Word of Mouth to Utilize Cone Beam Computed Tomography (CBCT) Services by Product Quality, Customer Trust and Customer Loyalty: A Linear Regression

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**Abstract**

**Introduction:** In a hospital service, there must be a superior service that can be used as a weapon in capturing patients in carrying out treatment through doctor referrals, in this case, the presence of CBCT services. Word of Mouth (WOM) occurs when customers talk to others about their opinion about a particular brand, product, service, or company. Several factors are believed to increase the desire of a referring dentist to do word of mouth, including the quality of the CBCT product itself, loyalty, and the level of trust of a dentist as a consumer. Objective: The study aimed to examine the relationship between product quality, customer trust, and customer loyalty with word of mouth on CBCT services. **Method:** The descriptive study was undergone with a cross-sectional approach. A total of 134 dentists were selected using systematic random sampling. The linear regression was used to analyze the data to test the dependent and independent variables. **Results:** The findings showed significant associations between the product quality, customer trust, and customer loyalty with the customer’s word of mouth for using the CBCT services. **Recommendation:** Further researchers need to develop path analysis or SEM methods to predict the customer’s word of mouth for using the CBCT services.

**Keywords:** product quality, customer trust, customer loyalty, word of mouth, CBCT

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INTRODUCTION

Hospitals as large service institutions are required to fulfill public health services appropriately. This is because there is a lot of competition, and if they do not pay attention to these demands, it will be challenging to maintain their survival (1). Several breakthroughs in health services are a must, especially to bridge the level of social differences in health services on the one hand to find the right form of funding efficiency for the community on the other hand. For this reason, hospitals must be able to develop marketing strategies (2).

Dental and Oral Hospital, abbreviated as RSGM, is a health service facility that provides individual dental and oral health services for treatment and recovery services without neglecting health promotion and disease prevention services carried out through outpatient, emergency, and medical treatment services. RSGM is a referral center for dental health services and a place for education and research. With the establishment of RSGM, it is expected that the community will be motivated to improve dental and oral health (3).

In Indonesia, the Dental and Oral Hospital (RSGM) is a leading dental and oral health service facility responsible for providing dental. Oral health services for the community and dental health providers restore patients' oral health to meet patient satisfaction better. According to the health care system in Indonesia, the role of dental and oral hospitals is as the spearhead of the health care system. Therefore health services are an essential factor of health but not the most influential. The utilization of available and optimal health services is crucial to improving a person's health status. To achieve optimal dental and oral health care, a radiographic examination is usually required for accurate diagnosis (3).

Radiographs often used to treat inflammation in teeth are usually periapical radiographs because information about the presence, location, and extent of periradicular lesions, root canal anatomy, and anatomical structures of the roots can be seen from these radiographs. However, periapical radiographs have many limitations in providing information (4). So it is often recommended to perform additional examinations in the form of extra-oral radiographs to support the examination.

Cone-beam computed tomography (CBCT) is an advanced extra-oral radiography system specially developed to generate distorted 3D information of the maxillofacial structure at a much lower radiation dose than conventional CT (5). CBCT technology is increasingly being used to manage dental inflammation treatment satisfaction. Potential applications in endodontics that can be observed include detecting apical periodontitis, pre-surgical assessment, evaluation of dental trauma and root fractures, determination of root canal configuration, and internal-external root resorption (6).

RSGM Usakti is one of the few RSGM that has CBCT services. This makes the Radiology Installation of RSGM Usakti get referrals from internal and external dentists. Good product quality will undoubtedly provide value for consumers, in this case, the referring doctor, along with customer trust and customer loyalty. The CBCT examination at RSGM usakti is expected to have a positive word of mouth regarding the service. Word of mouth from referring dentists as consumers are beneficial for managing RSGM Usakti as a marketing tool.

