Edelweiss Applied Science and Technology
ISSN: 2576-8484
Vol. 8, No. 5, 1311-1321
2024
Publisher: Learning Gate
DOI: 10.55214/25768484.v8i5.1834

Customer satisfaction optimization: Impact of PLN mobile application and price in the context of PT. PLN Palembang services

Sri Rahayu[1*], Yudha Mahrom[2], Sulaiman Helmi[3]
[1,2]Universitas Muhammadiyah Palembang, Indonesia; sri_rahayu@um-palembang.ac.id (S.R.) yudhamahrom@gmail.com (Y.M.)
[3]Postgraduate, Universitas Bina Darma, Indonesia; sulaimanhelmi@binadarma.ac.id (S.H.).

Abstract: This study aims to evaluate the effect of the PLN Mobile application and price on customer satisfaction at PT. PLN (Persero) UP3 Palembang ULP Rivai. This study also examines the role of price as a mediating variable in the relationship between the PLN Mobile application and customer satisfaction. The method used in this study is a quantitative approach with data analysis using Partial Least Squares Structural Equation Modeling (PLS-SEM). Primary data were collected through a survey involving 100 PLN Mobile customer respondents. The results of the analysis show that the PLN Mobile application has a positive and significant effect on customer satisfaction, with a path coefficient of 5.588 and a p-value <0.001. Price also has a significant effect on customer satisfaction with a path coefficient of 4.434 and a p-value <0.001. Furthermore, the indirect effect analysis revealed that price functions as a partial mediating variable between the PLN Mobile application and customer satisfaction, with a path coefficient of 3.513 and a p-value <0.001. These findings indicate that the PLN Mobile application and price directly affect customer satisfaction, and price plays an important role in strengthening the influence of the PLN Mobile application on satisfaction. Based on these results, it is recommended that PT. PLN continues to optimize the features and services of the PLN Mobile application to improve customer satisfaction and consider competitive pricing strategies. This study also suggests further studies to explore other factors that may affect customer satisfaction in the public service sector.

Keywords: *Customer satisfaction, PLN mobile application, Price.*

1. Introduction

In today's digital era, information technology not only facilitates communication, but also becomes the main foundation in the operation of various sectors, including the energy sector[1], [2]. Modern companies, such as PT PLN (Persero), are increasingly aware that service efficiency and effectiveness can no longer be achieved without integrating technology into their operational systems[3]. In an effort to improve service quality, PT PLN launched the PLN Mobile application which is designed to make it easier for customers to access services more quickly and efficiently[4], [5]. Through this application, customers can carry out various important activities, such as checking electricity bills, reporting disruptions, and getting information related to blackouts[6]. With these features, PLN hopes to provide more responsive and timely services, which ultimately contribute to increasing customer satisfaction[7], [8]. However, although this application offers various conveniences, its implementation does not always run smoothly[9]. Based on the results of direct interviews with several customers, there are still recurring complaints, such as unexpected power outages, inaccurate meter readings, and delays in the new installation process. This shows that even though technology has been implemented, there is still a gap between customer expectations and actual results in the field .

* Correspondence: sri_rahayu@um-palembang.ac.id

In recent years, public expectations of the quality of public services, including electricity services, have increased[10], [11]. Customer satisfaction in corporate management theory is one of the main indicators that can determine the success and sustainability of a company[12], [13]. When customers are satisfied, they tend to be loyal to the products or services offered, which in turn improves the company's reputation and strengthens competitiveness in the market[14], [15]. This satisfaction is usually achieved if the services provided meet or exceed customer expectations[16]. In the context of PT PLN (Persero), service quality, response speed, and price transparency are crucial factors that influence customer perceptions[17]. Many previous studies have proven that good service quality, coupled with reasonable pricing, greatly influences the level of customer satisfaction[18], [19]. However, along with the development of digital technology, other factors such as ease of access through mobile applications have begun to play a significant role[20]. However, studies related to the direct relationship between the use of mobile applications such as PLN Mobile and customer satisfaction in the energy sector, especially in Indonesia, are still minimal.

Companies such as PT PLN (Persero) are required to provide services that are not only reliable, but also can be accessed quickly and easily. This is where the role of digital technology, such as mobile applications, becomes increasingly important[21]. The use of this technology not only helps companies respond to customer needs more effectively but can also be a strategic tool to improve operational efficiency and reduce costs[22], [23]. However, in the context of PT PLN (Persero), especially in the Palembang area, there is still little empirical research that examines the effectiveness of the PLN Mobile application in increasing customer satisfaction[24], [25]. Therefore, this study is very important to answer unanswered questions about the extent to which digital technology can truly change the customer experience and increase their satisfaction with electricity services[26].

