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The Effect of Internet of Things (IoT) Implementation on Customer Satisfaction on the PLN Mobile Application

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Abstract

PT PLN (Persero), as the main electricity provider in Indonesia, faces challenges in improving service quality and customer satisfaction in the digital era. The implementation of the Internet of Things (IoT) through the PLN Mobile application, which offers features such as smart meters and real-time consumption monitoring, represents a service transformation strategy. This research aims to analyze the impact of Internet of Things (IoT) implementation on customer satisfaction within the PLN Mobile application. IoT has transformed the energy sector through technologies such as smart meters and real-time electricity monitoring. These features enable customers to manage their billing, receive energy usage notifications, and report outages more efficiently. A quantitative approach was employed using an online survey targeting PLN Mobile users. Data were analyzed using Partial Least Squares Structural Equation Modeling (PLS-SEM). The results indicate a positive and significant influence of IoT implementation on customer satisfaction. The path coefficient was 0.809, with a t-statistic of 17.001 and a p-value of 0.000. This suggests that the more effectively IoT-based features are utilized—such as real-time monitoring and energy control—the higher the level of customer satisfaction. The findings offer valuable insights for PLN to enhance its IoT capabilities as a strategy to improve service quality and foster long-term customer loyalty.

Keywords: Internet of Things; Customer Satisfaction; PLN Mobile.

INTRODUCTION

The digital era has created disruption in almost all sectors of life, including the energy sector. Amid the demands for efficiency, transparency, and better customer experience, the use of Internet of Things (IoT) technology is a strategic step to transform public services towards a more adaptive and data-driven system (Benjamin & Ruslim, 2023). IoT allows physical devices to connect directly to the internet network to collect, process, and exchange data automatically. In the context of electrical services, IoT integration plays an important role in building a real-time, decentralized, and responsive customer service, monitoring, and service system that addresses user needs (Ahmed, Abdou, & Elnagar, 2022).

PT PLN (Persero), the main electricity provider in Indonesia, faces a major challenge in ensuring reliable service to more than 80 million customers spread across a wide geographical area, from big cities to remote villages. This challenge is not only related to the technical aspects of electricity supply but also to improving the quality of customer service in the digital era. To address these challenges, PLN launched PLN Mobile as the vanguard of digitizing customer service (Chataut, Phoummalayvane, & Akl, 2023). This application offers various features, ranging from token purchases, bill payments, and outage reporting to IoT-based features such as consumption monitoring through smart meters and electricity usage notifications (Anderson & Sullivan, 2018; Oliver, 2014).

The implementation of IoT in PLN Mobile is a solution to several classic problems, especially in terms of recording electricity consumption (Fikri et al., 2016; Ghozali, 2016: Kotler & Armstrong, 2016, 2020; Menon & Dubé, 2021; Tran, 2020). Before the integration of technology, meter readings were done manually by field officers, which often led to misreadings, delays, and mismatches between bills and actual consumption (Orumwense & Abo-Al-Ez, 2023; Shah, Khan, Khan, Khan, & Eldin, 2023). According to the PLN Commercial Service Book (2024), complaints regarding bill spikes due to manual recording errors account for more than 18% of the total annual customer complaints. This negatively impacts not only customer satisfaction but also poses financial risks due to operational inefficiencies and potential revenue loss.

Since the implementation of smart meter technology, consumption recording has become automatic and accurate, with real-time data directly integrated into the PLN system and accessible to customers through PLN Mobil e(Fikri, Wiyani, & Suwandaru, 2016; Tran, 2020; Yuliana & Purnama, 2021). This feature has been proven to reduce customer complaints related to non-compliant bills by 23% in the trial area, based on PLN's internal data from the fourth quarter of 2024. Moreover, customers are empowered with self-control in monitoring and managing their electricity consumption (Ratna, 2020; Schweitzer, 2020; Tekinerdogan, Köksal, & Çelik, 2017).

Previous research has highlighted the significant potential of IoT in enhancing service delivery and customer satisfaction across various sectors. Ahmed et al. (2022) demonstrated in the Egyptian context that IoT implementation significantly boosts customer satisfaction by improving service transparency and reliability. Similarly, in the energy sector, Schweitzer (2020) emphasized that IoT technologies, particularly smart meters, are crucial for improving system uptime and customer satisfaction by enabling real-time monitoring and proactive issue resolution. Furthermore, Orumwense & Abo-Al-Ez (2023) provided a comprehensive review confirming that IoT applications in smart energy systems lead to greater operational efficiency and enhanced user engagement. However, a gap exists in the Indonesian context, particularly regarding the empirical measurement of IoT's direct impact on customer satisfaction within a national energy provider's digital platform like PLN Mobile. This study aims to fill that gap.