One form of marketing communication is word of mouth (WOM). Word of mouth is a form of praise, recommendations, and customer comments about customer experiences on services or products that influence customer decisions or customer buying behavior. Word of Mouth (WOM) occurs when customers talk to others about their opinion about a particular brand, product, service, or company to others (7).
Several factors are believed to increase the desire of a referring doctor to do word of mouth, including the quality of the CBCT product itself, loyalty, and the level of trust of a doctor as a consumer.

A company should offer products of good quality according to the needs and desires of consumers. If the function and reliability of a product provided are reasonable, it will produce a positive word of mouth. Pratama (2016) stated that product quality has a positive and significant effect on Word of Mouth (8).

This is in line with the study of Hatane Samuel (2018), which stated that product quality influences word of mouth (9). Edi Ulianti's research (2016) states that product quality and word of mouth have a significant relationship in making repeat purchases (10).

Based on Pfanner's (2007) study results quoted from Kassim & Abdullah (2010), it is known that 78% of consumers said they trust direct recommendations from other consumers through WOM, and 61% said they trust consumer opinions posted online, what marketers call viral marketing (11). Based on the results of Fahmi's study (2014), which showed that customer trust has a significant influence on WOM and customer retention, and WOM can be used as one of the bases for developing prospective customers' purchase intentions (12).

A business must maintain long-term relationships with its customers. Loyal customers will provide financial benefits and business success. Customers who have a loyal attitude can be used as mascots in disseminating positive information to other potential customers (Rahmawati & Suminar, 2014). Word of mouth is the result of customer loyalty (13).

Consumer loyalty is a manifestation and continuation of customer satisfaction in using the facilities and services provided by the company and keeping being a customer of the company. Loyalty is evidence of consumers who have always been strong and positive attitudes towards the company, one of which is by doing word of mouth (14).

When the consumer, in this case, the referring dentist, already has a customer trust attitude towards RSGM Usakti, it is hoped that WOM will be created from the referring doctor. This is in accordance with Zulherwan's study (2019), where customer trust influences WOM (15). When the customer feels the quality of service is good, friendly, and has felt satisfied with the product, the customer will make a good compliment and spread this news with positive results. When positive traits arise, there will be a sense of loyalty to a particular brand, in this case, the RSGM Usakti brand (15).

Loyalty, in general, can be interpreted as someone's loyalty to a product, both goods and certain services (16). Furthermore, when consumers are loyal to a product, they are likely to repurchase it. The intention to repurchase itself is a positive intention when people feel loyal to the product. This is in accordance with Gusti's study (2016), which stated a significant relationship between loyalty and WOM (17).

Based on this background, the researcher wants to know the effect of Product quality, Customer trust, and Customer loyalty on Word of Mouth CBCT radiography at the Radiology Installation of RSGM Usakti.

**OBJECTIVE**

The study aimed to examine the relationship between product quality, customer trust, and customer loyalty with word of mouth to utilize the CBCT services at the Radiology installation.
METHODS

Design
A cross-sectional study was applied in this study.

Sample, Sample size, Sampling Method
A total of 134 of dentists were selected based on systematic random sampling technique. The samples calculation based on formula from Sopiyudin (2011) N = ((Za+Zb)/InOR))2 x (1/(Px(1-Px)Py(1-Py)). To increase power analysis of sample calculations and prevent bias in data collection. The samples calculation as follows:

\[ N = \left(\frac{(1.96+0.84)}{2.25}\right)^2 \times \left(\frac{1}{(0.847-0.84740.876(1-0.876))}\right) \]
\[ N = 109 \text{ sample} \]

Thereby, researchers increased the number of samples by 10-20%. The inclusion criteria of samples in this study are dentists who refer CBCT, are fully aware, are mentally and physically healthy, and are willing to be respondents. Dentists who refer other than CBCT and dental radiologists were excluded from this study.

Instrument of Study
The researcher described a demographic data questionnaire to describe the characteristics of respondents. This instrument consists of age, gender, and last education.