This study not only focuses on the direct influence of the PLN Mobile application on customer satisfaction, but also examines whether the electricity price set by PT PLN (Persero) acts as a mediating factor in the relationship. Price is often one of the main factors considered by customers in assessing the services they receive[27]. In situations where customers feel that the price they pay is commensurate with the quality of service they receive, satisfaction tends to increase[28]. However, if there is a mismatch between price and service, this can trigger complaints and dissatisfaction. Therefore, this study offers a novel contribution by exploring the interaction between digital technology, price, and customer satisfaction, which has not been widely studied in the context of public services in Indonesia, especially the energy sector. The results of this study are expected to provide practical insights for PT PLN (Persero) in improving digital-based service strategies and price management to increase customer satisfaction and loyalty. This study is also expected to provide deeper insights for PT PLN (Persero), especially in the Palembang area, in formulating more effective and efficient service strategies using digital technology. The findings of this study are also expected to be a reference for further development of the PLN Mobile application to better meet customer expectations and answer challenges in the field. In addition, the implications of this study are not only beneficial for PT PLN internally but can also be a reference for other companies engaged in the public service sector in implementing digital innovation to improve service quality and customer satisfaction. Therefore, the main objective of this study is to analyze in depth how the PLN Mobile application affects customer satisfaction, as well as explore the role of price in strengthening the relationship.

2. Method

This study uses a descriptive method with a quantitative approach [29] to explore the effect of the PLN Mobile application and price on customer satisfaction at PT PLN (Persero) UP3 Palembang ULP Rivai. This study aims to assess the role of price as a mediating factor in the relationship between the PLN Mobile application and customer satisfaction. The study was conducted at PT PLN (Persero) UP3 Palembang ULP Rivai, located at Jl. Kapt. A Rivai No. 37, Palembang, during the period from March 1, 2024, to August 1, 2024, with a duration of 6 months.

Edelweiss Applied Science and Technology
ISSN: 2576-8484
Vol. 8, No. 5: 1311-1321, 2024
DOI: 10.55214/25768484.v8i5.1834

The population of this study includes all users of the PLN Mobile application and electricity customers of PT PLN (Persero) in the Palembang area. Given that the population size cannot be determined with certainty, this population is categorized as an infinite population[30]. For research purposes, a purposive sampling technique was used to determine the sample, namely 100 PLN Mobile customers who met specific criteria: customers who routinely pay electricity bills, often experience power outages, have difficulty using the PLN Mobile application, and experience obstacles in electricity services from PT PLN (Persero).

Data collection was conducted through two main methods. First, direct interviews[31] with company leaders and other related parties to gain in-depth insights into the quality of service and the impact of the PLN Mobile application and prices on customer satisfaction. Second, primary data was obtained through a questionnaire distributed to respondents[32]. This questionnaire contains questions designed to explore customer opinions and experiences regarding the PLN Mobile application and electricity services, both through direct delivery and face-to-face interviews.

Data analysis was conducted using descriptive techniques to provide an overview of the basic characteristics of the dataset, including the distribution of age, gender, and occupation of PLN Mobile application users. In addition, Partial Least Squares Structural Equation Modeling (PLS-SEM) was used to analyze the relationship between several variables in the structural model[33]. This method helps evaluate the dependency and interconnectedness between variables, providing insight into the influence of the PLN Mobile application and price on customer satisfaction (Hair, 2019).

3. Results and Discussion

3.1. Model Evaluation

The PLS-SEM model evaluation process was carried out using Smart-PLS 4.0 software. The first step involves factor analysis to evaluate the validity and reliability of latent constructs through confirmatory measurements. Next, the structural model is tested to determine the significance and evaluate the latent influence between constructs or variables. This evaluation ensures that the relationships between the variables in the model are reliable and valid.

3.2. Measurement Model or Outer Model

To explain the relationship between indicators and latent variables, a measurement model analysis, often called external model analysis, is conducted. In this analysis, there are three main criteria used to assess the external model: Convergent Validity, Discriminant Validity, and Composite Reliability.

Table 1.
Outer model.

Variables	Composite reliability (rho_a)	Average variance extracted (AVE)
PLN mobile application	0.804	0.629
Price	0.827	0.730
Customer satisfaction	0.884	0.589

Based on the composite reliability value for the PLN mobile application, price, customer satisfaction and service quality have exceeded 0.7. And the AVE value> 0.5 for PLN mobile, price, customer satisfaction and service quality. The structural research model before the outlier is as follows:

Edelweiss Applied Science and Technology
ISSN: 2576-8484
Vol. 8, No. 5: 1311-1321, 2024
DOI: 10.55214/25768484.v8i5.1834

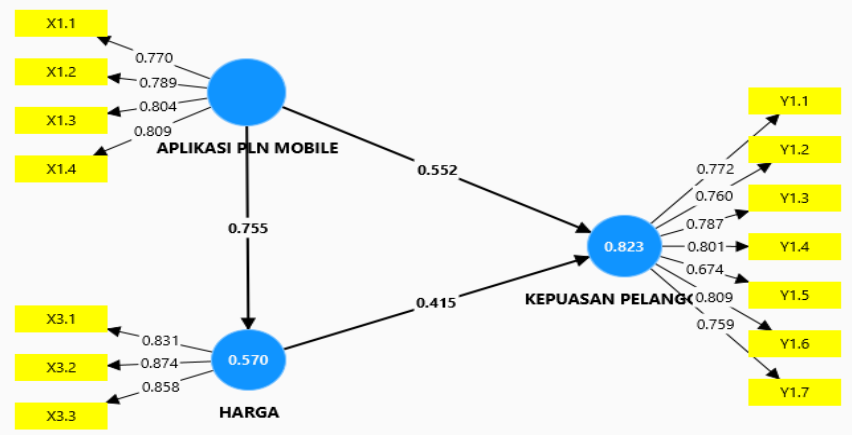

Figure 1.
Model estimation results.
Source: Smart-PLS4 processed data.

