

Driving Customer Loyalty through Product and Digital Service Quality: The Mediating Role of Satisfaction in PLN Mobile

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ABSTRACT

This study explores the impact of product quality and digital service quality on customer loyalty, with customer satisfaction as an intervening variable, focusing on PT. PLN (Persero) UP3 Cikupa in Tangerang Regency. In an era marked by rapid digital transformation, the adoption of digital services like PLN Mobile, a mobile application introduced by PLN in 2016, has significantly impacted how the company interacts with its customers. This research aims to understand how product quality and digital services influence customer satisfaction and, subsequently, their loyalty to the company. A quantitative approach was used, involving the collection of primary data through questionnaires distributed to 100 respondents who were users of PLN Mobile in the study area. The study applies multiple regression analysis to test the relationship between the variables. The results indicate that both product quality and digital service quality have a significant positive impact on customer satisfaction. Furthermore, customer satisfaction acts as a mediator between these factors and customer loyalty. It was found that improvements in the quality of PLN Mobile's product features, usability, and service reliability directly enhance customer satisfaction, which in turn fosters customer loyalty. These findings highlight the importance of continuously improving digital products and services to maintain long-term customer relationships and enhance competitive advantage in the utility sector. Additionally, the research underscores the significance of integrating customer feedback and maintaining high service standards in digital platforms to meet the evolving expectations of customers in the digital age. This study contributes valuable insights into the strategic management of digital service quality and customer satisfaction in the energy sector, providing recommendations for PLN (Persero) to refine its service offerings and enhance customer loyalty.

1. INTRODUCTION

Indonesia is currently in the 4.0 era moving towards 5.0, where digitalization has experienced rapid progress. This digitalization process has brought about numerous changes and conveniences in various areas. The world seems to be constantly striving to create the latest technological innovations to facilitate people's daily activities. This has resulted in humans being deeply connected to digitalization, meaning they will be constantly connected to the internet. In Indonesia, according to the Central Statistics Agency (BPS), the number of internet users in 2023 reached 78.6% of the total population, or approximately 221.5 million people out of a total population of 281.6 million (BPS, 2024). This result is also in line with a survey conducted by the Indonesian Internet Service Providers Association, which stated that by 2024, the number of internet users will reach 221,563,479 out of a total population of 278,696,200 Indonesians.(APJII, 2024).

Based on this, PT. PLN (Persero) UP3 Cikupa (Persero) participated in developing online-based service innovations, namely the PLN Mobile application to facilitate and provide convenience to PT. PLN (Persero) UP3 Cikupa customers. The PLN mobile application itself was first launched in 2016 and was officially released by the PLN board of directors at the 71st National Electricity Day ceremony at the PLN Head Office. Then in 2020, PLN relaunched New PLN Mobile which is present as a superior digital platform to meet all customer needs, providing convenience and a different electricity service experience because in this application customers can purchase tokens for prepaid customers, pay electricity bills for postpaid customers, monitor electricity usage, apply for power conversion services, self-help meter reading (Swacam), as well as customer complaint services.

Customer loyalty according to Priansa (2017) defined as a long-term customer commitment, which is implemented in the form of loyal behavior and attitudes towards the company and its products, by consuming regularly and repeatedly, so that the company and its products become an important part of the consumption process carried out by customers where this will contribute to increasing the company's income and ultimately, profit margins, while reducing expenses (Rasheed et al ,2014).

Product quality is all the characteristics of a product that can meet customer needs according to what customers expect. Product quality can be stated if a company can provide or offer quality products to customers, then customers will be able to feel satisfied (Willian et al, 2023). Product quality itself plays a significant role in influencing customer satisfaction and creating loyal customers for the products offered by the company. Customer satisfaction is achieved when what customers receive from the company exceeds their expectations (Gelu et al, 2022)

In addition to the quality of the products offered by a company, increasing customer loyalty requires quality service to encourage customers to remain loyal to the company. This is because Good service plays a strategic role in influencing the number of customers in a company (Sari et al, 2023), because good service quality will also create customer satisfaction which in the end is the company's basic capital in building loyalty (Yilmaz et al, 2017).

PT. PLN (Persero) is a State-Owned Enterprise engaged in the service sector providing services to prospective customers and the public related to electricity for both households and industry. As a company, PT. PLN (Persero) in achieving profits does not only rely on sales volume but must be oriented towards long-term satisfaction. As a company that provides electricity to both the public and industry, it is certainly not free from competitors who can at any time make customers change their minds regarding electricity providers at home or in industry. Moreover, with the existence of PLTU or Solar Cell which can make customers have other options in choosing electricity suppliers other than PT. PLN (Persero), loyal customers are needed for the company, so to produce loyal customers, other variables are needed to make it happen.

This research will be conducted in PT. PLN (Persero), specifically in UP3 Cikupa. UP3 Cikupa or the Cikupa Customer Service and Implementation Unit is responsible for electricity distribution in 17 sub-districts in Tangerang Regency. One effort to make customers loyal to the company is that the company must be able to quickly adapt to changes such as the current digitalization era forcing all communities and companies to transform towards digital and PT. PLN (Persero) has done this by launching the PLN Mobile application where in this application the company can feel closer to customers and customers can more easily reach the company.