The product quality questionnaire was used to measure the product quality assessment from the CBCT. Researchers modified product quality instruments based on Garvin's theory (1987). Instrument product quality consists of 3 dimensions, namely performance (2 statement items), durability (3 statement items), and aesthetics (3 items). The measurement scale is a Likert scale of 1-5. 1 = Strongly disagree, 2 = Disagree, 3 = Uncertain, 4 = Agree, 5 = Strongly agree. The highest score on this questionnaire is 40, with the lowest score being 8. The Cronbach's Alpha of the product quality instrument was 0.883. The Cronbach's Alpha of product quality instrument was 0.883

The Customer trust questionnaire is used to measure the Customer trust assessment of the referring physician. The researcher modified the Customer trust instrument based on Mayer's theory (1995). The Customer trust instrument consists of 3 dimensions, namely ability (4 statement items), benevolence (3 statement items), and integrity (3 items). The measurement scale is a Likert scale of 1-5. 1 = Strongly disagree, 2 = Disagree, 3 = Uncertain, 4 = Agree, 5 = Strongly agree. The highest score on this questionnaire is 50, while the lowest score is 10. The Cronbach's Alpha of the Customer trust questionnaire was 0.858.

The customer loyalty questionnaire is used to measure the customer loyalty assessment of the referring physician. The researcher modifies the Customer loyalty instrument based on Kotler's theory (2007). The Customer loyalty instrument consists of 3 dimensions, namely repeat purchases (3 items), referrals (2 items), and retention (2 items). The measurement scale is a Likert scale of 1-5. 1 = Strongly disagree, 2 = Disagree, 3 = Uncertain, 4 = Agree, 5 = Strongly agree. The highest score on this questionnaire is 35, with the lowest score being 7. The Cronbach's Alpha of Customer loyalty questionnaire was 0.802

The word of mouth questionnaire was used to measure the word of mouth assessment of the referring doctor. The researcher modified the word of mouth instrument based on Scnorfit's (2009) theory. The word of mouth instrument consisted of 3 dimensions, namely topics (3 items), talkers (3 items), and tools (3 items). The measurement scale is a Likert scale of 1-5. 1 = Strongly disagree, 2 = Disagree, 3 = Uncertain, 4 = Agree, 5 = Strongly agree. The highest score on this questionnaire is 45, with the lowest score being 9. The Cronbach's Alpha of the word of mouth
questionnaire was 0.853. It was indicated that all instruments were reliable

Statistical Analysis
The normal distribution was tested for all variables. The Multicollinearity test tested whether the regression model found a correlation between the independent variables (independent). An autocorrelation test was conducted to test whether in the linear regression model there is a correlation between the confounding error in period t and the confounding error in period t-1 (previous). The classical assumption test in this study has met the ideal requirements where the normality value is met, and there is no multicollinearity and autocorrelation.

Multiple regression analysis was used to predict the magnitude of product quality, customer trust, and Customer loyalty on word of mouth in the Radiology Installation of RSGM Usakti.

Ethical clearance

<table>
<thead>
<tr>
<th>Table 1. Respondent characteristics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Characteristic</td>
</tr>
<tr>
<td>Age</td>
</tr>
<tr>
<td>&lt; 30 Years old</td>
</tr>
<tr>
<td>30-35 Years old</td>
</tr>
<tr>
<td>35-40 Years old</td>
</tr>
<tr>
<td>&gt;40 Years old</td>
</tr>
<tr>
<td>Gender</td>
</tr>
<tr>
<td>Male</td>
</tr>
<tr>
<td>Female</td>
</tr>
<tr>
<td>Education</td>
</tr>
<tr>
<td>S1 (Profession)</td>
</tr>
<tr>
<td>S2 / Specialist</td>
</tr>
<tr>
<td>S3</td>
</tr>
</tbody>
</table>

Based on the distribution of respondent characteristic data, 46 respondents (34.32%) were male, and 88 respondents (65.68%) were female. This

This research has passed the ethical test by Code Ethics Enforcement Council Research Ethics Commission Esa Unggul University, No: 0221-21.221 /DPKE-KEP/FINAL-EA/UEU/VIII/2021

RESULT

Demographics
Based on the distribution of data on the characteristics of 134 respondents presented in table 1, it was found that 68 respondents (50.74%), aged 30-35 years were 18 respondents (13.43%), aged 35-40 years were 10 respondents (7.46%), and age over 40 years as many as 28 respondents (20.89%). Most respondents are in the age range of 30 years, where this age range is the age of young dentists or fresh graduates, where they still have knowledge and updates on scientific developments. This can conclude that dentists in this age range are very aware of the usefulness of CBCT with all its technology. This is in accordance with the customer trust variable.

