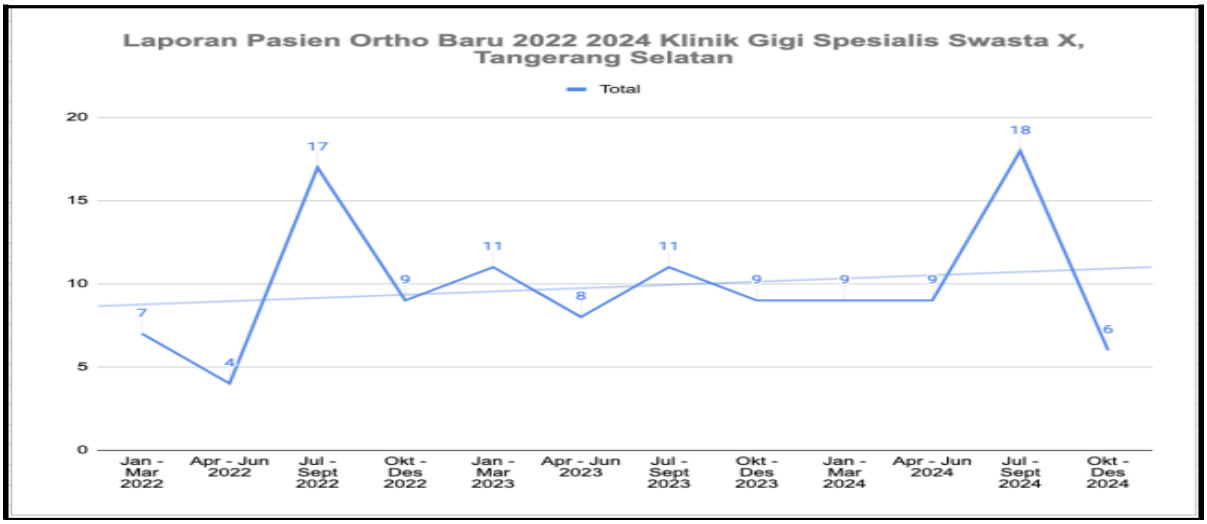

Figure 1. Number of New Orthodontic Patients (2022–2024) at Private Specialist Dental Clinic X.

The focus of this study on orthodontic patients is based on the phenomenon gaps at Private Specialist Dental Clinic X, specifically the clinic's failure to meet its monthly target for new orthodontic patients. As shown in Figure 1. Private Specialist Dental Clinic X records an average of 9 to 10 new orthodontic patients per quarter, which is equivalent to only 3 to 4 new orthodontic patients per month. Based on interviews conducted with the Branch Manager on March 15, 2025, it was revealed that the clinic aims to achieve a minimum of 5 or more new orthodontic patients each month. Furthermore, as illustrated in Figure 2. there was a downward trend in the number of orthodontic follow-up patients from January to September 2024, which coincided with the completion of orthodontic treatment for many existing patients (Private Specialist Dental Clinic X., 2025).

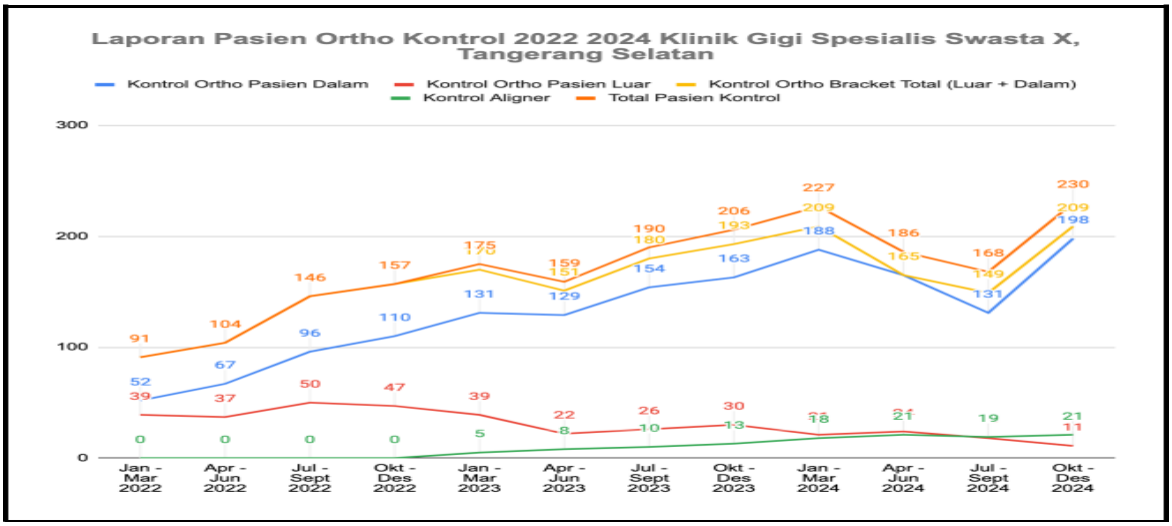

Figure 2. Number of Orthodontic Follow- up Patients (2022–2024) at Private Specialist Dental Clinic X.