The following is a summary of download data for the PLN Mobile application at PT. PLN (Persero) UP3 Cikupa, for 5 (five) years, as follows:

Table 1. Recapitulation of PLN Mobile Application Downloads PT. PLN (Persero) UP3 Cikupa 2020 – 2024

| No | Year | Number of App Downloads |
|------------------------|------|-------------------------|
| 1 | 2020 | 19,517 |
| 2 | 2021 | 113,663 |
| 3 | 2022 | 311,122 |
| 4 | 2023 | 58,541 |
| 5 | 2024 | 7,123 |
| TOTAL DOWNLOADS | | 509,966 |

Data source: PT. PLN Annual Report(Persero) UP3 Cikupa

From table 1.1 which has been displayed, it can be seen that the number of downloads of the PLN applicationMobileThe number of customers has reached 509,966, or approximately 86.7% of the total. PT. PLN (Persero) UP3 Cikupa serves 587,919 customers from 17 sub-districts in Tangerang Regency. This means that all customers are starting to utilize the PLN Mobile product provided by the company to facilitate service.

This feature is expected to make it easier for customers to access and utilize the services they use. With PLN Mobile, customers no longer need to visit the company's office to request services, such as complaints, electricity payments, or token purchases. Instead, they can access them directly from the

palm of their hand. This is the company's effort to gain customer loyalty. In addition to the convenience offered, it also requires high-quality service. Service quality is a benchmark for assessing the level of service provided by the company. Lestari (2019) Service quality describes the relationship between customer expectations of service and their perceptions of the service received. Service quality is considered a difficult process to define and measure, and therefore plays a key role in ensuring customer loyalty to a company (Shabani et al, 2022).

Customers who have been given convenience with PLN Mobile products will of course also be given good quality service, because it will have a long-term effect in creating customer satisfaction and making customers loyal to the company (Chang et al 2017). Satisfaction in Latin is satis or also means enough or can also be called sufficient and farece which means to do (Irawan 3t al, 2020). We can conclude that service satisfaction itself is the result of customer assessment that the service or services provided by the company have provided a level of enjoyment or satisfaction (Ilyas et al, 2022)

Customer loyalty is essential for a company to continue operating in the long term and for the company to continue achieving profits. Kotler & Keller (2016). Loyalty is defined as the commitment shown by customers when they decide to purchase a new product or even maintain a product, regardless of the marketing impact that may occur on their consumer behavior. So it is important for PT. PLN (Persero) UP3 Cikupa to know whether the quality of PLN Mobile products and the quality of digital services offered can make customers loyal because customers are satisfied with what has been provided by PT PLN, especially for PT PLN UP3 Cikupa customers.

There are several differences in the results related to the influence of satisfaction on customer loyalty, such as in research from Yesitadewi & Widodo in 2024 with the title *The Influence of Service Quality, Perceived Value, and Trust on Customer Loyalty via Customer Satisfaction in Deliveree* which found that customer satisfaction did not influence customer loyalty to the Deliveree company. However, in 2025, research from Chotisarn & Phuthong *Impact of artificial intelligence-enabled service attributes on customer satisfaction and loyalty in chain hotels: Evidence from coastal tourism destinations in western Thailand* refutes research from Yesitadewi, because research from Chotisarn shows that customer satisfaction plays a very strong role in producing loyal customers.

There are also differences in research results regarding product quality on customer satisfaction. In a study by Nur Rahmawati & Irmayanti Hasan (2023), who conducted research on Azarin Products, it stated that product quality has a positive influence on customer satisfaction. This was reinforced by research by Solihin & Hidayat (2025) who stated that product quality can be said to be a factor that has a significant influence on customer satisfaction, although in 2024, research by Syahailatua & Maura resulted that product quality did not have a significant effect on consumer satisfaction.

Likewise, different results also occurred in research related to product quality on customer loyalty, in research from Nur Rahmawati & Irmayanti Hasan in 2023 with the title *The Influence of Brand Trust and Product Quality on Customer Loyalty of Azarine Products Mediated by Consumer Satisfaction* provides results that there is no positive and significant influence between product quality on customer loyalty of Azarine products, however research in the same year was conducted by William & Ahmadi (2023) with the title *The Influence of Product Quality and Service Quality on Consumer Loyalty with Satisfaction as an Intervening Variable* at PT. CiptaEdu Kreasi, Bogor provides research results that there is a positive and significant influence between product quality on customer loyalty at PT. CiptaEdu Kreasi.

Based on what has been described above both the business phenomena that exist at PT. PLN (Persero) UP3 Cikupa and the existing research gap, the researcher will conduct research on the quality of PLN Mobile products, the quality of digital services, customer satisfaction and customer loyalty, especially in the field of electricity provider services, This is because these variables have never been done by previous researchers at PT. PLN (Persero) UP3 Cikupa. So the author is motivated to conduct research with the title "The Effect of PLN Mobile Product Quality and Digital Service Quality on Customer Loyalty with Customer Satisfaction as an Intervening Variable (Study at PT PLN (Persero) UP3 Cikupa, Tangerang Regency).

2. THE PROPOSED METHOD

This research uses a quantitative approach, which aims to test the theory by examining the relationships between variables numerically. A quantitative approach allows for objective measurement of variables and processing of numerical data, which is then analyzed using statistical procedures. This approach offers advantages in testing hypotheses and identifying patterns or relationships between variables that can be generalized to a larger population (Ghozali, 2016). According to Ghozali (2016), quantitative methods are very effective for analyzing causal relationships between variables using measurement instruments that produce numerical data, which are then tested statistically.

The scientific method used in this research has several characteristics that require attention. Singgih (2013) explains that the scientific method is critical, analytical, logical, objective, conceptual, theoretical, empirical, and systematic. This research adheres to these principles to ensure that all research procedures are structured and verifiable. This scientific approach also emphasizes the importance of data reliability and validity, which serve as the basis for drawing valid and accountable conclusions.