The last education of the respondents in this study was obtained. The previous education was S1/professional program as many as 76 respondents (56.71%), S2/specialist were 36 respondents (26.86%), and S3 were 22 respondents (16.41%).

Correlation analysis
The correlation test was carried out in this study to see the direction and magnitude of the relationship between variables. The results of the correlation test are presented in table 2.
Table 2. Correlation test

<table>
<thead>
<tr>
<th>Variable</th>
<th>Product quality</th>
<th>Customer trust</th>
<th>Customer loyalty</th>
<th>Customer loyalty</th>
</tr>
</thead>
<tbody>
<tr>
<td>Product quality</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Customer trust</td>
<td>0.835</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Customer loyalty</td>
<td>0.887</td>
<td>0.853</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Word of mouth</td>
<td>0.882</td>
<td>0.850</td>
<td>0.915</td>
<td>1</td>
</tr>
</tbody>
</table>

Partial Analysis (t-test)

In order to ensure that each variable, namely: Product quality, Customer trust, and Customer loyalty, affects word of mouth, a partial test will be carried out. The result is shown in table 3. Table 2 shows the correlation test results where the value of $r$ (product quality-customer trust) is 0.835, $r$ (product quality-word of mouth) is 0.882, $r$ (customer trust-customer loyalty) is 0.853, $r$ (customer trust-word of mouth) 0.850, $r$ (customer loyalty-word of mouth) 0.915. This shows that there is a strong positive linear correlation between all variables, with the highest correlation between customer loyalty and word of mouth variables.

Linear Regression

Linear regression analysis was used to predict the magnitude of the influence of the variables Product quality, Customer trust, and Customer loyalty on word of mouth in the radiology installation of RSGM Usakti.

Table 3. Partial Test Result With Two-Tailed Test With Significance At 5% Level Radiology RSGM Usakti

<table>
<thead>
<tr>
<th>Variable</th>
<th>t-count</th>
<th>t-table</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Product quality (X₁)</td>
<td>3.615</td>
<td>1.978</td>
<td>0.000</td>
</tr>
<tr>
<td>Customer trust (X₂)</td>
<td>2.824</td>
<td>1.978</td>
<td>0.005</td>
</tr>
<tr>
<td>Customer loyalty (X₂)</td>
<td>6.845</td>
<td>1.978</td>
<td>0.000</td>
</tr>
</tbody>
</table>

Variable Product quality (X₁)
Based on t-count > t-table, P-value = 0.000 or 0% < 5% means that variable Product quality has a significant effect to word of mouth CBCT service in Installation of Radiology RSGM Usakti.

Variable Customer trust (X₂)
Based on t-count > t-table, P-value = 0.005 or 0.5% < 5% means that variable Customer trust has a significant effect to word of mouth CBCT service in Installation of Radiology RSGM Usakti.

Variable Customer loyalty (X₃)
Based on t-count > t-table, P-value = 0.000 or 0% < 5% means that variable Customer loyalty has a significant effect to word of mouth CBCT service in Installation of Radiology RSGM Usakti.

F-test (simultaneously)

F-test is used to assess the significance of the effect of an independent variable simultaneously to a dependent variable (variable X to variable Y). The result is shown in table 4.
Based on F-count > F-table, P-value = 0,000 or 0% < 5% means that variable product quality, Customer trust, and Customer loyalty significantly affect word of mouth CBCT service in Installation of Radiology RSGM Usakti.