Based on the data obtained from Private Specialist Dental Clinic X and previous studies, no research has yet been conducted on the quality factors that influence orthodontic patient satisfaction and the occurrence of PWOM at Private Specialist Dental Clinic X, South Tangerang. Therefore, this study employs a research model adapted from several previous studies that examine the antecedent factors of orthodontic patient satisfaction and their impact on PWOM in private specialist dental clinics (Jung et al., 2018; Wong et al., 2018; Luo et al., 2018; Wibowo & Junaedi, 2019; Zadake et al., 2020; Souki et al., 2022). It is expected that this research will provide a scientific basis for developing strategies to improve orthodontic services and patient satisfaction, as well as their impact on PWOM among orthodontic care providers to attract new patients. Moreover, the findings are expected to contribute to improving both access to and the affordability of orthodontic care for the broader Indonesian population.

RESEARCH AND METHODOLOGY

This study is a quantitative survey research with a cross-sectional design conducted on a population of orthodontic patients at Private Specialist Dental Clinic X, South Tangerang. Primary data were collected by distributing questionnaires to 140 respondents. The minimum sample size, determined to be 123 respondents, was calculated using power analysis with G*Power software. The sampling technique used was non-probability purposive sampling, with inclusion criteria being patients aged 18–59 years who were currently undergoing orthodontic treatment or had completed treatment less than six months prior at Private Specialist Dental Clinic X, South Tangerang, and were capable and willing to complete the questionnaire.

This study consists of 11 independent variables, 1 mediating variable, and 1 dependent variable. The dependent variable is Positive Word of Mouth (PWOM); the 11 independent variables Facilities (FK), Cleanliness (KK), Dental Equipment (DE), Dental Supplies (DS), Orthodontist's Technical Skills (KTD), Doctor-Patient Relationship (HUB), Staff (SK), Treatment Duration (DUR), Accessibility (Clinic Location) (LOK), Appointment Scheduling (PJT), and Organization Administration (ADM), with Patient Satisfaction (PS) serving as the mediating variable.

This study includes 58 question indicators detailed as follows: Facilities consists of five indicators, Cleanliness five indicators, Dental Equipment four indicators, Dental Supplies three indicators, Orthodontist's Technical Skills five indicators, Doctor-Patient Relationship six indicators, Clinic Staff six indicators, Treatment Duration two indicators, Accessibility Clinic Location three indicators, Appointment Scheduling four indicators, Organization Administration six indicators, and Patient Satisfaction five indicators adopted from Souki et al. (2022). Positive Word of Mouth consists of four indicators adopted from Ismail (2022).

Data analysis in this study utilized the PLS-SEM method. Outer model evaluation was performed to assess the validity and reliability of the data by considering several aspects: indicator reliability (Outer

Loading values ≥ 0.7), construct reliability (Composite Reliability and Cronbach's alpha values ≥ 0.7), and convergent validity (AVE values ≥ 0.5). Furthermore, discriminant validity was evaluated using the Heterotrait-Monotrait Ratio (HTMT) approach, where HTMT values < 0.85 or 0.90 indicate good discriminant validity. All these criteria refer to the guidelines from Hair et al. (2019; 2021).

In the second stage analysis, the inner model was evaluated to assess the influence and strength of relationships between latent variables through analysis of inner VIF values, R^2, path coefficients, and significance value (p-value and t-statistic). An inner VIF value < 3 indicates no collinearity issues, while R^2 or Coefficient of Determination is used to measure how much the independent variables collectively explain the variance of the dependent variable in the research model, with the categories >0.75 as substantial, >0.5 as moderate, and >0.25 as weak explanatory power. The Q^2 measures the model's predictive relevance, where $Q^2 > 0$ means the model is considered relevant in predicting data changes. The analysis also includes hypothesis significance testing using bootstrapping, where a relationship is significant if p-value < 0.05 and t-statistic > 0.1645, as well as the display of specific indirect effects through mediating variables (Hair et al., 2021; Sarstedt et al., 2022; Henseler et al., 2014).

RESULTS AND DISCUSSION

Table 1. presents the respondent profiles in this study. A total of 140 respondents participated, and all data were utilized for actual analysis. According to Table 1, the respondents comprised 140 orthodontic patients, with the majority being female (80%, or 112 patients) and the remaining 20% (28 patients) male. In terms of age distribution, most respondents were in the 18–27 years age group (60.71%, or 85 patients), followed by the 28–43 years group (35.71%, or 50 patients), and the 44–59 years group (3.57%, or 5 patients). Regarding domicile, most respondents resided in Tangerang (78.57%), followed by Jakarta (14.29%), with a smaller proportion from Bogor (2.86%), Bekasi (0.71%), and other areas outside Greater Jakarta (3.57%). Based on employment status, 53 patients (37.86%) were private employees, 46 patients (32.86%) were students, 16 patients (11.43%) were entrepreneurs, 3 patients (2.14%) were Government Employees, 6 (4.29%) were unemployed, and 16 patients (11.43%) were in other occupations not mentioned above. In terms of educational background, the majority of respondents held a bachelor's degree (57.86%), followed by high school graduates (27.86%) and those with less than a high school education (6.43%). From all respondents, 83.57% had visited the clinic more than twice, while 16.43% had visited exactly twice. Additionally, almost all respondents (97.86%, or 137 ipatients) were still undergoing orthodontic treatment, with only a small proportion (2.14%, or 3 patients) having completed their orthodontic treatment.

