

RESEARCH ARTICLE



Variations in Satisfaction from Prepaid and Postpaid Electricity Use Based on Community Perception in Bandar Sribhawono

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Abstract

During World War II, electricity companies in Indonesia were controlled by Japan and subsequently seized by Indonesian youths after independence in September 1945, then handed over to the Republic of Indonesia government. President Sukarno established the Electricity and Gas Office on October 27, 1945. PLN (State Electricity Company) has adopted various innovations, including Prepaid Electricity Service (LPB), as part of efforts to enhance service quality to the public. This study focuses on comparing satisfaction between Prepaid and Postpaid electricity users based on community perceptions in Bandar Sribhawono. Data analysis methods using Chi-Square test and Coefficient of Contingency indicate that the presence of Prepaid PLN significantly contributes to improving community satisfaction, with a contingency coefficient value of 0.7985, exceeding the critical value set. These findings suggest that promotional strategies and services implemented by PT PLN (State Electricity Company) Distribution in Bandar Sribhawono have the potential to influence public preferences in choosing between Prepaid and Postpaid electricity. The implications of these findings can serve as a basis for enhancing marketing strategies and services to achieve broader adoption of Prepaid Electricity in the future.

Keyword: Public Perception, Prepaid, Postpaid

Introduction

Electricity is not only an essential need in modern life but also has a long history involving the evolution of companies and regulations in Indonesia. Since the late 19th century, the establishment of power plants by Dutch companies marked the beginning of electricity management in Indonesia, where during World War II, control of these companies shifted from the Netherlands to Japan. However, after Indonesia's independence in September 1945, the government and Indonesian youth regained control over these electricity companies. October 27, 1945, was designated as National Electricity Day by President Sukarno, marking the resurgence of the electricity industry in Indonesia. A major transformation occurred when these electricity companies became BPU-PLN on January 1, 1961, and later PT PLN (Persero), which is responsible for electricity distribution throughout Indonesia, including in Bandar Sribhawono.

Although PLN has implemented various innovations, including the development of Prepaid Electricity (LPB) to enhance service quality, there are still several issues that need to be addressed. There are differing views regarding the cost of using prepaid electricity compared to postpaid. Some people consider prepaid electricity more economical because it allows for more direct control over usage, while others find it more expensive because it requires separate token purchases. There are also challenges in socializing and educating the public about the benefits and usage of prepaid electricity. Many consumers do not fully understand the migration process and the benefits of using LPB. In some areas, the infrastructure supporting

prepaid electricity use may not be optimal, such as the scarcity of counters or locations for purchasing tokens.

According to PT PLN (Persero) Jakarta Raya and Tangerang Distribution (2022), the development of LPB is a progressive step in improving electricity usage efficiency for consumers. Experts in the electricity sector suggest the need for continued intensive and comprehensive socialization, as well as improving supporting infrastructure such as mobile applications for token purchases and more responsive customer services. By addressing these issues, PLN is expected to provide better and more equitable electricity services to the public and enhance consumer satisfaction with the use of prepaid electricity in Bandar Sribhawono and across Indonesia.

Method

This study uses primary data obtained directly from the first-hand source, namely individuals or persons through interviews and questionnaire surveys (Umar, 2020:42). Respondents are members of the public who provide feedback through questionnaires regarding the physical evidence, reliability, responsiveness, assurance, empathy, and satisfaction with PLN services.

According to Widayat and Amirullah (in Purnamasari, 2021), the operational definition of variables in this study is elaborated as follows, **Public Perception of Prepaid Electricity** Prepaid electricity is considered the latest innovation from PLN services promising convenience, freedom, and comfort for customers (Purnamasari, 2021). Customers can control their electricity usage according to their needs and abilities, which is deemed practical as it does not require conventional monthly payments. **Public Perception of Postpaid Electricity** The use of postpaid electricity is expected to provide transparent and professional services, adapting to the expectations and needs of the community (Purnamasari, 2021).

Population and Sample

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The population in this study consists of PLN customers who paid their electricity bills from May 2022 to December 2022, totaling 10,378 customers (Umar, 2020:77).