Until June 2025, PLN Mobile has been downloaded 58.3 million times and recorded more than 15 million transactions per month, with a total transaction value of IDR 4.2 trillion. However, data from PLN's Commerce and Customer Service Division shows that the number of monthly active users (MAU) only reaches 17.8 million subscribers, or around 30.5% of total downloads. The large discrepancy between the number of downloads and active users reflects obstacles in the optimal adoption of the application by customers. This demonstrates that the success of digital transformation is not only determined by application penetration but also by the intensity and quality of its use.

In addition, a study benchmarking PLN Mobile application with electric utilities in other countries revealed that although Indonesia has implemented IoT features in its electricity service applications, PLN still lags in terms of personalized engagement and behavioral incentive design. For example, in Singapore, customers are rewarded with incentive points for energy savings that can be exchanged for bill discounts or shopping vouchers. This approach has been proven to significantly change people’s energy consumption behavior. Meanwhile, the reward token system at PLN is still passive and has not been directly integrated with actual customer consumption data available through IoT.

This situation confirms that the implementation of IoT needs to be supported by a strong user engagement and education strategy. At PLN UP3 Bulungan, known as one of the best units nationally in terms of service and digitalization, there is still a phenomenon of customers coming directly to the office even though all services are available in the application. Internal findings state that more than 40% of customer service office visitors have actually downloaded the app but have not actively used it due to difficulty understanding features, old habits, or limited digital literacy.

Therefore, this study focuses on PLN UP3 Bulungan customers to identify the influence of IoT implementation in the PLN Mobile application on customer satisfaction, as well as examine the difference in perception between traditional features (such as payments) and new IoT-based features (such as smart meters, consumption notifications, and automatic disturbance reporting). Data collection was carried out through convenience sampling, with respondents consisting of customers who came to the office and those reached through the dissemination of online surveys.

This research is important not only to measure the effectiveness of IoT-based features in improving customer satisfaction but also to uncover which dimensions most determine digital customer loyalty and engagement—whether it is ease of access, self-control, or even reluctance to interact directly with agents. The findings of this study are expected to form the basis for the development of PLN Mobile as a service platform based on data and customer behavior, not just a channel for digitizing routine services.

Thus, the urgency of this research lies not only in the aspect of technological modernization but also in how IoT can be used effectively and inclusively to meet customer expectations, improve operational efficiency, strengthen PLN's competitiveness in the digital energy sector, and support national targets toward a sustainable and smart energy system.

The purpose of this study is to find out and analyze the influence of the implementation of Internet of Things (IoT) on customer satisfaction in the PLN Mobile application. The benefits of this research are expected to provide strategic input for PT PLN (Persero) and other electricity service providers in optimizing the use of IoT-based applications to improve service quality and customer satisfaction. This study presents an empirical analysis of customer responses to digital features in the PLN Mobile application, which can be used as a basis for formulating service development policies. In addition, this research produces proposals for education and socialization programs to help customers better understand and utilize the available digital features. The recommendations include feature development strategies based on customer data findings, as well as mitigation measures against infrastructure and data security challenges, to ensure the adoption of IoT technology runs efficiently, securely, and sustainably.

RESEARCH METHOD

This research employed a quantitative approach to measure the influence of IoT implementation on customer satisfaction among PLN Mobile application users. Data were collected using a convenience sampling method. The primary data collection tool was an online survey distributed via social media and messaging applications targeting PLN Mobile users within the UP3 Bulungan area. To reduce bias from only surveying digitally engaged users, offline questionnaires were also administered to customers who visited the PLN UP3 Bulungan service office and were identified as app users. The survey consisted of a structured questionnaire using a 5-point Likert scale, ranging from 1 (Strongly Disagree) to 5 (Strongly Agree), designed to measure perceptions of IoT features and overall customer satisfaction.