Outliers are carried out to fulfill the validity and reliability assumptions in the outer model.

3.2. Validity Test

3.2.1. Convergent Validity Test (Validity Test Using Outer Loading)

Convergent validity test in the measurement model with reflective indicators is assessed based on the reliability of individual items, using a standardized loading factor[34]. This loading factor measures how much correlation there is between each indicator and the construct it represents[3]. A loading factor value above 0.70 is considered ideal or valid for an indicator measuring the construct. However, in early research on the development of a measurement scale, a loading factor value between 0.50 and 0.60 is still considered adequate[35]. Convergent validity can also be measured through the loading factor, which shows the average variance explained by the indicators in a construct[36]. A loading factor value above 0.50 indicates good convergent validity, where more than half of the indicator's variance can be explained by the construct[37].

Table 2.
Outer loading.

Item	PLN mobile application	Price	Customer satisfaction
X1.1	0.770		
X1.2	0.789		
X1.3	0.804		
X1.4	0.809		
X3.1		0.831	
X3.2		0.874	
X3.3		0.858	
Y1.1			0.772
Y1.2			0.760
Y1.3			0.787
Y1.4			0.801
Y1.5			0.674
Y1.6			0.809
Y1.7			0.759

Source: SmartPLS 4.1.0.6 Processed Data.

Edelweiss Applied Science and Technology
ISSN: 2576-8484
Vol. 8, No. 5: 1311-1321, 2024
DOI: 10.55214/25768484.v8i5.1834

Validity testing for reflective indicators is done by measuring the correlation between item scores and construct scores. Measurement with reflective indicators shows a change in a construct if other indicators in the same construct change or are removed from the model. Based on the test results, the PLN Mobile Application, Price, Customer Satisfaction, has different data depending on the valid value, based on the provisions of the value above 0.05. This validity indicates that the indicators effectively measure the intended construct. In addition, this validity ensures that any changes in the construct can be accurately reflected by changes in the relevant indicators[38]. Thus, a high validity value is very important to ensure the reliability and accuracy of the research results. Values above 0.05 indicate that some of the relationships between indicators and constructs are quite strong and significant, so that the analysis results can be trusted for decision making.

3.3. Composite Reliability

As a superior alternative compared to Cronbach's Alpha value in testing reliability in Structural Equation Modeling (SEM), Composite Reliability can be evaluated through two main measures: internal consistency and Cronbach's Alpha [39]. While Cronbach's Alpha tends to provide a lower bound estimate in measuring reliability, Composite Reliability provides a more accurate estimate without assuming that reliability is the same[40]. In other words, Composite Reliability is a closer approach in estimating parameters with higher accuracy[41]. The interpretation of Composite Reliability is similar to Cronbach's Alpha, where values above 0.70 are considered acceptable and indicate good internal consistency of the construct being measured.

Table 3.
Composite reliability.

Variables	Composite reliability (rho_a)
PLN mobile application	0.804
Price	0.827
Customer satisfaction	0.884

Source: SmartPLS 4.1.0.6 Processed Data.

Based on Table 3, the reliability test results obtained from composite reliability show satisfactory values for each construct: PLN Mobile Application with a value of 0.804, Price with a value of 0.827, and Customer Satisfaction (KP) with a value of 0.884. These results indicate that each construct has a high level of reliability, indicated by a composite reliability value greater than 0.70 for all constructs. The composite reliability values obtained from all constructs are above 0.70, thus meeting the criteria for good reliability.

3.4. Multicollinearity Test

In this study, the structural model includes a multicollinearity or collinearity test to determine whether there is intercorrelation between independent variables in the construct model. Intercorrelation refers to a linear or strong relationship between independent variables and other predictor variables in the structural model[42]. To assess whether the formative indicators experience multicollinearity, the Variance Inflation Factor (VIF) value is used. A VIF value <10 indicates that the indicator does not experience multicollinearity[43]. Based on data analysis, several indicators show VIF values <10, indicating that these indicators are free from multicollinearity[44].

Edelweiss Applied Science and Technology
ISSN: 2576-8484
Vol. 8, No. 5: 1311-1321, 2024
DOI: 10.55214/25768484.v8i5.1834

Table 4.
Multicollinearity test.

Item	VIF	Information
X1.1	1.560	No multicollinearity occurs
X1.2	1.625	No multicollinearity occurs
X1.3	1.693	No multicollinearity occurs
X1.4	1.764	No multicollinearity occurs
X3.1	1.802	No multicollinearity occurs
X3.2	1.866	No multicollinearity occurs
X3.3	1.763	No multicollinearity occurs
Y1.1	2.008	No multicollinearity occurs
Y1.2	1.902	No multicollinearity occurs
Y1.3	2.016	No multicollinearity occurs
Y1.4	2.349	No multicollinearity occurs
Y1.5	1.508	No multicollinearity occurs
Y1.6	2.340	No multicollinearity occurs
Y1.7	1.836	No multicollinearity occurs

Source: SmartPLS 4.1.0.6 Processed Data.