In the data collection process, this study used two main types of data: primary data and secondary data. Primary data was obtained directly from respondents through distributed questionnaires, while secondary data was obtained from other sources, such as research journals, books, or official documents from PT PLN (Persero) UP3 Cikupa. This data collection technique allows researchers to obtain a more complete picture of the topic being studied. Given that the data collected is numerical, the instrument used in this study is a questionnaire with a Likert scale that allows researchers to measure respondents' perceptions of various factors that influence customer loyalty (Sugiyono, 2015).

3. RESULTS AND DISCUSSION

This study also includes a descriptive analysis of the main variables: PLN Mobile Product Quality, Digital Service Quality, Customer Loyalty, and Customer Satisfaction. This process was conducted by reviewing the data distribution of each variable using the mean, standard deviation, frequency, and percentage of respondents' responses to the questionnaire.

Table 2. Descriptive Statistical Test Results of Product Quality

| | Descriptive Statistics | | | | | | | | | |
|---------|------------------------|------------|------------|------------|------------|------------|------------|------------|--------------------|----------|
| | N | Range | Minimum | Maximum | Sum | Mean | | | Standard Deviation | Variance |
| | Statistics | Statistics | Statistics | Statistics | Statistics | Statistics | Std. Error | Statistics | Statistics | |
| KP_1 | 100 | 5 | 2 | 7 | 493 | 4.93 | .117 | 1,166 | 1,359 | |
| KP_2 | 100 | 6 | 1 | 7 | 506 | 5.06 | .127 | 1,270 | 1,613 | |
| KP_3 | 100 | 5 | 2 | 7 | 498 | 4.98 | .125 | 1,247 | 1,555 | |
| KP_4 | 100 | 4 | 3 | 7 | 497 | 4.97 | .115 | 1,150 | 1,322 | |
| KP_5 | 100 | 4 | 3 | 7 | 503 | 5.03 | .127 | 1,275 | 1,625 | |
| KP_6 | 100 | 5 | 2 | 7 | 503 | 5.03 | .118 | 1,185 | 1,403 | |
| Valid N | 100 | | | | | | | | | |

Source: Data processed by SPSS, 2025

Based on Table 4.5, the results of the descriptive statistical test show that all variables in this study have a total of 100 respondents. For Product Quality, the lowest standard deviation value is in statement 6 with a standard deviation value of 1.185 and the highest is in statement 5 with a standard deviation value of 1.275.

Table 3. Descriptive Statistical Test Results of Service Quality

| | Descriptive Statistics | | | | | | | | | |
|------|------------------------|------------|------------|------------|------------|------------|------------|------------|--------------------|----------|
| | N | Range | Minimum | Maximum | Sum | Mean | | | Standard Deviation | Variance |
| | Statistics | Statistics | Statistics | Statistics | Statistics | Statistics | Std. Error | Statistics | Statistics | |
| KL_1 | 100 | 6 | 1 | 7 | 487 | 4.87 | .119 | 1,186 | 1,407 | |

| | | | | | | | | | |
|---------|-----|---|---|---|-----|------|------|-------|-------|
| KL_2 | 100 | 6 | 1 | 7 | 495 | 4.95 | .113 | 1,132 | 1,280 |
| KL_3 | 100 | 6 | 1 | 7 | 498 | 4.98 | .105 | 1,054 | 1,111 |
| KL_4 | 100 | 6 | 1 | 7 | 507 | 5.07 | .110 | 1,103 | 1,217 |
| KL_5 | 100 | 4 | 3 | 7 | 493 | 4.93 | .104 | 1,037 | 1,076 |
| KL_6 | 100 | 6 | 1 | 7 | 494 | 4.94 | .116 | 1,162 | 1,350 |
| KL_7 | 100 | 5 | 2 | 7 | 502 | 5.02 | .106 | 1,063 | 1,131 |
| KL_8 | 100 | 6 | 1 | 7 | 508 | 5.08 | .116 | 1,161 | 1,347 |
| KL_9 | 100 | 5 | 2 | 7 | 498 | 4.98 | .103 | 1,035 | 1,070 |
| KL_10 | 100 | 5 | 2 | 7 | 503 | 5.03 | .107 | 1,068 | 1,141 |
| KL_11 | 100 | 6 | 1 | 7 | 494 | 4.94 | .106 | 1,062 | 1,128 |
| KL_12 | 100 | 6 | 1 | 7 | 492 | 4.92 | .113 | 1,134 | 1,286 |
| KL_13 | 100 | 6 | 1 | 7 | 502 | 5.02 | .117 | 1,172 | 1,373 |
| KL_14 | 100 | 5 | 2 | 7 | 500 | 5.00 | .113 | 1,128 | 1,273 |
| KL_15 | 100 | 5 | 2 | 7 | 498 | 4.98 | .112 | 1,119 | 1,252 |
| KL_16 | 100 | 5 | 2 | 7 | 501 | 5.01 | .111 | 1,105 | 1,222 |
| KL_17 | 100 | 5 | 2 | 7 | 497 | 4.97 | .115 | 1,150 | 1,322 |
| KL_18 | 100 | 5 | 2 | 7 | 503 | 5.03 | .104 | 1,039 | 1,080 |
| KL_19 | 100 | 5 | 2 | 7 | 489 | 4.89 | .107 | 1,072 | 1,149 |
| KL_20 | 100 | 5 | 2 | 7 | 499 | 4.99 | .113 | 1,133 | 1,283 |
| KL_21 | 100 | 5 | 2 | 7 | 500 | 5.00 | .105 | 1,054 | 1,111 |
| KL_22 | 100 | 6 | 1 | 7 | 499 | 4.99 | .108 | 1,078 | 1,162 |
| Valid N | 100 | | | | | | | | |

Source: Data processed by SPSS, 2025

Based on Table 4.6, the results of the descriptive statistical test show that all variables in this study have a total of 100 respondents. For Service Quality, the lowest standard deviation value is in statement 9 with a standard deviation value of 1.035 and the highest is in statement 1 with a standard deviation value of 1.186.