Data analysis and hypothesis testing were conducted using Partial Least Squares Structural Equation Modeling (PLS-SEM) with SmartPLS software version 4.1.0.2. PLS-SEM was chosen because it accommodates a relatively small sample size of 100 respondents, handles non-normal data, supports complex models with many indicators, and provides robust estimates of multicollinearity among variables (Hair et al., 2019).

RESULTS AND DISCUSSION

Descriptive Statistical Analysis

Descriptive statistics provide an overview of the variables used in the research. The results of descriptive statistics explain the average magnitude, standard deviation, highest value, and lowest value of the *internet of things* (IoT) implementation variables and customer satisfaction. From the statistics obtained in this study, it can be explained that from 100 samples as a trial, it was obtained:

Table 1. Descriptive Statistics

Variable	*Items*	*Mean*	*Min*	*Max*	*Standard Deviation*
Implementation of *the Internet of Things* (IoT) PLN *Mobile* (X) Application	X.1	4,200	3	5	0,424
	X.2	4,200	2	5	0,548
	X.3	4,290	2	5	0,516
	X.4	4,350	3	5	0,497
	X.5	4,200	1	5	0,648
PLN Mobile Customer Satisfaction (Y)	Y.1	4,290	3	5	0,496
	Y.2	4,290	2	5	0,571
	Y.3	4,330	3	5	0,511
	Y.4	4,350	3	5	0,517
	Y.5	4,320	2	5	0,546

Source: Data Processing with SmartPLS (2025)

Based on Table 1, the IoT implementation variables in the *PLN Mobile* (X) application consist of five main indicators, namely monitoring *real-time* electricity usage (X.1), energy usage notifications (X.2), checking electricity bills (X.3), submitting complaints (X.4), and controlling energy consumption (X.5). The average value of these indicators ranges from 4,200 to 4,350, which shows that most respondents give a positive assessment of IoT-based features in *the PLN Mobile* application. The minimum score is in the range of 1 to 3, while the maximum score for all indicators is 5, which means that there are respondents who give the highest score to the available features. Standard deviation varied between 0.424 and 0.648, indicating variation in respondents' answers, with the indicator controlling energy consumption (X.5) having the highest level of variation (0.648), indicating a difference in perception of the effectiveness of this feature.

For the variable of customer satisfaction with *the PLN Mobile* application (Y), there are five main indicators, namely satisfaction with the application service (Y.1), fulfillment of customer expectations (Y.2), compatibility of features with needs (Y.3), convenience in monitoring bills (Y.4), and increased loyalty to PLN (Y.5). The average score ranges from

4,290 to 4,350, which reflects a fairly high level of satisfaction. The minimum value is in the range of 2 to 3, while the maximum value remains 5 on all indicators. The standard deviation ranges from 0.496 to 0.571, indicating that, although the majority of customers are satisfied, there is still variation in their answers. The indicator of meeting customer expectations (Y.2) has the highest standard deviation (0.571), which means that there is a difference in perception in terms of the extent to which this application meets user expectations.

From the results of these descriptive statistics, it can be concluded that the implementation of IoT in *the PLN Mobile* application is well received by users, with the majority of respondents assessing features such as *real-time* electricity monitoring, energy notifications, and bill checks as useful aspects. In addition, the level of customer satisfaction with the application is also relatively high, which shows that the available features are quite in accordance with user needs and are able to increase customer loyalty to PLN. However, the existence of relatively high standard deviations in several indicators indicates that there are still differences in experience among users, so PLN needs to continue to evaluate and improve application features to meet customer expectations more optimally.

Data Analysis and Hypothesis Testing

In this sub-chapter, the data analysis process is explained using SmartPLS to conduct hypothesis testing.

Evaluation *of Measurement (Outer) Model*

The measurement model for the validity and reliability test, the model determination coefficient, and the path coefficient for the equation model can be seen in the following Figure 4.2:

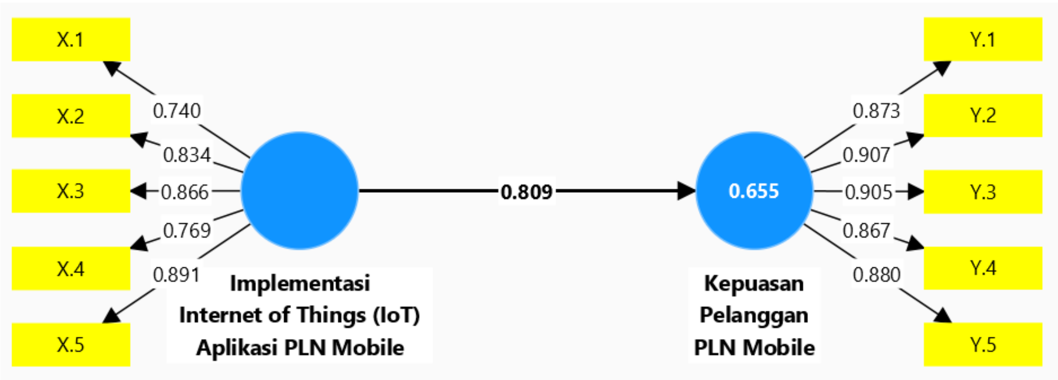

Figure 1. Results Display *PLS Algorithm*
Source: Data Processing with SmartPLS (2025)

Based on the results of data processing using the PLS-SEM method, a structural model was obtained that showed the relationship between IoT implementation variables in the PLN Mobile application (variable X) and PLN Mobile customer satisfaction (variable Y). The path coefficient value between the two variables is 0.809, which shows the positive and strong influence of IoT implementation on customer satisfaction. In addition, the R-square (R2) value in the customer satisfaction variable is 0.655, which means that 65.5% of variability in customer satisfaction can be explained by the implementation of IoT through the PLN Mobile application.

For the indicators in the IoT implementation variable, the following loading factor values were obtained: X.1 indicator of 0.740, X.2 of 0.834, X.3 of 0.866, X.4 of 0.769, and X.5 of 0.891. These values indicate that all indicators are above the minimum threshold of 0.70, which indicates that each indicator is valid in measuring IoT implementation variables.

Meanwhile, for the customer satisfaction variable, the loading factor values were obtained as follows: Y.1 is 0.873, Y.2 is 0.907, Y.3 is 0.905, Y.4 is 0.867, and Y.5 is 0.880. All indicators also show values above 0.70, which means they are valid in representing the customer satisfaction construct.

Overall, this model shows that the good implementation of IoT technology in the PLN Mobile application as measured through five main indicators contributes significantly to increasing customer satisfaction, which is also measured through five indicators. These results show that strengthening IoT features in PLN's digital services plays a very important role in creating a positive and sustainable customer experience.

a. Convergent Validity

Table 1. AVE then *Communality*

Variable	AVE	*Communality*
Implementation of *the Internet of Things* (IoT) PLN *Mobile* (X) Application	0,676	0,822
PLN Mobile Customer Satisfaction (Y)	0,786	0,887

Source: Data Processing with SmartPLS (2025)

The convergent validity of the measurement model using reflective indicators is assessed based on the *loading factor* of the indicators that measure the construct. In this study, there are 2 constructs with a total of 10 indicators. Based on the test results of the measurement model seen in Figure 1 and Table 2, it can be explained as follows:

1) The IoT implementation construct in *the PLN Mobile* application is measured using X.1, X.2, X.3, X.4, and X.5, where all indicators have a *loading factor* above 0.7, AVE above 0.5, and *communality* above 0.5.
2) The construct of customer satisfaction with *the PLN Mobile* (Y) application is measured using Y.1, Y.2, Y.3, Y.4, and Y.5, where the indicator has a *loading factor* above 0.7, AVE above 0.5, and *communality* above 0.5.

Based on the results of the *loading factor* above, it can be concluded that the construct has good *convergent validity*.

b. Discriminant Validity

Discriminant validity *testing* is carried out to prove whether an indicator in a construct will have the largest *loading factor* in the construct it forms than a *loading factor* in another construct. You can see *the cross loading* in Table 3 below:

Table 2. ***Cross Loading***

Indicators	**Implementation of *the Internet of Things* (IoT) PLN *Mobile* (X) Application**	***PLN Mobile* Customer Satisfaction (Y)**
X.1	0,834	0,691
X.2	0,866	0,628
X.3	0,769	0,568
X.4	0,891	0,810
X.5	0,767	0,873
Y.1	0,766	0,907
Y.2	0,659	0,905
Y.3	0,656	0,867
Y.4	0,721	0,880
Y.5	0,740	0,587

Source: Data Processing with SmartPLS (2025)