Based on Table 4, overall, the indicators do not experience multicollinearity because the VIF value is <10. Therefore, it can be concluded that there is no multicollinearity between the PLN Mobile Application, price, and customer satisfaction.

3.5. Inner Model Test

The assessment of the structural model using SmartPLS begins by looking at the R Square value for each endogenous latent variable, such as application, price, and customer satisfaction.

3.6. R Square

R-Square in linear regression measures the extent to which endogenous variables can be explained by exogenous variables. The criteria for assessing the R-Square value are as follows: R^2 value = 0.67 indicates a substantial influence (large/high quality), R^2 value = 0.33 indicates a moderate influence (medium), and R^2 value = 0.19 indicates a weak influence (small). In this study, the R-Square for the Price variable is 0.570 with an Adjusted R-Square of 0.565. This shows that the variables that affect Customer Satisfaction can explain 57% of the variability in Price, which is included in the moderate influence category. The Adjusted R-Square value that is close to the R-Square value indicates that this model is very good at explaining Price variability. Meanwhile, the R-Square for Customer Satisfaction is 0.823 with an Adjusted R-Square of 0.819. This means that the variables that influence Customer Satisfaction can explain 82.3% of the variability in Customer Satisfaction, which is included in the category of large influence. The Adjusted R-Square value which is almost the same as R-Square indicates that this model is very good at explaining the variability of Customer Satisfaction.

3.7. F Square

F-Square (F^2) is a measure used to assess the relative impact of independent variables on dependent variables in a model. This measure can indicate how much influence the independent variables have on the dependent variable with the following criteria: F^2 value = 0.02 indicates a small or less significant impact, F^2 value = 0.15 indicates a moderate impact, and F^2 value = 0.35 indicates a large or significant impact. Based on data obtained from SmartPLS 4.1.0.6, it was found that for the Price variable on the PLN Mobile Application, the F^2 value was 1.325, which indicated a large impact. This means that Price

Edelweiss Applied Science and Technology
ISSN: 2576-8484
Vol. 8, No. 5: 1311-1321, 2024
DOI: 10.55214/25768484.v8i5.1834

has a significant influence on the quality of service provided by the PLN Mobile Application. Furthermore, for the PLN Mobile Application variable on Customer Satisfaction, the F^2 value was 0.738, which indicated a high impact, indicating that the PLN Mobile Application has a strong influence on Customer Satisfaction. Finally, the F^2 value for the Price variable on Customer Satisfaction was 0.418, which also indicated a high impact, indicating that Price had a significant influence on Customer Satisfaction. With these results, it can be concluded that the Price and PLN Mobile Application have varying but significant impacts on other variables.

3.8. Hypothesis Testing

Hypothesis testing in this study was conducted through a structural model (inner model) by examining the R Square value as a goodness-of-fit model test. The statistic used is the t-test, where the resampling method allows to ignore the assumption of normal distribution and does not require a large sample. The test results using bootstrapping from the SmartPLS analysis can be found in the inner model weight output presented in the structural model image.

3.10. Direct Effect

Direct effect analysis aims to test the hypothesis regarding the direct influence of the independent variable (exogenous) on the dependent variable (endogenous). In this analysis, the path coefficient is used to determine the direction and strength of the influence. If the path coefficient value is positive, then the influence of the independent variable on the dependent variable is unidirectional; that is, an increase in the independent variable will be followed by an increase in the dependent variable. Conversely, if the path coefficient value is negative, the influence is in the opposite direction; in this case, an increase in the independent variable will cause a decrease in the dependent variable. In addition, the probability or significance value (P-Value) is also used to determine the significance of the analysis results. If the P-Value value is less than 0.5, then the results are considered significant, while if the P-Value is greater than 0.5, the results are considered insignificant.

Table 5.
Proof of hypothesis of direct influence.

Path coefficient	T statistics	P values	Information
PLN mobile application -> Price	12.282	0.000	significant
PLN mobile application -> Customer satisfaction	5.588	0.000	significant
Price -> Customer satisfaction	4.434	0.000	significant

Source: SmartPLS 4.1.0.6 processed data.

Based on the analysis results shown in Table 5 regarding the proof of the hypothesis of direct influence, all tested relationships show significant results. The path coefficient for the relationship between the PLN Mobile Application and Price is 12.282 with a p value of 0.000, indicating that the effect of the PLN Mobile Application on Price is statistically significant. In addition, the relationship between the PLN Mobile Application and Customer Satisfaction is also significant, with a path coefficient of 5.588 and a p value of 0.000, indicating that the increase in the PLN Mobile Application has a positive impact on Customer Satisfaction. Likewise, the effect of Price on Customer Satisfaction is also significant, with a path coefficient of 4.434 and a p value of 0.000. In conclusion, all three relationships show a strong and significant direct impact, confirming that the PLN Mobile Application and Price have a significant effect on Customer Satisfaction.