Table 1. Respondent Profile

Characteristic	Category	Total (n)	Percentage (%)
Gender	Male	28	20%
	Female	112	80%
Age Group	18 – 27 years	85	60.72%
	28 – 43 years	50	35.71%
	44 – 59 years	5	3.57%
Domicile	Jakarta	20	14.29%
	Bogor	4	2.86%
	Tangerang	110	78.57%
	Bekasi	1	0.71%
	Others	5	3.57%
Employment Status	Private Employee	16	11.43%
	Student	53	37.86%
	Entrepreneur	46	32.86%
	Government Employee	16	11.43%
	Unemployed	3	2.14%
	Others	6	4.29%
Educational Background	< Senior High School	9	6.43%
	Senior High School	39	27.86%
	Diploma	5	3.57%

Characteristic	Category	Total (n)	Percentage (%)
	Bachelor's Degree	81	57.86%
	Master's Degree	6	4.29%
Number of Visits (Last 6 Months)	≤ 2 times	23	16.43%
	> 2 times	117	83.57%
Treatment Status	Ongoing	137	97.86%
	Completed	3	2.14%

Source: Data Analysis using SmartPLS 4.1 (2025)

The measurement model (outer model) evaluation in this study was conducted by testing indicator reliability, internal consistency reliability, convergent validity, and discriminant validity to assess the validity and reliability of the research model. In Table 2, all indicators have outer loading values greater than 0.7, indicating that the indicators in the model are reliable and each consistently and accurately reflects the measured variable. The composite reliability (CR) and Cronbach's alpha values for each variable also exceed 0.7, demonstrating that internal consistency reliability has been achieved. This means that all indicators within each variable are consistent in measuring the intended construct, making the measurement results dependable. In addition, the AVE values are ≥ 0.5 (Table 2), indicating that all constructs meet the criteria for convergent validity. An AVE value ≥ 0.5 means that more than 50% of the variance of the indicators can be explained by the latent construct, so these indicators truly represent the variable being measured.

Table 2. Validity and Reability Testing

Constructs and Indicators	*Outer Loading*
Facilities (CR= 0,884, AVE= 0,605)	
FK1: The physical facilities at Dental Clinic X are well-organized.	0.799
FK2: The physical facilities at Dental Clinic X have an attractive appearance.	0.841
FK3: Dental Clinic X has good air ventilation.	0.791
FK4: The rooms at Dental Clinic X have good lighting.	0.732
FK5: The waiting room at Dental Clinic X is comfortable.	0.719
Cleanliness (CR= 0,888, AVE=0,615)	
KK1: Dental Clinic X is clean.	0.768
KK2: Dental Clinic X uses clean instruments to treat patients.	0.900
KK3: Dental Clinic X uses sterilized instruments to treat patients.	0.712
KK4: Medical personnel at Dental Clinic X use Personal Protective Equipment (PPE) when performing procedures.	0.702
KK5: Private Specialist Dental Clinic X always has clean equipment.	0.823
Dental Equipment (CR=0,859, AVE=0,604)	
DE1: The dental equipment used at Dental Clinic X is well-maintained.	0.700
DE2: The dental equipment used at Dental Clinic X is comfortable to use.	0.802
DE3: The dental equipment used at Clinic X is adequate.	0.787
DE4: The dental equipment used at Dental Clinic X is sufficient to serve all patients.	0.814
Dental Supplies (CR= 0,848, AVE= 0,652)	
DS1: The dental materials used at Dental Clinic X are of good quality.	0.900
DS2: The dental materials used at Dental Clinic X are durable (for example, not easily dislodged or broken).	0.788
DS3: The dental supplies at Dental Clinic X are sufficient to serve all patients.	0.726
Orthodontist's Technical Skills (CR= 0,875, AVE= 0,585)	
KTD1: The Orthodontist at Dental Clinic X has a high level of professional qualifications.	0.812
KTD2: The Orthodontist at Dental Clinic X demonstrates technical knowledge in his/her field	0.710
KTD3: The Orthodontist at Dental Clinic X has technical skills in performing their duties.	0.789
KTD4: The Orthodontist at Dental Clinic X is prepared to answer and clarify patients' doubts or questions.	0.777