Table 4 Descriptive Statistics Test Results of Customer Satisfaction

| Descriptive Statistics | | | | | | | | | |
|------------------------|------------|------------|------------|------------|------------|------------|------------|--------------------|------------|
| | N | Range | Minimum | Maximum | Sum | Mean | | Standard Deviation | Variance |
| | Statistics | Statistics | Statistics | Statistics | Statistics | Statistics | Std. Error | Statistics | Statistics |
| KEPPEL_1 | 100 | 4 | 3 | 7 | 439 | 4.39 | .095 | .952 | .907 |
| KEPPEL_2 | 100 | 5 | 2 | 7 | 446 | 4.46 | .108 | 1,077 | 1,160 |
| KEPPEL_3 | 100 | 5 | 2 | 7 | 446 | 4.46 | .091 | .915 | .837 |
| KEPPEL_4 | 100 | 5 | 2 | 7 | 448 | 4.48 | .106 | 1,059 | 1,121 |
| Valid (N) | 100 | | | | | | | | |

Source: Data processed by SPSS, 2025

Based on Table 4.7, the results of the descriptive statistical test show that all variables in this study have a total of 100 respondents. In Customer Satisfaction, the lowest standard deviation value is in

statement 4 with a standard deviation value of 0.915 and the highest is in statement 2 with a standard deviation value of 1.077.

Table 5. Descriptive Statistics Test Results of Customer Loyalty

| Descriptive Statistics | | | | | | | | | |
|------------------------|------------|-------------|------------|------------|------------|------------|--------------------|------------|------------|
| | N | Range | Minimum | Maximum | Sum | Mean | Standard Deviation | Variance | |
| | Statistics | Statistic s | Statistics | Statistics | Statistics | Statistics | Std. Errro r | Statistics | Statistics |
| LP_1 | 100 | 5 | 2 | 7 | 459 | 4.59 | .114 | 1,138 | 1,295 |
| LP_2 | 100 | 4 | 3 | 7 | 483 | 4.83 | .102 | 1,016 | 1,031 |
| LP_3 | 100 | 4 | 3 | 7 | 472 | 4.72 | .106 | 1,064 | 1,133 |
| LP_4 | 100 | 4 | 3 | 7 | 463 | 4.63 | .100 | 1,002 | 1,003 |
| Valid N | 100 | | | | | | | | |

Source: Data processed by SPSS, 2025

Based on Table 4.8, the results of the descriptive statistical test show that all variables in this study have a total of 100 respondents. For Customer Loyalty, the lowest standard deviation value is in statement 4 with a standard deviation value of 1.002 and the highest is in statement 1 with a standard deviation value of 1.138.

Analysis Testing

Validity and Reliability Test

Validity testing is carried out to determine whether an item is suitable for use or not, so the significance test is carried out by comparing the calculated r value with the r table. *degree of freedom(df) = n-2*, in this case n is the number of samples. In this study the number of samples (n) = 100 and the size of df can be calculated $df = 100-2 = 98$ and alpha 0.1 obtained r table = 0.1654 (at df = 98 with a two-sided test). So, items that have a correlation coefficient value below 0.1654 are considered invalid.

Meanwhile, reliability testing is used to assess the level of consistency and stability of an instrument in producing the same results when tested under different conditions or at different times. A Cronbach's Alpha value <0.60 is considered poor, 0.70-0.80 is considered acceptable reliability, while above 0.80 indicates high (good) reliability.

Table 6 Validity and Reliability Test Results

| Instrument | Validity Test Results | | Reliability Test Results |
|--|-----------------------|------------------|--------------------------|
| | Loading Factor | Cronbach's alpha | |
| PLN Mobile Product Quality (X1) | | | |
| KP-1 | .885** | | |
| KP-2 | .915** | | |
| KP-3 | .922** | | .957 |
| KP-4 | .889** | | |
| KP-5 | .916** | | |
| KP-6 | .919** | | |
| Digital Service Quality (X2) | | | |
| KL-1 | .879** | | |
| KL-2 | .873** | | |
| KL-3 | .838** | | |
| KL-4 | .854** | | |
| KL-5 | .825** | | .985 |
| KL-6 | .848** | | |
| KL-7 | .887** | | |

| | | |
|-----------------------------------|--------|------|
| KL-8 | .879** | |
| KL-9 | .837** | |
| KL-10 | .873** | |
| KL-11 | .851** | |
| KL-12 | .913** | |
| KL-13 | .852** | |
| KL-14 | .843** | |
| KL-15 | .871** | |
| KL-16 | .882** | |
| KL-17 | .879** | |
| KL-18 | .883** | |
| KL-19 | .891** | |
| KL-20 | .886** | |
| KL-21 | .890** | |
| KL-22 | .887** | |
| Customer Satisfaction (Y1) | | |
| KEPPEL-1 | .880** | |
| KEPPEL-2 | .859** | .895 |
| KEPPEL-3 | .874** | |
| KEPPEL-4 | .885** | |
| Customer Loyalty (Y) | | |
| LP-1 | .903** | |
| LP-2 | .885** | .909 |
| LP-3 | .899** | |
| LP-4 | .859** | |

Source: Data processed by SPSS, 2025

Based on the results of the data processing in Table 4.6, the validity test shows that the statements in all variables produce a correlation coefficient value of more than 0.1654 ($r > 0.1654$). These results indicate that all statements in this study have high validity values, so they can be used as material for further testing. Based on Table 4.6 above, it can be seen that the reliability values for all variables are greater than 0.80 (>0.80) or have high (good) reliability values. These results indicate that all statements in the variables have high reliability values, so they can be used for further testing.

a. Multiple Linear Regression Test

Regression analysis is a statistical method used to analyze and build models that describe the relationship between multiple variables. Multiple regression is often applied to problems involving more than one independent variable that influences a dependent variable.