The findings of this study are consistent with previous research that highlights the importance of mobile applications and pricing in influencing customer satisfaction. For instance, [45] found that user-friendly and feature-rich mobile applications have a significant impact on customer satisfaction by enhancing convenience, accessibility, and service efficiency. This supports the finding that the PLN Mobile Application can positively influence Customer Satisfaction. Moreover, a study by [46]

Edelweiss Applied Science and Technology
ISSN: 2576-8484
Vol. 8, No. 5: 1311-1321, 2024
DOI: 10.55214/25768484.v8i5.1834

confirmed that the perception of fair and competitive pricing is a crucial factor affecting customer satisfaction. They found that prices considered fair by customers directly contribute to their overall perception of service quality and satisfaction. This aligns with the significant relationship between Price and Customer Satisfaction observed in this study. Another study by [21] emphasized that users' experience with mobile applications greatly influences their intention to continue using the app. In this context, the PLN Mobile Application can enhance customer satisfaction by offering an intuitive interface and faster services, as evidenced by the findings of this research[22]. Overall, the results of this study reinforce the theories proposed by previous research that mobile technology and favorable price perceptions play a critical role in boosting customer satisfaction. Digital innovations like the PLN Mobile Application, combined with competitive pricing strategies, can be key factors in building long-term relationships with customers and increasing their loyalty to the company's services.

3.11. Indirect Effect

Indirect effect analysis aims to test the hypothesis regarding the indirect influence of the independent variable (exogenous) on the dependent variable (endogenous) through the intermediary variable. In this analysis, the assessment criteria are based on the P-Value. If the P-Value is less than 0.05, then the effect is considered significant, indicating that the intermediary variable has an important role in the relationship between the independent variable and the dependent variable. Conversely, if the P-Value is greater than 0.05, the effect is considered insignificant, indicating that the intermediary variable does not play a role in the relationship between the independent variable and the dependent variable.

Table 6.
Proof of hypothesis of indirect influence.

Path coefficient	T statistics	P values	Information
PLN mobile application -> Price -> Customer satisfaction	3.513	0.000	Partial mediation

Source: SmartPLS 4.1.0.6 Processed data.

Based on the results of the analysis presented in Table 6 regarding the proof of the hypothesis of indirect influence, it was found that the indirect effect of the PLN Mobile Application through Price on Customer Satisfaction showed significant results. The path coefficient for this indirect effect is 3.513 with a p-value of 0.000. This indicates that the Price variable acts as a partial mediator in the relationship between the PLN Mobile Application and Customer Satisfaction. In other words, the PLN Mobile Application affects Customer Satisfaction not only directly but also through the influence of Price. This finding confirms that although the direct effect of the PLN Mobile Application on Customer Satisfaction is significant, the role of Price as a mediating variable also strengthens the relationship, indicating a partial mediation process in the analyzed model.

This finding aligns with several previous studies that emphasize the importance of mediating variables in understanding the dynamics between technology and customer satisfaction. For instance, research by [47] highlights that mediation analysis is crucial in uncovering the mechanisms through which independent variables influence outcomes. In this case, Price serves as an important factor in bridging the effect of the PLN Mobile Application on Customer Satisfaction, showing that customer perception of price adds another layer of influence. Furthermore, studies such as those by [48] have shown that price perception often plays a mediating role between service quality, including digital applications, and customer satisfaction. They argue that customers who perceive prices as fair are more likely to express higher satisfaction with the overall service, even when using a mobile application. This supports the idea that while the PLN Mobile Application directly improves satisfaction by offering convenience and efficiency, its impact is further amplified when customers perceive the pricing structure as reasonable.

Edelweiss Applied Science and Technology
ISSN: 2576-8484
Vol. 8, No. 5: 1311-1321, 2024
DOI: 10.55214/25768484.v8i5.1834

Additionally, the study by [49] supports the current findings, demonstrating that digital service platforms often enhance customer satisfaction indirectly through pricing factors. The study found that users of mobile applications who felt that the prices associated with the services were fair were more satisfied with the service overall. This reinforces the concept of partial mediation observed in this study, where Price helps explain the link between the PLN Mobile Application and Customer Satisfaction. In conclusion, the results show that Price partially mediates the relationship between the PLN Mobile Application and Customer Satisfaction. This implies that improvements in the PLN Mobile Application will enhance customer satisfaction, but their effectiveness is amplified when the perception of price is also positive. This highlights the importance of not only optimizing mobile applications but also considering pricing strategies to achieve higher levels of customer satisfaction.

4. Conclusion

Based on the data analysis, there are several main findings related to the influence of the variables studied. First, the results of the direct effect analysis show that the PLN Mobile Application has a significant effect on Price and Customer Satisfaction, with path coefficients of 12,282 and 5,588, respectively, and a p value indicating significance at the 0.000 level. Second, Price also has a significant effect on Customer Satisfaction, with a path coefficient of 4,434 and the same p value (0.000). This finding confirms that the PLN Mobile Application and Price variables directly contribute to increasing Customer Satisfaction. In addition, the indirect effect analysis shows that Price functions as a partial mediator in the relationship between the PLN Mobile Application and Customer Satisfaction. The path coefficient for this indirect effect is 3,513 with a p value of 0.000, indicating that Price mediates part of the direct relationship between the PLN Mobile Application and Customer Satisfaction. This shows that in addition to the direct effect, the PLN Mobile Application also affects Customer Satisfaction through changes in Price.

This study has several limitations that need to be considered. First, this study was only conducted in one location, namely PT. PLN (Persero) UP3 Palembang ULP Rivai, which may limit the generalization of the findings to a wider context. Second, although the sample size includes 100 respondents, limitations in sample variability and representation may affect the results of the study. Third, this study relies on quantitative data collected through questionnaires and interviews, which may not fully describe the qualitative factors that may affect Customer Satisfaction.