Constructs and Indicators	*Outer Loading*
KTD5: The Orthodontist at Dental Clinic X can make accurate diagnoses to determine the most appropriate treatment.	0.730
Doctor - Patient Relationship (CR= 0,921, AVE= 0,661)	
HUB1: The Orthodontist at Dental Clinic X is willing to listen to their patients.	0.791
HUB2: The Orthodontist at Dental Clinic X explains patients' issues clearly in words they can understand.	0.815
HUB3: The Orthodontist at Dental Clinic X maintains a friendly atmosphere during consultations.	0.809
HUB4: The Orthodontist at Dental Clinic X shows interest in solving patients' problems as best as possible.	0.829
HUB5: The Orthodontist at Dental Clinic X explains the treatment options and when the treatment will end.	0.851
HUB6: The Orthodontist at Dental Clinic considers the patient's expectations and shows interest in meeting them.	0.781
Staff (CR= 0,917, AVE= 0,648)	
SK1: The staff at Dental Clinic X always wear uniforms.	0.786
SK2: The staff at Dental Clinic X are competent in performing their duties.	0.795
SK3: The staff at Dental Clinic X provide services to patients responsively.	0.802
SK4: The staff at Dental Clinic X listen carefully to patients' opinions.	0.829
SK5: The staff at Dental Clinic X are always willing to respond to patient complaints.	0.793
SK6: The staff at Private Specialist Dental Clinic X treat patients politely.	0.823
Treatment Duration (CR= 0,952, AVE= 0,908)	
DUR1: Orthodontic treatment at Dental Clinic X is fast.	0.949
DUR2: The duration of orthodontic treatment at the clinic matches what was agreed upon.	0.957
Accessibility (Location) (CR= 0,849, AVE= 0,652)	
LOK1: Dental Clinic X is in a strategic location.	0.779
LOK2: Dental Clinic X is located in a comfortable area.	0.814
LOK3: Dental Clinic X is easily accessible for patients.	0.829
Appointment Scheduling (CR= 0,858, AVE= 0,604)	
PJT1: The opening hours of Dental Clinic X suit patients' needs.	0.742
PJT2: It is easy to schedule an appointment at Dental Clinic X.	0.866
PJT3: Dental Clinic X is punctual in keeping scheduled appointments.	0.779
PJT4: Dental Clinic X does not cancel previously scheduled appointment times with its patients.	0.712
Organization Administration (CR= 0,889, AVE= 0,572)	
ADM1: Dental Clinic X has good administration.	0.745
ADM2: Dental Clinic X resolves patients' problems efficiently.	0.755
ADM3: Dental Clinic X explains its procedures to patients transparently.	0.775
ADM4: Dental Clinic X has clear communication.	
ADM5: Dental Clinic X fulfills its commitments made with patients.	0.764
ADM6: Dental Clinic X confirms appointment times with patients by phone call or message with sufficient notice.	0.758 0.740
Orthodontic Patient Satisfaction (CR= 0,893, AVE= 0,670)	
PS1: I am satisfied with the results of the services provided by Dental Clinic X.	0.852
PS2: I am pleased to receive services from Dental Clinic X.	0.788
PS3: I feel I receive good orthodontic treatment at a reasonable price at Dental Clinic X.	0.810
PS4: Using the services provided by Dental Clinic X for orthodontic care is worth my time and effort.	0.839
PS5: Compared to other dental clinics, it is wise to choose Dental Clinic X for orthodontic treatment.	0.803
Positive Word of Mouth (CR= 0,837, AVE= 0,675)	
PWOM1: I will say positive things about Dental Clinic X to others.	0.802
PWOM2: I will recommend Dental Clinic X to someone who asks for my advice.	0.824

Constructs and Indicators	*Outer Loading*
PWOM3: I will encourage my friends to visit Dental Clinic X.	0.823
PWOM4: I will encourage my relatives or family to visit Dental Clinic X.	0.836
Note: CR= Composite Reliability; AVE= average variance extracted.	

Source: Data Analysis using SmartPLS 4.1 (2025)

Table 3. Discriminant Validity (HTMT)

	ADM	DE	DS	DUR	FK	HUB	KK	KTD	LOK	PJT	PS	PWOM	SK
ADM													
DE	0.175												
DS	0.145	0.08											
DUR	0.254	0.042	0.12										
FK	0.102	0.143	0.096	0.087									
HUB	0.153	0.296	0.192	0.069	0.103								
KK	0.088	0.094	0.132	0.118	0.128	0.129							
KTD	0.077	0.126	0.094	0.226	0.109	0.168	0.131						
LOK	0.15	0.115	0.079	0.125	0.173	0.212	0.158	0.183					
PJT	0.159	0.136	0.188	0.343	0.152	0.113	0.198	0.137	0.195				
PS	0.434	0.443	0.258	0.427	0.233	0.459	0.271	0.336	0.343	0.281			
PWOM	0.226	0.24	0.147	0.285	0.084	0.265	0.137	0.408	0.296	0.311	0.664		
SK	0.091	0.137	0.076	0.09	0.085	0.092	0.162	0.135	0.128	0.13	0.287	0.167	

Source: Data Analysis using SmartPLS 4.1 (2025); Note: FK = Facilities; KK = Cleanliness; DE = Dental Equipment; DS = Dental Supplies; KTD = Orthodontist's Technical Skills; HUB = Doctor-Patient Relationship; SK = Staffs; DUR = Treatment Duration; PJT = Appointment Scheduling; ADM = Organization Administration; PS = Patient Satisfaction; PWOM = Positive Word of Mouth.

The last step in the outer model evaluation is the discriminant validity test using the HTMT ratio. The HTMT assessment criterion requires that each construct should have an HTMT value of less than 0.85 or 0.90. As shown in Table 3 below, all variables in this study have HTMT ratios below 0.85, indicating that the research model has achieved good discriminant validity. Therefore, it can be concluded that all variables have passed the HTMT discriminant validity test, and thus all indicators and constructs have successfully met the validity and reliability criteria.