**Coefficient of Determination**
The coefficient of Determination is used for calculating the contribution of the independent variable to the dependent variable. The Coefficient of Determination in this study is demonstrated in Table 5.

<table>
<thead>
<tr>
<th>Model</th>
<th>Sum Squares</th>
<th>df</th>
<th>Mean Square</th>
<th>F</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Regression</td>
<td>3276.111</td>
<td>3</td>
<td>1092.307</td>
<td>285.527</td>
<td>.000&lt;sup&gt;a&lt;/sup&gt;</td>
</tr>
<tr>
<td>Residual</td>
<td>497.202</td>
<td>130</td>
<td>3.825</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>3773.313</td>
<td>133</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Based on Table 5, Adjusted R-square values for word of mouth were 0.865. This means that the percentage effect of the variable Product quality, Customer trust, and Customer loyalty to word of mouth was 86.5%, while the remaining 13.5% was affected by other factors.

**Multiple Linear Regression Equation Model**
Multiple linear regression analysis resulted in the regression equation listed in Table 6. The Regression equation shows the regression constant of 1,653. It can be interpreted that Product quality, Customer trust and Customer loyalty are at the stable condition as X=0, while word of mouth is 1,653. The X<sub>1</sub> (Product quality) coefficient of regression is 0.297 and positively affects Y (Word of mouth). When the product quality increases by one, assuming other variables are constant, then it will increase word of mouth CBCT service in Installation of Radiology RSGM Usakti by 0.297.

The coefficient of regression of X<sub>2</sub> (Customer trust) is 0.177, has a positive effect on Y (Word of mouth), which means when the customer trust increases by one assuming other variables are constant, then it will increase word of mouth CBCT service in Installation of Radiology RSGM Usakti by 0.177.

The coefficient of regression of X<sub>3</sub> (Customer loyalty) is 0.644, which has a positive effect on Y (Word of mouth). When the customer trust increases by one assuming other variables are constant, it will increase word of mouth CBCT service in Radiology Installation of RSGM Usakti by 0.644.

It can be concluded from the regression estimation that Customer loyalty customer trust to the word of mouth of
referring doctors in Radiology Installation RSGM Usakti according to the coefficient of regression 0.644 (unstandardized coefficients).

The multiple linear regression equation is $\hat{Y} = 1.653 + 0.297 X_1 + 0.177 X_2 + 0.644 X_3$

Adjusted $R^2$: 0.868

Table 6. Regression estimation output

<table>
<thead>
<tr>
<th></th>
<th>Koefisien Estimate</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Word of mouth (Y)</td>
<td>1.653</td>
<td></td>
</tr>
<tr>
<td>Product Quality (X_1)</td>
<td>0.297</td>
<td>0.000</td>
</tr>
<tr>
<td>Customer trust (X_2)</td>
<td>0.177</td>
<td>0.005</td>
</tr>
<tr>
<td>Customer loyalty (X_3)</td>
<td>0.644</td>
<td>0.000</td>
</tr>
</tbody>
</table>

**DISCUSSION**

According to the regression coefficient analysis of the Product quality variable, a significant effect is 0.297. With an increase in attention to Product quality by one unit, word of mouth at the installation of Radiology RSGM Usakti will increase by 0.297. In this case, the higher the positive response to product quality, word of mouth will increase. An indication is based on characteristics of a company or hospital that offer products of good quality and according to the needs and desires of consumers.

In this case, the radiographic results from the CBCT radiology installation of RSGM Usakti can be judged to have good product quality. If the function and reliability of a product offered are reasonable, it will produce a positive word of mouth. This case will affect the referring doctor’s desire to do word of mouth regarding CBCT RSGM usakti. This is in line with the Pratama study (2016) (18), which stated that product quality has a positive and significant effect on word of mouth. This is in accordance with the study (18), which indicated that product quality impacts word of mouth. Edi Ulianti’s results study (2016) stated that Product quality significantly correlates with word of mouth in repeat purchase.