For future research, it is recommended that this study be expanded to include more locations and different contexts to increase the generalizability of the findings. Research could also consider more in-depth qualitative data collection methods, such as in-depth interviews or focus group discussions, to gain more comprehensive insights into customer experiences. In addition, further research could examine other variables that may influence Customer Satisfaction and consider longitudinal analysis to see changes in satisfaction over time. The use of more varied research methods and involving triangulation techniques can provide a more holistic picture of the factors that influence Customer Satisfaction.

References

[1] A. Adrian, "Empowerment strategies of micro, small, medium enterprises (msmes) to improve indonesia export performance," *Int. J. Econ. Bus. Account. Res.*, vol. 2, no. 04, pp. 50–60, 2019, doi: 10.29040/ijebar.v2i04.222.

[2] I. Alam, J. S. Kartar Singh, and M. U. Islam, "Does supportive supervisor complements the effect of ethical leadership on employee engagement?," *Cogent Bus. Manag.*, vol. 8, no. 1, 2021, doi: 10.1080/23311975.2021.1978371.

[3] S. A. Raza, A. Umer, M. A. Qureshi, and A. S. Dahri, "Internet banking service quality, e-customer satisfaction and loyalty: the modified e-SERVQUAL model," *TQM J.*, vol. 32, no. 6, pp. 1443–1466, 2020, doi: 10.1108/TQM-02-2020-0019.

[4] C. Wang, R. S. Batth, P. Zhang, G. S. Aujla, Y. Duan, and L. Ren, "VNE solution for network differentiated QoS and security requirements: from the perspective of deep reinforcement learning," *Computing*, vol. 103, no. 6, pp. 1061–1083, 2021, doi: 10.1007/s00607-020-00883-w.

[5] I. B. Cempena, I. A. S. Brahmayanti, E. D. Astawinetu, F. A. B. K. Panjaitan, I. A. N. Kartini, and H. Panjaitan, "The role of customer values in increasing tourist satisfaction in Gianyar Regency, Bali, Indonesia," *J. Asian Financ. Econ. Bus.*, vol. 8, no. 8, pp. 553–563, 2021, doi: 10.13106/jafeb.2021.vol8.no8.0553.

[6] A. Byanjankar, M. Heikkila, and J. Mezei, "Predicting credit risk in peer-to-peer lending: A neural network approach," *Proc. - 2015 IEEE Symp. Ser. Comput. Intell. SSCI 2015*, pp. 719–725, 2015, doi: 10.1109/SSCI.2015.109.

[7] M. A. Saleh, A. Quazi, B. Keating, and S. S. Gaur, "Quality and image of banking services: a comparative study of conventional and Islamic banks," *Int. J. Bank Mark.*, vol. 35, no. 6, pp. 878–902, 2017, doi: 10.1108/IJBM-08-2016-0111.

[8] L. Sun and C. Bunchapattanasakda, "Employee engagement: A literature review," *Int. J. Hum. Resour. Stud.*, vol. 9, no. 1, p. 63, 2019, doi: 10.5296/ijhrs.v9i1.14167.

[9] H. Harmen, A. Lubis, Aprinawati, L. M. Harahap, and R. Indriani, "Antecedent affecting chinese ethnic community saving at islamic bank of north sumatra," in *Proceedings of the 2nd International Conference of Strategic Issues on Economics, Business and, Education (ICoSIEBE 2021)*, 2022, vol. 204, no. ICoSIEBE 2021, pp. 66–76. doi: 10.2991/aebmr.k.220104.010.

[10] R. Santosa, "Quality of public service for regional water companies: A case study in local water company region II Makassar City," *Int. J. Multicult. Multireligious Underst.*, vol. 7, no. 2, p. 498, 2020, doi: 10.18415/ijmmu.v7i2.1496.

[11] X. Zhang, P. Yu, J. Yan, and I. Ton A M Spil, "Using diffusion of innovation theory to understand the factors impacting patient acceptance and use of consumer e-health innovations: A case study in a primary care clinic Healthcare needs and demand," *BMC Health Serv. Res.*, vol. 15, no. 1, pp. 1–15, 2015, doi: 10.1186/s12913-015-0726-2.

[12] A. Krizanova, G. Lazaroiu, L. Gajanova, J. Kliestikova, M. Nadanyiova, and D. Moravcikova, "The effectiveness of marketing communication and importance of its evaluation in an online environment," *Sustain.*, vol. 11, no. 24, pp. 1–19, 2019, doi: 10.3390/su11247016.

[13] A. Demir, L. Maroof, N. U. Sabbah Khan, and B. J. Ali, "The role of E-service quality in shaping online meeting platforms: a case study from higher education sector," *J. Appl. Res. High. Educ.*, vol. 13, no. 5, pp. 1436–1463, 2020, doi: 10.1108/JARHE-08-2020-0253.

[14] K. Fuchs and K. Fangpong, "Using the servqual framework to examine the service quality in higher education in Thailand," *Educ. Q. Rev.*, vol. 4, no. 2, pp. 363–370, 2021, doi: 10.31014/aior.1993.04.02.286.