Based on Table 3 above, *the cross-loading* value also shows a good *discriminant validity* because the correlation value of the indicator to the construct is higher than the correlation value of the indicator with other constructs. As an illustration, the *loading factor* of IoT implementation in *the PLN Mobile* (X) application, where customer satisfaction with *the PLN Mobile* (Y) application has a value smaller than the X1.1, X1.2, X1.3, X1.4, and X1.5 indicators in the IoT implementation variable in the *PLN Mobile* (X) application. The table also shows that these indicators have an equally large relationship than the *loading factor* with other constructs. The same thing is also seen in the indicator of customer satisfaction with the *PLN Mobile* (Y) application. Thus, latent constructs predict indicators, influence each other, and interdependence between variables with each other.

c. *Composite Reliability* and *Cronbach's Alpha*

In addition to the construct validity test, a construct reliability test was also carried out which was measured by *composite reliability* and *Cronbach's alpha* of the indicator block that measured the construct. The following are the results *of the composite reliability* and *Cronbach's alpha tests* from SmartPLS:

Table 4. ***Composite Reliability*** **and** ***Cronbach's Alpha***

Variable	***Cronbach's Alpha***	***Composite Reliability***
Implementation of *the Internet of Things* (IoT) PLN *Mobile* (X) Application	0,879	0,894
PLN Mobile Customer Satisfaction (Y)	0,932	0,935

Source: Data Processing with SmartPLS (2025)

Constructs are declared reliable if they have *a composite reliability* value above 0.70 and *Cronbach's alpha* above 0.60. From the *SmartPLS* output results above, all constructs have *a composite reliability* value above 0.70 and *Cronbach's alpha* above 0.60. So, it can be concluded that the construct has good reliability.

Structural Model Testing (*Inner Model*)

The structural model in PLS is evaluated using R^2 for the dependent variable and the path coefficient value for the independent variable which is then assessed for significance based on the t-statistical value of each path. The structural model of this research can be seen in the following figure:

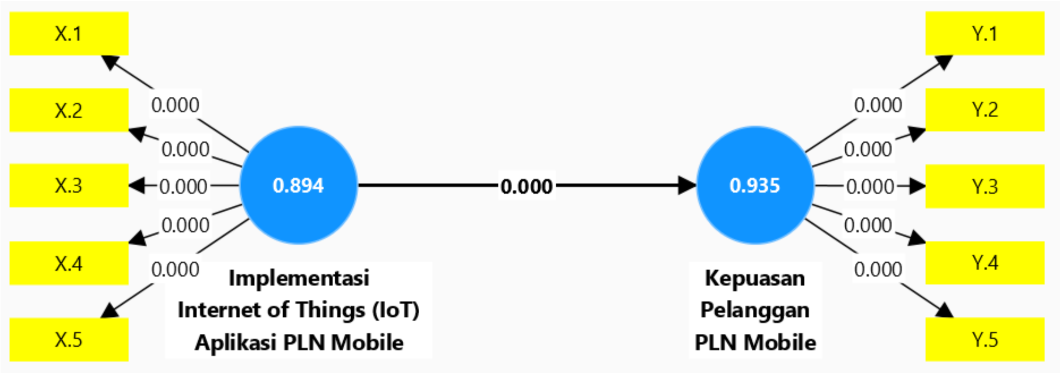

Figure 2. Display *Output* Structural Models
Source: Data Processing with SmartPLS (2025)

Based on the results of the structural model significance test using SmartPLS software, the results were obtained that all indicators and relationships between variables in the model had a very high level of significance. This is indicated by a *p-value* of 0.000 on all indicators and structural relationships, which is significant at a confidence level of 99% ($\alpha < 0.01$).

The AVE value or the strength of the indicator's contribution to the latent construct is indicated by the *construct loading* value (the value in the middle of the blue circle), which is 0.894 for the PLN Mobile application IoT implementation construct, and 0.935 for *the PLN Mobile* customer satisfaction construct. These values indicate that the model has excellent convergent reliability, since its value far exceeds the minimum threshold of 0.50.

In addition, the entire indicator for both constructs (X.1-X.5 for IoT, and Y.1-Y.5 for customer satisfaction) also shows *a p-value* of 0.000, which means that each indicator significantly represents the latent construct it is measuring. In other words, all question items used in the questionnaire were proven to be statistically valid.