Inner Model Evaluation

After all indicators passed the validity and reliability tests in the outer model, the next step is to evaluate the inner model or structural model, as illustrated in Figure 4. The first step of inner model evaluation is to perform a collinearity statistics test using the Variance Inflation Factor (VIF) values to ensure that there are no multicollinearity issues within the model. This test is important because high multicollinearity can cause indicators to become redundant, thereby reducing their statistical significance in the model (Hair et al., 2019). Based on Table 4, the VIF values range from 1.000 to 1.207, all of which are below 3, indicating that there is no collinearity issue in this study.

Next, to analyze the R^2 or coefficient of determination. Based on Table 5, the R^2 for Patient Satisfaction is 0.620, which shows moderate explanatory power. This means that the variables–Facilities, Cleanliness, Dental Equipment, Dental Supplies, Orthodontist's Technical Skills, Doctor-Patient Relationship, Staff, Treatment Duration, Accessibility (Location), Appointment Scheduling, and Organization Administration collectively explain 62.0% of the variance in Orthodontic Patient Satisfaction, while the remaining 38.0% is influenced by other factors not included in this study. Meanwhile, the R^2 value for the Positive Word of Mouth variable is 33.0%, which is influenced by patient satisfaction, indicating a weak explanatory power. The remaining 67.0% is influenced by other variables not examined in this research.

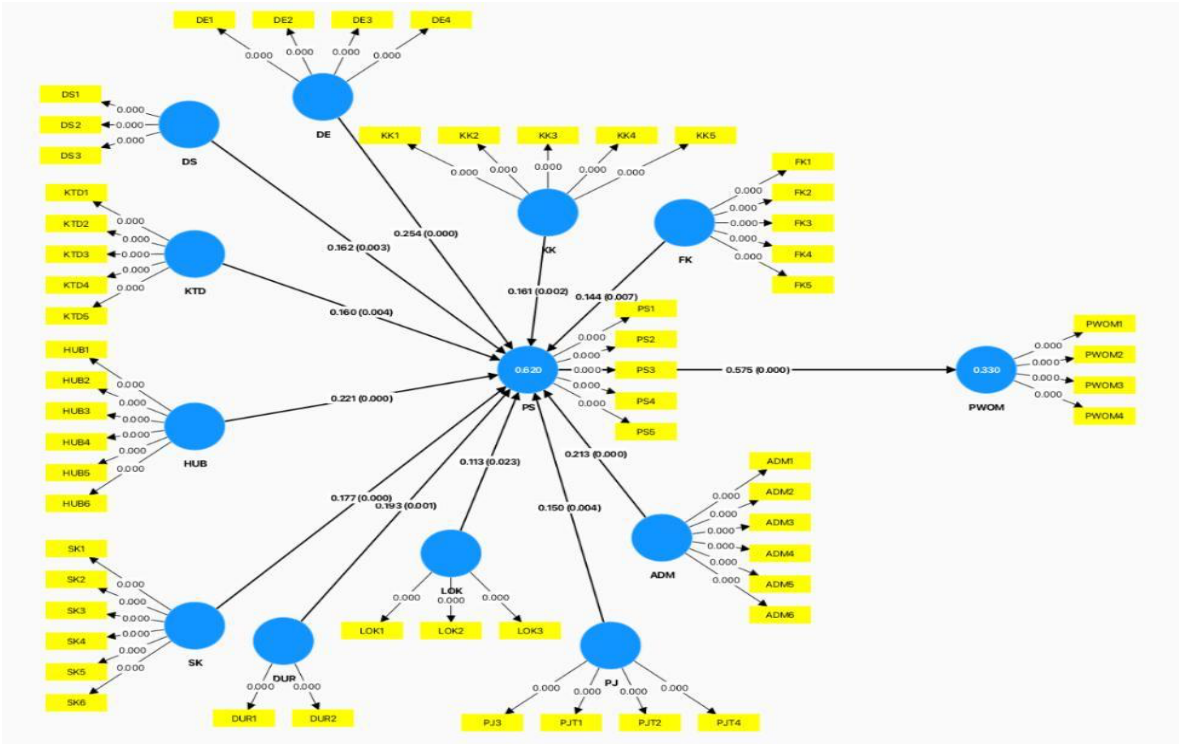

Figure 4. Structural Model

Table 4. Collinearity Statistic (VIF)

Independent Variable	Patient Satisfaction	Positive Word of Mouth
Facilities	1.049	
Cleanliness	1.075	
Dental Equipment	1.109	
Dental Supplies	1.052	
Orthodontist's Technical Skills	1.077	
Doctor-Patient Relationship	1.173	
Staff	1.046	
Treatment Duration	1.207	
Accessibility (Location)	1.082	
Appointment Scheduling	1.158	
Organization Administration	1.113	
Patient Satisfaction	-	1.000

Source: Data Analysis using SmartPLS 4.1 (2025)

Table 5. Coefficient of Determination (R^2)

Dependent Variable	R^2	Interpretation
Patient Satisfaction	0.620	Moderate Explanatory power
Positive Word of Mouth	0.330	Weak Explanatory power

Source: Data Analysis using SmartPLS 4.1 (2025)