[15] I. Kircova and Emel Esen, "The Effect of Corporate Reputation on Consumer Behaviour and Purchase Intentions," *Manag. Res. Pract.*, vol. 10, no. 4, pp. 21–32, 2018.

[16] S. Shokouhyar, S. Shokoohyar, and S. Safari, "Research on the influence of after-sales service quality factors on customer satisfaction," *J. Retail. Consum. Serv.*, vol. 56, no. 11, p. 102139, 2020, doi: 10.1016/j.jretconser.2020.102139.

[17] A. Amri, R. Ramadhi, and Z. Ramdani, "Effect of organization commitment, work motivation and work discipline on employee performance (study at. PT. PLN (Persero) P3B Sumatera UPT Padang)," *Int. J. Educ. Manag. Innov.*, vol. 2, no. 1, p. 88, 2021, doi: 10.12928/ijemi.v2i1.3183.

[18] C. Huang, X. Wang, and X. Wang, "Effective-Capacity-Based Resource Allocation for End-to-End Multi-Connectivity in 5G IAB Networks," *IEEE Trans. Wirel. Commun.*, vol. 21, no. 8, pp. 6302–6316, 2022, doi: 10.1109/TWC.2022.3148203.

[19] N. F. Naini, Sugeng Santoso, T. S. Andriani, U. G. Claudia, and Nurfadillah, "The Effect of Product Quality, Service Quality, Customer Satisfaction on Customer Loyalty," *J. Consum. Sci.*, vol. 7, no. 1, pp. 34–50, 2022, doi: 10.29244/jcs.7.1.34-50.

[20] V. Wibowo, I. Gautama, E. A. Kuncoro, and A. Bandur, "Improving sustainability in the small-medium culinary industry: Analyzing the role of open innovation and competitive advantage," *J. Syst. Manag. Sci.*, vol. 14, no. 2, pp. 172–187, 2024, doi: 10.33168/JSMS.2024.0211.

[21] B. A. Manko, "How digital marketing can use a smart phone app to improve any business's bottom line," *J. Inf. Technol. Teach. Cases*, vol. 12, no. 2, pp. 244–249, 2022, doi: 10.1177/20438869221075638.

[22] F. Hasbolah, "The digital accounting entrepreneurship competency for sustainable performance of the rural micro, small and medium enterprises (msmes): An empirical review," *Int. J. Small Mediu. Enterp.*, vol. 4, no. 1, pp. 12–25, 2021, doi: 10.46281/ijsmes.v4i1.1471.

[23] B. Rahimi, H. Nadri, H. L. Afshar, and T. Timpka, "A systematic review of the technology acceptance model in health informatics," *Appl. Clin. Inform.*, vol. 9, no. 3, pp. 604–634, 2018, doi: 10.1055/s-0038-1668091.

[24] H. Rafique, A. O. Almagrabi, A. Shamim, F. Anwar, and A. K. Bashir, "Investigating the acceptance of mobile library applications with an extended technology acceptance model (TAM)," *Comput. Educ.*, vol. 145, p. 103732, 2020, doi: 10.1016/j.compedu.2019.103732.

[25] M. A. AM, S. Helmi, G. K. Kassymova, H. Retnawati, S. Hadi, and E. Istiyono, "Effect of job satisfaction on service quality mediated by lecturer performance at state universities," in *Materials of International Practical Internet Conference "Challenges of Science,"* 2022, no. V, pp. 62–71. doi: 10.31643/2022.08.

[26] C. M. Barbu, D. L. Florea, D. C. Dabija, and M. C. R. Barbu, "Customer experience in fintech," *J. Theor. Appl. Electron.*

Commer. Res., vol. 16, no. 5, pp. 1415–1433, 2021, doi: 10.3390/jtaer16050080.

[27] E. Rachmawati, Suliyanto, and A. Suroso, "A moderating role of halal brand awareness to purchase decision making," *J. Islam. Mark.*, vol. 13, no. 2, pp. 542–563, 2022, doi: 10.1108/JIMA-05-2020-0145.

[28] M. I. El-Adly, "Modelling the relationship between hotel perceived value, customer satisfaction, and customer loyalty," *J. Retail. Consum. Serv.*, vol. 50, no. 40, pp. 322–332, 2019, doi: 10.1016/j.jretconser.2018.07.007.

[29] J. W. Creswell, *Research design: Qualitative, quantitative, and mixed methods approaches*, Six. California: SAGE Publications, 2022.

[30] J. W. Creswell and V. L. P. Clark, "Choosing a mixed methods design," in *Designing and Conducting Mixed Methods Research*, California: Sage Publications, Inc., 2011, pp. 53–106.

[31] M. A. AM and E. Purnama, "Exploring innovative approaches and evaluation techniques in physics education at Madrasah Aliyah Negeri," in *Proceedings of the 6th International Conference on Current Issues in Education (ICCIE) 2023, Advances in Social Science, Education and Humanities Research*, 2024, pp. 20–29. doi: 10.2991/978-2-38476-245-3_4.

[32] M. A. AM, F. A. Setiawati, S. Hadi, and E. Istiyono, "Psychometric properties career of commitment instrument using classical test theory and graded response model," *J. Pedagog. Sociol. Psychol.*, vol. 5, no. 2, pp. 26–40, 2023, doi: 10.33902/jpsp.202320018.