Table 7. Substructure Multiple Regression Test Results 1

| Coefficientsa | | | | | |
|---------------|-----------------------------|------------|---------------------------|-------|-------|
| Model | Unstandardized Coefficients | | Standardized Coefficients | t | Sig. |
| | B | Std. Error | Beta | | |
| 1 | (Constant) | -.638 | 1,639 | -.389 | .698 |
| | Product Quality | .293 | .035 | .554 | 8,339 |
| | Quality Of Service | .088 | .011 | .531 | 7,992 |

a. Dependent Variable: Customer Satisfaction

Source: Data processed by SPSS, 2025

From table 4.9 it can be concluded that:

$$Y = \alpha + b1X1 + b2X2 + e$$

$$KP = \alpha + 0.554(KP) + 0.531(KL) + e$$

The regression equation above can be concluded as follows:

- Constant: meaning that if the quality of PLN Mobile products and the quality of digital services are considered constant for Customer Satisfaction
- The multiple regression coefficient value of the PLN Mobile product quality variable is positive, namely 0.554. This means that for every 1% increase in PLN Mobile product quality, the customer satisfaction variable will increase by 0.554.
- The multiple regression coefficient value of the digital service quality variable is positive, namely 0.531. This means that for every 1% increase in the digital service quality variable, the customer satisfaction variable will increase by 0.531.

Table 8. Substructure 2 Multiple Regression Test Results

| Coefficients | | Unstandardized Coefficients | | Standardized Coefficients | t | Sig. |
|---|-----------------------|-----------------------------|------------|---------------------------|-------|------|
| | Model | B | Std. Error | Beta | | |
| 1 | (Constant) | -.252 | 1,607 | | -.157 | .876 |
| | Product Quality | .197 | .045 | .348 | 4,370 | .000 |
| | Quality Of Service | .043 | .014 | .245 | 3.126 | .002 |
| | Customer Satisfaction | .470 | .099 | .439 | 4,720 | .000 |
| A. Dependent Variable: Customer Loyalty | | | | | | |

Source: Data processed by SPSS, 2025

From table 4.10 it can be concluded that:

$$Y = \alpha + b1X1 + b2X2 + b3X3 + e$$

$$LP = \alpha + 0.348(KP) + 0.245(KL) + 0.439(KEPPEL) + e$$

The regression equation above can be concluded as follows:

- Constant: meaning that if the quality of PLN Mobile products, the quality of digital services, customer satisfaction, the value is considered constant for customer loyalty.
- The multiple regression coefficient value of the PLN Mobile product quality variable is positive, namely 0.348. This means that for every 1% increase in PLN Mobile product quality, the customer loyalty variable will increase by 0.348.
- The multiple regression coefficient for the digital service quality variable is positive, at 0.245. This means that for every 1% increase in the digital service quality variable, the customer loyalty variable will increase by 0.245.
- The multiple regression coefficient for the customer satisfaction variable is positive, at 0.439. This means that for every 1% increase in the customer satisfaction variable, the customer loyalty variable will increase by 0.439.

b. Hypothesis Testing

1) Coefficient of Determination Test

In multiple linear regression, the coefficient of determination is used to determine the percentage contribution of the independent variables to the dependent variable. An R^2 value close to 0 indicates a weak contribution of the independent variables in explaining consumer loyalty, while an R^2 value close to 1 indicates a strong contribution.

Table 9. Results of the Determination Coefficient Test I

| Model | R | R Square | Adjusted R Square | Standard Error of the Estimate |
|---|-------|----------|-------------------|--------------------------------|
| 1 | .757a | .573 | .564 | 2,311 |
| a. Predictors: (Constant), Service Quality, Product Quality | | | | |

Source: Data processed by SPSS, 2025

Based on the analysis results, the R-square value was 0.573, or 57.3%. This indicates that 57.3% of the variation in customer satisfaction can be jointly explained by the independent variables, namely PLN Mobile Product Quality and Digital Service Quality. The remaining 42.7% is explained by other factors outside this model.

Table 9. Results of the Determination Coefficient II Test

| Model | R | R Square | Adjusted R Square | Standard Error of the Estimate |
|-------|-------|----------|-------------------|--------------------------------|
| 1 | .803a | .645 | .634 | 2,264 |

a. Predictors: (Constant), Customer Satisfaction, Service Quality, Product Quality

Source: Data processed by SPSS, 2025

Based on the analysis results, the R-square value was 0.645, or 64.5%. This indicates that 64.5% of the variation in customer loyalty can be jointly explained by the independent variables, namely PLN Mobile Product Quality, Digital Service Quality, and Customer Satisfaction. The remaining 35.5% is explained by other factors outside this model.

2) Simultaneous Test (F Test)

The F test is used to evaluate whether independent variables simultaneously have a significant influence on the dependent variable. In this study, the F test is used to assess whether the research model meets the requirements *goodness of fit*.