The Q-Square (Q^2) is used to measure the predictive relevance of the model, with $Q^2 > 0$ indicating predictive relevance. According to Hair et al. (2021), Q^2 values between 0–0.25 indicate low predictive relevance, 0.25–0.5 moderate, and >0.5 high predictive relevance. The results of this study show that Patient Satisfaction has a Q^2 value of 0.360 shows moderate predictive relevance, meaning the independent variables–Facilities, Cleanliness, Dental Equipment, Dental Supplies, Orthodontist's Technical Skills, Doctor-Patient Relationship, Staff, Treatment Duration,Accessibility (Location),

Appointment Scheduling, and Organization Administration are able to predict Patient Satisfaction fairly well. Meanwhile, Positive Word of Mouth has a Q^2 value of 0.214, shows a low predictive relevance, indicating that the predictive contribution of the Patient Satisfaction variable to PWOM is still limited.

Tabel 6. Coefficient of Relevance (Q-Square)

Dependent Variable	Nilai Q^2	Interpretation
Patient Satisfaction	0,360	Medium Predictive Relevance
Positive Word of Mouth	0,214	Small Predictive Relevance

Source: Data Analysis using SmartPLS 4.1 (2025)

Hyphothesis Testing

The significance of path coefficients in this study are tested using bootstrapping method with 10,000 samples, applying a one-tailed t-statistic criterion of > 1.65 and a p-value < 0.05, with an alpha value of 5% and a confidence interval level of 95%. All twelve hypotheses tested in this study were supported, as each satisfied the required t-statistic and p-value threshold, as shown in Table 8. In addition to significance values, the magnitude and direction of the path coefficients were also evaluated. All twelve hypothesis paths had positive directions, indicating that the higher the value of an independent variable, the higher the value of the related dependent variable, consistent with the hypothesized relationships. It is notable that the Dental Equipment variable had the highest path coefficient (0.254) among all 11 independent variables, while Location had the smallest (0.113). Ranking the variables by their path coefficient magnitudes, the top five factors exerting the most substantial direct effect on patient satisfaction were Dental Equipment, Organization Administration, Doctor-Patient Relationship, Treatment Duration, and Staff. This suggests that Dental Equipment contributes the most, while Location contributes the least to Orthodontic Patient Satisfaction.

Table 9 presents the results of the indirect effect analysis between the independent and dependent variables. The five main factors found to have the greatest influence on Positive Word of Mouth (PWOM) through the mediation of patient satisfaction, in order, are Cleanliness, Doctor-Patient Relationship, Facilities, Dental Supplies, and Organization Administration. Analysis of the ten mediation paths indicates that all are statistically significant, as the one-tailed t-statistic values are greater than 1.65 and the p-values are less than 0.05, with an alpha of 5% and a confidence level of 95%. All paths also have positive coefficients, confirming that patient satisfaction is an important mediator in the relationship between all the service factors mentioned and PWOM. Of all the paths, Cleanliness has the largest indirect effect on PWOM, whereas Location, although it is significant, has the smallest effect. This suggests that location serves more as a supporting factor rather than a primary determinant of indirect PWOM.

Table 8. Hypothesis Testing Result and Path Coefficient

Hypothesis	Path Coefficient	T Statistics	P-Value	Result
H1: Facilities → Orthodontic Patient Satisfaction	0,144	2,448	0.007	Supported
H2: Cleanliness → Orthodontic Patient Satisfaction	0,161	2,837	0.002	Supported
H3: Dental Equipment → Orthodontic Patient Satisfaction	0,254	3,800	0.000	Supported
H4: Dental Supplies → Orthodontic Patient Satisfaction	0,162	2,787	0.003	Supported
H5: Orthodontist's Technical Skills → Orthodontic Patient Satisfaction	0,160	2,628	0.004	Supported
H6: Doctor - Patient Relationship → Orthodontic Patient Satisfaction	0,221	3,648	0.000	Supported

H7: Staff → Orthodontic Patient Satisfaction	0,177	3,301	0.000	Supported
H8: Treatment Duration → Orthodontic Patient Satisfaction	0,193	3,111	0.001	Supported
H9: Accessibility (Location) → Orthodontic Patient Satisfaction	0,113	1,993	0.023	Supported
H10: Appointment Scheduling → Orthodontic Patient Satisfaction	0,150	2,618	0.004	Supported
H11: Organization Administration → Orthodontic Patient Satisfaction	0,213	3,728	0.000	Supported
H12: Orthodontic Patient Satisfaction→ Positive Word of Mouth	0,575	6,812	0.000	Supported

Source: Data Analysis using SmartPLS 4.1 (2025)