[33] S. A. Salloum, A. Qasim Mohammad Alhamad, M. Al-Emran, A. Abdel Monem, and K. Shaalan, "Exploring students' acceptance of e-learning through the development of a comprehensive technology acceptance model," *IEEE Access*, vol. 7, pp. 128445–128462, 2019, doi: 10.1109/ACCESS.2019.2939467.

[34] J. F. H. Jr., L. M. Matthews, R. L. Matthews, and M. Sarstedt, "PLS-SEM or CB-SEM: updated guidelines on which method to use," *Int. J. Multivar. Data Anal.*, vol. 1, no. 2, p. 107, 2017, doi: 10.1504/ijmda.2017.087624.

[35] N. D. Iskuntianti, M. A. Faisal, J. Naimah, and V. F. Sanjaya, "The influence of brand image, lifestyle, and product quality on purchasing decisions," *J. Bus. Manag. Rev.*, vol. 1, no. 6, pp. 436–448, 2020, doi: 10.47153/jbmr16.752020.

[36] A. Purwanto and Y. Sudargini, "Partial least squares structural squation modeling (PLS-SEM) analysis for social and management research: A literature review," *J. Ind. Eng. Manag. Res.*, vol. 2, no. 4, pp. 114–123, 2021.

[37] J. F. J. Hair, G. T. M. Hult, C. M. Ringle, and M. Sarstedt, *A primer on partial least squares structural equation modeling (PLS-SEM)*, Third. SAGE Publications Inc., 2022.

[38] M. A. Am and F. A. Setiawati, "Examining the psychometric properties of the career commitment instrument through classical test theory and the graded response model," *J. Educ. Res. Eval.*, vol. 7, no. 3, pp. 455–468, 2023, doi: 10.23887/jere.v7i3.59619.

[39] M. Thees, S. Kapp, K. Altmeyer, S. Malone, R. Brünken, and J. Kuhn, "Comparing two subjective rating scales assessing cognitive load during technology-enhanced STEM laboratory courses," *Front. Educ.*, vol. 6, pp. 1–16, 2021, doi: 10.3389/feduc.2021.705551.

[40] M. L. úci. A. P. ereir. Cardoso, L. H. Ramos, and M. D'Innocenzo, "Coaching leadership: Leaders' and followers' perception assessment questionnaires in nursing," *Einstein (Sao Paulo).*, vol. 12, no. 1, pp. 66–74, 2014, doi: 10.1590/S1679-45082014AO2888.

[41] D. S. Sukirno and S. Siengthai, "Does participative decision making affect lecturer performance in higher education?," *Int. J. Educ. Manag.*, vol. 25, no. 5, pp. 494–508, 2011, doi: 10.1108/09513541111146387.

[42] E. Dermawan, R. A. Baktiono, and M. Arif, "Lifestyle , Brand Image , Product Attributes and How They Affect on Purchasing Decisions," *IJIEEB (International J. Integr. Educ. Eng. Business)*, vol. 04, no. 02, pp. 119–127, 2021.

[43] F. Tentama, P. A. Rahmawati, and P. Muhopilah, "The effect and implications of work stress and workload on job satisfaction," *Int. J. Sci. Technol. Res.*, vol. 8, no. 11, pp. 2498–2502, 2019.

[44] D. D. Bokol, . R., and S. Perdana, "Understanding of accounting and training for the development of msme's financial statements based on sak emkm," *Int. J. Small Mediu. Enterp.*, vol. 3, no. 1, pp. 43–47, 2020, doi: 10.46281/ijsmes.v3i1.560.

[45] H. Zhou, Q. Wang, and X. Zhao, "Corporate social responsibility and innovation: A comparative study," *Ind. Manag. Data Syst.*, vol. 120, no. 5, pp. 863–882, 2020, doi: 10.1108/IMDS-09-2019-0493.

[46] F. Baier, A.-T. Decker, T. Voss, T. Kleickmann, U. Klusmann, and M. Kunter, "What makes a good teacher? The relative importance of mathematics teachers' cognitive ability, personality, knowledge, beliefs, and motivation for instructional quality," *Br. J. Educ. Psychol.*, vol. 89, no. 4, pp. 767–786, 2019, doi: 10.1111/bjep.12256.

[47] B. Jamal Ali *et al.*, "Hotel Service Quality: The Impact of Service Quality on Customer Satisfaction in Hospitality," *Int. J. Eng. Bus. Manag.*, vol. 5, no. 3, pp. 2456–8678, 2018, [Online]. Available: https://creativecommons.org/licenses/by/4.0/

[48] N. Nugraha, O. Rukmana, D. S. Mulyati, R. Pamungkas, and A. Satriani, "The influence of digital technology on the culinary industry," *KnE Soc. Sci.*, vol. 2022, no. 2, pp. 147–156, 2022, doi: 10.18502/kss.v0i0.12320.

[49] N. J. Foss, P. G. Klein, L. B. Lien, T. Zellweger, and T. Zenger, "Ownership competence," *Strateg. Manag. J.*, vol. 42, no. 2, pp. 302–328, 2021, doi: 10.1002/smj.3222.