Finally, the relationship between IoT constructs and customer satisfaction also showed a *p-value* of 0.000, which strengthened the finding that there was a positive and significant relationship between the implementation of IoT technology in *the PLN Mobile* application and customer satisfaction. Thus, these results support the hypothesis that, the better the implementation of IoT in PLN's digital services, the higher the level of customer satisfaction felt. These findings are an important basis for PLN to continue to optimize IoT-based digital features in order to improve service quality and customer loyalty.

To assess the significance of the prediction model in structural model testing, it can be seen from the *t-statistic* and *p-value* values between independent variables to dependent variables in the *path coefficient* table in the *SmartPLS* output below:

Table 3. ***Path Coefficient*** **(*Mean*, STDEV, and *t-Value*)**

	***Original Sample* (O)**	***Sample Mean* (M)**	***Standard Deviation* (STDEV)**	***t-Statistic* (|O/STDEV|)**	***P-Value***
Implementation of *the Internet of Things* (IoT) PLN *Mobile* (X) Application -> *PLN Mobile* Customer Satisfaction (Y)	0,809	0,811	0,048	17,001	0,000

Source: Data Processing with SmartPLS (2025)

Hypothesis Testing

Based on Table 5, the *path coefficient* between the implementation of *the internet of things* (IoT) in *the PLN Mobile* (X) application and PLN Mobile *(Y) customer satisfaction* shows an *original sample* (O) value of 0.809. This value reflects a strong positive relationship between IoT implementation and customer satisfaction, which means that the better the implementation of IoT in *the PLN Mobile* application, the higher the customer satisfaction.

The *sample mean* value (M) of 0.811 indicates that this result is quite stable in various resampling (*bootstrapping*). Meanwhile, a *standard deviation* value (STDEV) of 0.048 indicates that the variation in the estimation of this relationship is relatively small, so the results can be said to be quite consistent.

To assess the significance of this relationship, *t-statistic* and *p-value* were used. In the table, *the t-statistic* value is 17.001, which is well above the general significance limit of 1.96 (for a 5% significance level) or 2.58 (for a 1% significance level). This shows that the relationship between the implementation of IoT in *the PLN Mobile* application and customer satisfaction is statistically significant. In addition, a *p-value* of 0.000 (less than 0.05) also indicates that this relationship is significant, so the research hypothesis that there is an influence of IoT implementation on customer satisfaction is acceptable.

Based on these results, it can be concluded that the implementation of IoT in *the PLN Mobile* application has a strong and significant influence on customer satisfaction. This means that the more optimal the IoT-based features such as *real-time* electricity monitoring, energy notifications, and power consumption control, the higher the level of customer satisfaction. This result implies that PLN needs to continue to develop and improve IoT features in *the PLN Mobile* application to maintain and improve customer satisfaction in a sustainable manner.

This research shows that the implementation of IoT in *the PLN Mobile* application has a very strong and significant influence on customer satisfaction. This is shown by the *path coefficient* value of 0.809, *t-statistic* of 17.001, and *p-value* of 0.000. This figure is statistically well below the significance threshold of 0.05, indicating that the better the quality of the implementation of IoT features, the higher the level of customer satisfaction felt. However, to gain a more thorough understanding, it is necessary to distinguish between new IoT-based features and old ones that are administrative in nature, as they both contribute through different mechanisms.

IoT-based features in *PLN Mobile* include *smart meter integration,* real-time *electricity consumption monitoring*, overuse notifications, automatic bill prediction, and remote meter readings without the need for an officer. These features not only provide transparency in energy consumption, but also give customers greater control over their daily electricity usage.

Previously, meter readings were done manually every month by officers, which often led to delays, billing errors, and customer complaints. With *smart meters*, customers can directly monitor consumption through the application, find out the estimated bill, and receive notifications when the usage is close to the power limit. This *before-after* comparison shows a shift from passive services to self-reliance-based services, where customers no longer rely on manual processes and feel more secure and trust in the systems used.

On the other hand, administrative features such as bill payment, outage reporting, and customer service requests digitally remain appreciated by customers as they improve time efficiency and convenience. However, its contribution to customer satisfaction is not as big as IoT features, as it does not provide a transformative new experience, but rather simply digitizes conventional service processes. Customers tend to be more satisfied with features that provide direct control, especially with regards to consumption and billing. This is driven by the need to avoid uncertainty, given that electricity bills are often a source of complaints due to inaccurate manual readings.