Table 9. Specific Indirect Effect

Hypothesis Path	Path Coefficient	T Statistics	P-Value	Result
Facilities → Orthodontic Patient Satisfaction → PWOM	0.123	3.346	0.000	Mediating effect present
Cleanliness → Orthodontic Patient Satisfaction → PWOM	0.146	3.211	0.001	Mediating effect present
Dental Equipment → Orthodontic Patient Satisfaction → PWOM	0.093	2.549	0.005	Mediating effect present
Dental Supplies → Orthodontic Patient Satisfaction → PWOM	0.111	2.800	0.003	Mediating effect present
Orthodontist's Skills → Orthodontic Patient Satisfaction → PWOM	0.083	2.378	0.009	Mediating effect present
Doctor - Patient Relationship → Orthodontic Patient Satisfaction → PWOM	0.127	3.459	0.000	Mediating effect present
Staff → Orthodontic Patient Satisfaction → PWOM	0.092	2.536	0.006	Mediating effect present
Treatment Duration → Orthodontic Patient Satisfaction → PWOM	0.092	2.478	0.007	Mediating effect present
Accessibility (Location) → Orthodontic Patient Satisfaction → PWOM	0.065	1.806	0.035	Mediating effect present
Appointment Scheduling → Orthodontic Patient Satisfaction → PWOM	0.086	2.391	0.008	Mediating effect present
Organization Administration → Orthodontic Patient Satisfaction → PWOM	0.102	3.017	0.001	Mediating effect present

Source: Data Analysis using SmartPLS 4.1 (2025)

IPMA (Importance Performance Map Analysis)

Figure 5. IPMA Construct

Figure 5 displays the results of the IPMA construct analysis, categorizing each service variable into four quadrants based on their levels of importance and performance with respect to the patient satisfaction. Quadrant I (High Importance, High Performance) includes variables that are both highly important and already performing well, such as Dental Equipment (DE), Doctor-Patient Relationship (HUB), Organization Administration (ADM), and Staff (SK). The management of the Clinic should continue to maintain the performance of these variables. Meanwhile, Quadrant II (High Importance, Low Performance) contains Treatment Duration (DUR), a highly important variable with low performance, which should be prioritized for improvement. Enhancements in this area can be achieved by evaluating schedule effectiveness and providing clear patient education regarding estimated treatment times, so patient expectations can be properly managed.

On the other hand, Quadrant III (Low Importance, Low Performance) includes Facilities (FK), Dental Supplies (DS), Orthodontist's Technical Skills (KTD), Location Accessibility (LOK), and Appointment Scheduling (PJT). Although not top priorities, these variables still need to be maintained to at least meet minimum service standards. Quadrant IV (Low Importance, High Performance) consists solely of Cleanliness (KK), which, while not a primary priority, should be maintained at its current standard without excessive allocation of resources. Thus, the IPMA results highlight the need for clinic management to focus improvement efforts on variables with high importance but low performance, particularly Treatment Duration, while continuing to maintain quality in other aspects that are already performing well.

DISCUSSION

This study aims to provide recommendations to dental clinic managers by identifying the factors influencing orthodontic patient satisfaction and its impact on Positive Word of Mouth (PWOM). The findings demonstrate that service quality factors—including Facilities, Cleanliness, Dental Equipment, Dental Supplies, Orthodontist's Technical Skills, Doctor-Patient Relationship, Staff, Treatment Duration, Location, Appointment Scheduling, and Organization Administration—all have a positive effect on Orthodontic Patient Satisfaction, which in turn positively influences PWOM.

H1 is supported, indicating that service quality has a positive impact on Orthodontic Patient Satisfaction (t-statistic = 2.448 > 1.65; p-value = 0.007 < 0.05). This means that the better the clinical facilities provided, the higher the patient satisfaction. Adequate facilities create a comfortable clinic experience and enhance satisfaction, consistent with previous studies by Xuan et al. (2021) and Owusu et al. (2024).

H2 is supported, showing that clinic cleanliness positively influences Orthodontic Patient Satisfaction (t-statistic = 2.837 > 1.65; p-value = 0.002 < 0.05). High standards of cleanliness and the use of personal protective equipment increase patient satisfaction by reducing infection risks. This finding aligns with previous literature (Aktha et al., 2023; Sugondo et al., 2021; Ali et al., 2024).

H3 is supported, indicating that Dental Equipment positively affects Orthodontic Patient Satisfaction (t-statistic = 3.800 > 1.65; p-value = 0.000 < 0.05). High-quality, clean, and technologically advanced equipment improves patient experiences and satisfaction, as supported by Sharka et al. (2024).

H4 is supported, showing that Dental Supplies positively impact Orthodontic Patient Satisfaction (t-statistic = 2.787 > 1.65; p-value = 0.003 < 0.05). High-quality dental supplies contribute to successful, long-lasting treatment results and enhance patient trust and satisfaction. This finding is consistent with Jafarzadeh et al. (2025).

H5 is supported, demonstrating that Orthodontist's Technical Skills have a significant positive effect on Orthodontic Patient Satisfaction (t-statistic = 2.628 > 1.65; p-value = 0.004 < 0.05). Higher technical skills lead to higher patient satisfaction, in line with previous research highlighting clinical competence as a main determinant (Goedhart et al., 1996; Calnan et al., 1999; Carneiro et al., 2010; Riley et al., 2016; Wong et al., 2018; Zadake et al., 2020).

H6 is supported, with Doctor-Patient Relationship significantly contributing to Orthodontic Patient Satisfaction (t-statistic = 3.648 > 1.65; p-value = 0.000 < 0.05). Effective communication, empathy, and trust are crucial for long-term orthodontic care, as supported by Zhang et al. (2016), Zadake et al. (2020), Wu et al. (2021), and Stonehouse-Smith et al. (2022).