Table 10 Simultaneous Test Results I

| Model | Sum of Squares | df | Mean Square | F | Sig. |
|-------|----------------|----------|-------------|---------|--------------|
| 1 | Regression | 694,612 | 2 | 347,306 | 65,039 .000b |
| | Residual | 517,978 | 97 | 5,340 | |
| | Total | 1212,590 | 99 | | |

A. Dependent Variable: Customer Satisfaction

B. Predictors: (Constant), Service Quality, Product Quality

Source: Data processed by SPSS, 2025

Based on the ANOVA test results in Table 4.13, a significance value of 0.000 (<0.1) was obtained. Because the calculated F value is greater than the F table (2.14) and the significance value is less than 0.1, it can be concluded that the model in this study can be said to be appropriate or meets the goodness of fit.

Table 11 Simultaneous Test Results II

| Model | Sum of Squares | df | Mean Square | F | Sig. |
|-------|----------------|----------|-------------|---------|--------------|
| 1 | Regression | 895,591 | 3 | 298,530 | 58,236 .000b |
| | Residual | 492,119 | 96 | 5.126 | |
| | Total | 1387,710 | 99 | | |

A. Dependent Variable: Customer Loyalty

B. Predictors: (Constant), Customer Satisfaction, Service Quality, Product Quality

Source: Data processed by SPSS, 2025

Based on the ANOVA test results in Table 4.14, a significance value of 0.000 (<0.1) was obtained. Because the calculated F value is greater than the F table (2.14) and the significance value is less than 0.1, it can be concluded that the model in this study can be said to be appropriate or meets the goodness of fit.

3) Partial Test (T-Test)

The t-test is used to determine the extent to which PLN Mobile product quality and Digital Service Quality influence customer satisfaction and customer loyalty. The significance level used is 10% (0.1). If the calculated $t < t$ table (1.6609) or the significance value > 0.1 , then H_0 fails to be rejected and H_a is rejected. If the calculated $t > t$ table (1.6609) or the significance value < 0.1 , then H_0 is rejected and H_a is accepted, which indicates that the independent variable has a significant effect on the dependent variable.

Table 12 Partial Test Results I

| Coefficients | | | | t | Sig. |
|--------------------|--------------------------------|------------------------------|------|-------|------|
| Model | Unstandardized Coefficients | Standardized Coefficients | | | |
| | B | Std. Error | Beta | | |
| (Constant) | -.638 | 1,639 | | -.389 | .698 |
| Product Quality | .293 | .035 | .554 | 8,339 | .000 |
| Quality Of Service | .088 | .011 | .531 | 7,992 | .000 |

a. Dependent Variable: Customer Satisfaction

Source: Data processed by SPSS, 2025

a) The Influence of PLN Mobile Product Quality on Customer Satisfaction.

PLN Mobile Product Quality has a t-value of 8.339 and a significance value of 0.000 (<0.1). Since the t-value is greater than the t-table (1.6609) and the significance value is less than 0.1, it can be concluded that PLN Mobile Product Quality has a significant effect on Customer Satisfaction.

b) The Influence of Digital Service Quality on Customer Satisfaction.

Digital service quality has a t-value of 7.992 and a significance value of 0.000 (<0.1). Because the t-value is greater than the t-table (1.6609) and the significance value is less than 0.1, it can be concluded that digital service quality has a significant effect on customer satisfaction.

Table 13 Partial Test Results II

| Coefficients | | | | t | Sig. |
|-----------------------|--------------------------------|------------------------------|------|-------|------|
| Model | Unstandardized Coefficients | Standardized Coefficients | | | |
| | B | Std. Error | Beta | | |
| (Constant) | -.252 | 1,607 | | -.157 | .876 |
| Product Quality | .197 | .045 | .348 | 4,370 | .000 |
| Quality Of Service | .043 | .014 | .245 | 3.126 | .002 |
| Customer Satisfaction | .470 | .099 | .439 | 4,720 | .000 |

A. Dependent Variable: Customer Loyalty

Source: Data processed by SPSS, 2025

c) The Influence of PLN Mobile Product Quality on Customer Loyalty.

PLN Mobile's product quality has a t-value of 4,370 and a significance value of 0.000 (<0.1). Since the t-value is greater than the t-table (1.6609) and the significance value is less than 0.1, it can be concluded that PLN Mobile's product quality has a significant effect on customer loyalty.

d) The Influence of Digital Service Quality on Customer Loyalty.

Digital service quality has a t-value of 3.126 and a significance value of 0.002 (<0.1). Because the t-value is greater than the t-table (1.6609) and the significance value is less than 0.1, it can be concluded that digital service quality has a significant effect on customer loyalty.

e) The Influence of Customer Satisfaction on Customer Loyalty.

Customer satisfaction has a t-value of 4.720 and a significance value of 0.000 (<0.1). Because the t-value is greater than the t-table (1.6609) and the significance value is less than 0.1, it can be concluded that customer satisfaction has a significant effect on customer loyalty.

4) Sobel test

The Sobel test is used to assess the level of significance of the indirect influence between independent variables on dependent variables through intervening variables.

Table 14.Sobel Test Results Table

| Relationship between variables | a | b | Sa | Sb | Sobel Test Results (P-Value) | Interpretation |
|---|------|------|------|------|------------------------------|---|
| PLN Mobile product quality towards customer loyalty through customer satisfaction | .293 | .470 | .035 | .099 | .0000 | Customer Satisfaction is able to mediate the influence of PLN Mobile product quality on Customer Satisfaction |
| Digital service quality towards customer loyalty through customer satisfaction | .088 | .470 | .011 | .099 | .0000 | Customer Satisfaction is able to mediate the influence of digital service quality on Customer Satisfaction |

Source: Data processed by Sobel Test Calculator, 2025

The Influence of PLN Mobile Product Quality on Customer Satisfaction

Based on the results of the hypothesis test, the PLN MOBILE product quality variable has a t-value of 8.339 and a significance value of 0.000 (<0.1). Because the t-value is greater than the t-table (1.6609) and the significance value is less than 0.1, it can be concluded that PLN Mobile Product Quality has a significant effect on Customer Satisfaction.