However, the adoption rate of IoT-based features has not been maximized. Although *the PLN Mobile* application has been downloaded by most customers in the UP3 Bulungan area, not all users take advantage of all available features. Some respondents admitted to only using the app to pay bills or report outages, and were unaware of the existence or benefits of features such as consumption monitoring or power limit notifications. This gap reflects challenges in terms of digital literacy, promotional effectiveness, and application interface design that is not yet fully intuitive. Some customers don't even realize that the electricity meter in their home is already digital-based and can be accessed through an app.

These findings show a shift in customer preferences in energy-based public services. If previously the reliability of the system and the speed of response were the main focus as stated in the study of Ahmed *et al.* (2022), now customers value the ability to monitor and regulate energy consumption independently. The same thing was also conveyed by Schweitzer (2020), who highlighted the contribution of IoT in improving energy service *uptime*. The study adds that the active participation of customers in the energy consumption management process contributes significantly to their satisfaction and loyalty to the service. In this context, IoT is not only a tool of efficiency, but also an instrument of customer empowerment.

This result is also in line with the findings of Ratna (2020) in the retail sector which shows that data-based service personalization can improve customer satisfaction. At *PLN Mobile*, this form of personalization can be seen from the presence of overconsumption warnings, bill estimates, and power usage suggestions that are adjusted to user consumption patterns. The presence of contextual and easily accessible information makes customers feel cared for and given solutions that are relevant to their needs.

Technically, the measurement model in this study showed excellent validity and reliability. All indicators have a *loading factor* value above 0.70, AVE above 0.50, and *composite reliability* and *Cronbach's alpha* values that exceed the minimum threshold. The *results of the inner model* also reinforce the validity of the findings by showing that the relationships between constructs are stable, supported by *bootstrapping* values that are close to the original coefficient and low standard deviation. This shows that respondents' perception of IoT features is quite consistent and generalizable.

When compared to the previous study, the *path coefficient* value of 0.809 in this study is relatively high. The Ahmed *et al. study* and Schweitzer, for example, on average reported coefficients between 0.5 and 0.7. This can reflect users' enthusiasm for the presence of new IoT-based features, or it can also show that expectations for the digitalization of public services in Indonesia are still relatively low, so that when features such as *smart meters* are present, the impact is felt greater and highly appreciated.

The study found no hypotheses that were rejected. All relationships between variables in the model were declared statistically significant. However, the most prominent is the understanding that the application of IoT technology in the context of public services in Indonesia has great potential to improve customer satisfaction, as long as the features offered are able to answer real needs and are socialized effectively. Aspects such as consumption control, information transparency, and ease of digital access have proven to be more impactful than just improving the response to disruptions.

Practically, this finding is the foundation for PLN to strengthen features based on customer independence and energy literacy. In addition, improvements are needed in the aspects of promotion, education, and UX design of *the PLN Mobile* application, so that customers can better recognize and utilize the existing features to the fullest. Periodic evaluation of the relevance of old features and integration with *smart home* systems also needs to be considered to expand a more efficient, participatory, and sustainable energy ecosystem (Purwanto, 2019; Sugiyono, 2021).

Overall, this research makes an important contribution in expanding understanding of the role of IoT in improving the quality of energy-based public services. Digital transformation through smart technology has proven to be not just an effort at internal efficiency, but a strategic step in building trust, loyalty, and a more participatory long-term relationship between PLN and its consumers (Ghozali & Latan, 2015; Chin et al., 2020).

CONCLUSION

The study found that the smart meter feature in the IoT-based PLN Mobile application had the strongest influence on customer satisfaction, with a path coefficient of 0.809, a t-statistic of 17.001, and a p-value of 0.000. This was unexpected, as traditional features like complaints and bill payments were previously considered more impactful but showed a weaker influence. Customers valued features that offer transparency and real-time control over their electricity consumption, addressing longstanding issues such as bill spikes caused by meter reading errors. This suggests a shift in customer satisfaction from reliance on direct services to a preference for self-reliant, proactive, and empowering digital solutions. Theoretically, the results imply that digital technologies enhancing customer control and trust have a greater effect on satisfaction in public services, providing a strategic foundation for PLN to prioritize IoT-based innovations centered on customer experience and empowerment. Future research could explore the long-term behavioral impact of these features and investigate how to integrate personalized engagement strategies to further enhance digital service adoption.

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