H7 is supported, indicating that Staff positively influence Orthodontic Patient Satisfaction (t-statistic = 3.301 > 1.65; p-value = 0.000 < 0.05). Professional and empathetic support staff play a significant role in shaping the patient experience, as evidenced by Ali (2016), Aldossary et al. (2023), and Tibeica et al. (2024).

H8 is supported, showing that Treatment Duration has a positive impact on Orthodontic Patient Satisfaction (t-statistic = 3.111 > 1.65; p-value = 0.001 < 0.05). Shorter treatment times are associated with greater satisfaction, consistent with findings by Ututu et al. (2023) and Almasri et al. (2024), which show that prolonged treatment can lower satisfaction.

H9 is supported, demonstrating that Clinic Location Accessibility has a positive effect on Orthodontic Patient Satisfaction (t-statistic = 1.993 > 1.65; p-value = 0.023 < 0.05). Easier access to the clinic increases satisfaction, supporting prior studies that highlight the importance of convenient location for timely and routine visits (Al Ghanem et al., 2023; Alhozgi et al., 2021).

H10 is supported, indicating that Appointment Scheduling positively influences Orthodontic Patient Satisfaction (t-statistic = 2.618 > 1.65; p-value = 0.004 < 0.05). Organized, accessible, and timely scheduling—especially with electronic systems—increases satisfaction and perceived professionalism (Katre, 2014; Ostadmohammadi et al., 2025).

H11 is supported, demonstrating that Organization Administration has a significant positive effect on Orthodontic Patient Satisfaction (t-statistic = 3.728 > 1.65; p-value = 0.000). Effective Organization administration practices enhance patient satisfaction, confirming earlier findings (Wang et al., 2021; Samsudin, 2021; Ramírez Altamirano & Orrego-Ferreyros, 2024).

H12 is supported, indicating that Orthodontic Patient Satisfaction has a positive impact on Positive Word of Mouth (t-statistic = 6.812 > 1.65; p-value = 0.000 < 0.05). Satisfied patients are more likely to recommend the clinic, strengthening its reputation and serving as effective promotion. This finding is consistent with previous studies (Ali, 2016; Siripipatthanakul, 2021; Soare et al., 2022; Pauli et al., 2023).

This research model demonstrates moderate explanatory power (R^2 = 0.620) and medium predictive relevance (Q^2 = 0.360) for the Patient Satisfaction variable, indicating that the all the independent variables mentioned in this model adequately predict patient satisfaction at Private Specialist Dental Clinic X, South Tangerang. However, for the PWOM variable, the model exhibits only weak explanatory power (R^2 = 0.330) and low predictive relevance (Q^2 = 0.214), suggesting limited predictive ability and the need to include additional variables directly to Positive Word of Mouth and expand the population area in future studies.

CONCLUSION

This study aimed to identify the antecedent factors of Orthodontic Patient Satisfaction and analyze their impact on Positive Word of Mouth (PWOM) at Private Specialist Orthodontic Dental Clinic X, South Tangerang. The findings indicate that Facilities, Cleanliness, Dental Equipment, Dental Supplies, Orthodontist's Technical Skills, Doctor-Patient Relationship, Staff, Treatment Duration, Clinic Location Accessibility, Appointment Scheduling, and Organization Administration all have a positive effect on Orthodontic Patient Satisfaction. Furthermore, Orthodontic Patient Satisfaction positively influences Positive Word of Mouth. Among the eleven independent variables, the five most influential in directly affecting patient satisfaction are Dental Equipment, Organization Administration, Doctor-Patient Relationship, Treatment Duration, and Clinic Staff. Additionally, the five independent variables that most strongly influence PWOM through the mediation of patient satisfaction are, in order: Cleanliness, Doctor-Patient Relationship, Facilities, Dental Supplies, and Organization Administration.

The theoretical implication of this study is that it supports previous research and contributes to the literature by providing new insights into the antecedents of patient satisfaction and their impact on Positive Word of Mouth, particularly within the population of orthodontic patients in private dental clinics. The results of this study provide managerial implications for all Private Dental Clinic in identifying the antecedent factors of orthodontic patient satisfaction–Facilities, Cleanliness, Dental Equipment, Dental Supplies, Orthodontist's Technical Skills, Doctor-Patient Relationship, Staff, Treatment Duration, Clinic Location Accessibility, Appointment Scheduling, and Organization Administration that–can enhance word-of-mouth recommendations and ultimately increase the number of new orthodontic patients.

This study has several limitations. The data were collected cross-sectionally, providing only a one-time observation and unable to capture changes in orthodontic patient perceptions or behavior over time. Future research should consider using a multiple cross-sectional or longitudinal design to observe changes in patient satisfaction and PWOM over a specific period. Furthermore, the quantitative survey approach limits findings to numerical data without in-depth understanding, thus a mixed-method approach—combining quantitative surveys with interviews or focus group discussions—is recommended for future research. This study was also conducted at a single clinic in South Tangerang, making the results less representative of the broader population. Therefore, future studies should include clinics in different or wider areas, such as across Greater Jakarta, to enhance generalizability.

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