This shows that the quality of PLN Mobile products has met or exceeded user expectations in terms of functionality, ease of use, reliability, security, and the relevance of its features which are continuously updated to meet customer needs, which will increase customer satisfaction as consumers of PT. PLN itself. Consistent positive experiences that meet expectations will automatically increase customer satisfaction. Because customer satisfaction will be a comparison between the product quality expected by customers and the product quality directly experienced by customers.[6]. So we can conclude that customers who perceive PLN Mobile products as high quality will increase customer satisfaction. The results of this study are in line with research conducted by Solihin & Hidayat (2025)which states that product quality can be said to be a factor that has a significant influence on customer satisfaction at the company PT. Alfa Indah Abadi, research conducted by Nur Rahmawati & Irmayanti Hasan (2023)also stated the same thing that the quality of Azarin products has a positive and significant influence on customer satisfaction in consuming Azarin products.

The Influence of Digital Service Quality on Customer Satisfaction

Based on the results of the hypothesis test, the digital service quality variable has a t-value of 7.992 and a significance value of 0.000 (<0.1). Because the t-value is greater than the t-table (1.6609) and the significance value is less than 0.1, it can be concluded that Digital Service Quality has a significant effect on Customer Satisfaction.

This shows that in this fast-paced digital era, the quality of PT PLN's digital services plays a crucial role in shaping customer satisfaction. This is because customer interactions with PLN are increasingly shifting from face-to-face to digital platforms, particularly the PLN Mobile application. Therefore, their

experiences on this platform directly reflect their perceptions of PLN's overall service quality, especially the quality of digital services that respond quickly to needs and problems such as reporting disruptions, obtaining real-time information about the location of power outages, and access to digital customer service. The digital services provided by PT. PLN (Persero) can meet customer expectations for smooth, fast, secure, and relevant services, making customers feel that their expectations for quality have been met.

This result is in line with research from Purwanti et al., (2015) which results in the quality of service being positively correlated with customer satisfaction, which means that the better the quality of service provided, the greater the satisfaction felt by customers, in line with this research from Nigatu et al., (2023) also stated that the quality of ATM services offered by the company can increase the satisfaction felt by Bank customers in Ethiopia.

The Influence of PLN Mobile Product Quality on Customer Loyalty

Based on the results of the hypothesis test, the PLN MOBILE product quality variable has a t-value of 4,370 and a significance value of 0.000 (<0.1). Because the t-value is greater than the t-table (1.6609) and the significance value is less than 0.1, it can be concluded that PLN Mobile Product Quality has a significant effect on Customer Loyalty.

The quality of PLN Mobile products consistently provides a high-quality experience (reliable, easy, fast, functional, safe) to customers cumulatively and significantly contributes to increasing customer loyalty. This is because people are now dependent on smartphones so that with the existence of PLN Mobile products, customers feel more efficient, feel more time and energy saving because all matters related to PT. PLN can be accessed on PLN Mobile from buying electricity to reporting power outages or adding power, checking the location of power outages, all of which have been fulfilled on the PLN Mobile application to foster a sense of customer loyalty to PT. PLN (Persero)

This research is in line with research from Taufik et al., (2022) results show that product quality has an influence and greatly determines how loyal customers are, as does research from Naini et al., (2022) which states something similar that quality products increase customer loyalty. Research from Qibtiyah et al., (2024) This further strengthens the fact that product quality has a positive and significant influence on customer loyalty.

The Influence of Digital Service Quality on Customer Loyalty

Based on the results of the hypothesis test, the digital service quality variable has a t-value of 3.126 and a significance value of 0.002 (<0.1). Because the t-value is greater than the t-table (1.6609) and the significance value is less than 0.1, it can be concluded that Digital Service Quality has a significant effect on Customer Loyalty.

These results indicate that today, customers are looking for easy 24/7 access. PLN's digital services (apps, websites, chatbots) allow customers to manage their electricity needs anytime and anywhere. The digital services offered by PT. PLN (Persero) also allow customers to resolve electricity matters quickly and seamlessly, saving time, energy, and even transportation costs because customers do not need to bother visiting the PLN office to resolve their electricity matters. In addition, the digital services offered also provide clear, accurate, and transparent information regarding bills, complaint status, even power outage schedules and blackout locations so that customers feel very helped by the existence of digital services and foster loyalty to PT. PLN (Persero).

The results of this study are in line with research conducted by Agarwal & Gowda (2020) who conducted research on the Indian Aviation Industry which resulted in the conclusion that providing quality service in aviation services can produce loyal customers to the company, in line with this research from Dewi et al., (2021) also stated that service quality has a significant and positive influence on customer loyalty to laundry services in Indonesia, and this is further strengthened by research from Shabani et al., (2022) which also strengthens that service quality has a significant and positive influence on customer loyalty to laundry services in Indonesia.

The Influence of Customer Satisfaction on Customer Loyalty

Based on the results of the hypothesis test, the digital service quality variable has a t-value of 4.720 and a significance value of 0.000 (<0.1). Because the t-value is greater than the t-table (1.6609) and the significance value is less than 0.1, it can be concluded that Customer Satisfaction has a significant effect on Customer Loyalty.