Based on the regression coefficient analysis of the Customer trust variable, the results obtained are a significant result of 0.177. This means that the higher the Customer trust is by one unit, word of mouth at the RSGM Usakti radiology installation will increase by 0.177. In this case, it can be said that the higher the positive response to customer trust, word of mouth will increase.

This study shows that there is word of mouth carried out by referring doctors to CBCT services at the Installation of Radiology RSGM Usakti when they already have trust in the CBCT examination service itself.

This study aims to prove the critical aspects of social networks are word of mouth and the amount of conversation and communication between various parties. Supported by very social Indonesians, this makes for a great WOM place. WOM needs to consider many things. RSGM Usakti must fully understand the wishes of these referring doctors, the language that consumers will use will be more adapted to the community itself. One thing that is contained in WOM is storytelling (18,19,20). this story becomes an interesting spice for a promotion for RSGM Usakti

Word of mouth is a marketing activity providing information on a product or service from one consumer to another. Word of mouth is often referred to as viral marketing, a marketing technique used to spread marketing messages from one website to another, which can create exponential growth like a virus (21,22,23).
The results of this study are also in line with the results of previous study (12), which showed that customer trust has a significant positive effect on WOM and customer retention. In addition, WOM can be used as a basis for developing prospective customers' purchase intentions.

Based on the study results by Muhammad Reza (2017), customer trust has a significant positive effect on WOM and customer retention. In addition, WOM can be used as one of the bases for developing prospective customers' purchase intentions.

Based on the regression coefficient analysis of the Customer loyalty variable, the results obtained are a significant result of 0.644. This means that the higher the customer loyalty is by one unit, word of mouth at the RSGM Usakti radiology installation will increase by 0.644. In this case, the higher the positive response to customer loyalty, the increased word of mouth.

A business must maintain long-term relationships with its customers because loyal customers will provide financial benefits and business success. Customers who have a loyal attitude can be used as mascots in disseminating positive information to other potential customers (Rahmawati & Suminar, 2014). Word of mouth is the impact resulting from the attitude of customer loyalty.

According to the theory put forward by Stanley and Griffin, loyalty is a good response from consumers by making repeat purchases (24,25,26,27), with customer loyalty (referring doctor) being the manifestation and continuation of customer satisfaction in using facilities and services. In this case, the CBCT service at RSGM Usakti remains a company customer. Loyalty is evidence of consumers who have always been strong and positive attitudes towards the company, one of which is by doing word of mouth (14).

Product quality, customer trust, and customer loyalty variables significantly affect word of mouth CBCT services at RSGM Usakti radiology installation based on F-table, which is greater than F-count and Sig value below 0.05. The contribution of Product quality, Customer trust, and Customer loyalty variables to the variable word of mouth CBCT services at the Radiology Installation of RSGM Usakti by looking at the results of Adjusted R Square or (Adjusted R2) = 0.868.

This shows that the variables Product quality, Customer trust, and Customer loyalty explained the change in the variable word of mouth of referring doctors by 84.6%. This indicates that product quality, customer trust, and customer loyalty from referring doctors to CBCT services at the Radiology Installation of RSGM Usakti have a high effect on word of mouth performed by referring doctors.

The regression estimation results show that the customer loyalty variable has the highest standardized coefficients with a significance of 0.644 and prob. Sig. as much as 0.000 shows that this variable has a higher effect than other variables. In this study, the independent variables Product quality ($X_1$), Customer trust ($X_2$), and Customer loyalty ($X_3$) have a positive effect either partially or simultaneously on word of mouth services for CBCT Radiology Installation RSGM Usakti.

This illustrates that a referring doctor who recognizes the product's quality from CBCT, believes in the product, and has loyalty to RSGM Usakti is likely to do positive word of mouth regarding the CBCT service itself.

**CONCLUSIONS**

Product Quality, Customer trust, and Customer loyalty have a significant effect on word of mouth regarding CBCT service in Radiology Installation of RSGM Usakti.

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