This reinforces the fact that customers who repeatedly experience satisfaction with positive interactions with PLN, such as smooth bill payments or electricity token purchases via PLN Mobile, fast new installation requests, or prompt complaint handling, continue to cultivate positive experiences. Furthermore, stable electricity and easy digital services make customers feel satisfied with the services provided by PT. PLN (Persero), resulting in a sense of trust and security, which fosters customer loyalty to PT. PLN (Persero).

This research is in line with research conducted by Yesitadewi & Widodo (2024) stated that high customer satisfaction has a positive effect on customer loyalty. The more satisfied customers are with Deliveree Indonesia's services, the more likely they are to remain loyal, as research from Malki et al., (2023) which shows that customer satisfaction has a positive influence on customer loyalty.

The Influence of PLN Mobile Product Quality on Customer Loyalty through Customer Satisfaction at PT. PLN (Persero) UP3 Cikupa

The results of the mediation test using the Sobel method showed a p-value of 0.000, which is smaller than 0.1. This indicates that customer satisfaction is able to significantly mediate the influence of PLN Mobile product quality on consumer loyalty among PT. PLN (Persero) UP3 Cikupa customers. The quality of PLN Mobile products that continues to strive to be the best for customers does not immediately make customers loyal to PT. PLN (Persero) but creates a satisfaction to customers and only then will customer satisfaction produce loyal customers to the company. High customer expectations and can be met by the quality of PLN Mobile products such as applications that do not often error, clear menu navigation, fast application response when loading data, complete features make customers satisfied with the interaction on PLN Mobile products and will become loyal customers, who will continue to use the application, recommend it, and feel committed to PT. PLN as their electricity service provider.

The results of this study are in line with research conducted by Wulansari & Widowati (2022) where there is a positive and significant influence of Product Quality on Consumer Loyalty with Customer Satisfaction as an intervening variable on Yenita Konveksi consumers, this is also in line with research from William & Ahmadi (2023) which found that consumer satisfaction can have a positive influence between product quality and consumer loyalty and is also strengthened by research from Tambunan & Prabowo (2023) which proves that the quality of products provided by XL Axiata Prepaid cards in Surabaya can provide customer loyalty through customer satisfaction.

The Influence of Digital Service Quality on Customer Loyalty through Customer Satisfaction at PT. PLN (Persero) UP3 Cikupa

The results of the mediation test using the Sobel method showed a p-value of 0.000, which is smaller than 0.1. This indicates that customer satisfaction is able to significantly mediate the influence of digital service quality on consumer loyalty among PT. PLN (Persero) UP3 Cikupa customers. The quality of digital services offered by PT. PLN (Persero) such as the PLN Mobile application, website, chatbot has made it easier for customers to fulfill their needs for services from PT. PLN (Persero) such as customers can make electricity payments or purchase tokens via PLN Mobile/website without interruption even in the middle of the night, then the disruption reporting feature in the application that is directly integrated with the field team, the new transparent cost simulation feature creates satisfaction for customers with the digital services of PT. PLN (Persero) offered, this triggers a sense of loyalty in customers. This is in line with the current conditions, where all lines of life have begun to shift to the digital realm, PT. PLN (Persero) also adapts to the situation by providing customers with convenience, speed, and reliability of digital services so that customers of PT. PLN (Persero) become loyal customers, who continue to choose PT. PLN (Persero) as their main energy provider.

The results of this study are in line with research Yesi Triyuliarlita Amelia & Koko Safitri (2021) conducted at the Hangout Cafe in Sampit, the results showed that consumer satisfaction was a full mediator between service quality and loyalty, as were the research results from Sari & Dwiridotjahjono (2023) which results in service quality having a positive and significant influence on loyalty through customer satisfaction on the Go-Jek online transportation service.

4. CONCLUSION

Based on the results of data analysis and hypothesis testing conducted using SPSS v.25 software with seven research hypotheses, PT. PLN (Persero) UP3 Cikupa in Tangerang Regency showed a significant relationship between the four variables studied, namely PLN Mobile product quality, digital service quality, customer satisfaction, and customer loyalty. The results of this study show that PLN Mobile product quality and digital service quality have a positive and significant effect on customer satisfaction. In addition, both factors are also proven to influence customer loyalty. Specifically, this study found that customer satisfaction acts as a mediator connecting PLN Mobile product quality and digital service quality to customer loyalty. In other words, customer satisfaction can strengthen the relationship between product and service quality with customer loyalty.

The results of the hypothesis test indicate that PLN Mobile product quality and digital service quality have a significant impact on customer satisfaction at PT. PLN (Persero) UP3 Cikupa. This demonstrates the importance of continuously improving the performance of the PLN Mobile application, maintaining digital service quality, and ensuring a satisfying customer experience through these two factors. This study also shows that customer satisfaction serves as a mediator connecting product quality and digital service quality with customer loyalty. This means that satisfied customers are more likely to be loyal to the company, which leads to increased retention and long-term relationships.

Based on these findings, several recommendations can be provided to the management of PT. PLN (Persero) UP3 Cikupa to further improve the customer experience. First, the company needs to ensure the stability of the PLN Mobile application and continue to develop new features relevant to customer needs. Second, the company must also improve the consistency and reliability of digital services and maintain customer data security and privacy. By maintaining the quality of these products and services, the company can maintain customer satisfaction, which leads to higher loyalty. Furthermore, recommendations for further research include expanding the variables used in the study and delving deeper into the relationship between product quality, service, satisfaction, and loyalty in other companies, both in the service and non-service sectors.

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