Sample

$$n = \frac{N}{1 + Ne^2}$$

Where:

n = sample size

N = population size = 10,378

e = sampling error, for example, 20%,

$$\begin{aligned} n &= \frac{10378}{1 + 10378(0,2)^2} \\ &= \frac{10378}{1 + 10378(0,04)} \\ &= \frac{10378}{1 + 415,12} \\ &= \frac{10378}{416,12} \\ &= 24,93 \end{aligned}$$

Based on the calculation, a sample of 24.93 was obtained and rounded up to 25 respondents. Therefore, the sample size for this study is 25 respondents (n = 25). The sampling method used was Slovin's method with a sampling error (e) of 20%, resulting in a sample of 25 respondents selected by accidental sampling from PLN customers in Bandar Sribhawono (Usman and Akbar, 2021:185).

Data Collection Methods Interview: Data is collected through interviews with marketing personnel involved in the promotion and advertising of electricity products. **Documentation:** This method is used to gather data related to relevant information and documentation. **Questionnaire Method:** A closed questionnaire is used to collect data from respondents, which will be processed and analyzed to solve research problems (Supardi, 2020:127).

Data Analysis Techniques Data will be analyzed using the Chi-Square formula to determine differences in satisfaction between prepaid and postpaid electricity users based on public perception (Sugiyono, 2020:185). Additionally, the Coefficient Contingency (KK) formula will be used to classify data based on public perception of electricity services.

To analyze the classification of data based on public perception in Bandar Sribhawono, the Chi-Square formula as written by Suharsimi Arikunto (2020) will be used.

$$X^2 = \left[\frac{\sum (F_o - F_h)^2}{F_h} \right]$$

Where:

X² : Chi-Square

F_o : Observed frequency

F_h : Expected frequency

The chi-square analysis results will then be consulted with the statistical hypothesis as follows:

H₀: μ = 0 (no relationship)

H_a: μ ≠ 0 (there is a relationship)

According to Sugiyono (2010:185), "If the calculated r is smaller than the table value, then H₀ is accepted, and H_a is rejected. Conversely, if the calculated r is greater than the table value (r_h > r_{table}), then H_a is accepted."

To analyze the difference between the use of prepaid and postpaid electricity in terms of public perception, the Coefficient of Contingency (KK) formula is used, as written by Suharsimi Arikunto (2020):

$$KK = \frac{\sqrt{X^2}}{X^2 + N}$$

KK: Coefficient of Contingency

X²: Chi-square

N: Sample size of the study

The analysis result from the KK formula above will be consulted against the KK table to find the maximum KK value using the following formula:

$$KK_{mak} = \frac{\sqrt{M-1}}{M}$$

Where:

KK_{mak}: Maximum coefficient of contingency

M: Maximum score achieved

Results And Discussion

In the realm of electricity services, consumer behavior in choosing between prepaid and postpaid options is influenced by various factors. These include external stimuli such as market conditions, individual responses shaped by reactions to these stimuli, and intervening variables like internal motivations and attitudes towards electricity usage. Successful marketing in this field hinges on companies' ability to understand and meet consumer needs effectively, aiming ultimately for customer satisfaction (Kotler et al., 2020).

Consumers in advanced societies exhibit diverse desires influenced by local cultures, which mold their perceptions of products and needs. Companies that thrive in competitive markets not only meet existing consumer demands but also innovate to create new desires among consumers (Kotler et al., 2020). The foundational principle in marketing stresses the importance of comprehensive research to uncover and understand consumer desires, thereby enabling the development of tailored marketing strategies that adapt to dynamic market needs (Kotler et al., 2020).

Using electricity wisely involves practices such as adopting energy-efficient appliances and ensuring proper maintenance of household electrical installations for safety purposes. Regular inspections and rehabilitation of older installations are essential to prevent accidents due to electrical faults (PLN, 2021).

Maslow's theory of human motivation posits that individuals must first satisfy basic needs before progressing to higher levels of satisfaction, such as self-actualization. Marketers apply this theory to design strategies that align with different consumer needs levels (Maslow, 1943). Understanding consumer motivations and decision-making processes is crucial for fostering strong customer loyalty (Mowen, 2002).

Prepaid electricity represents an innovation offering convenience and control to consumers, allowing them to manage their electricity usage according to their needs and financial capabilities (PLN, 2023). However, challenges identified by the public include inconvenience during the recharge process and restrictions on usage flexibility (Hariyanto, 2018).

Conversely, postpaid electricity offers simplicity without the need for frequent recharging, but it faces challenges related to billing administration and potential service disconnections due to delayed payments (Tjiptono, 2006).

Both prepaid and postpaid systems significantly influence public perceptions of electricity providers like PLN. Positive or negative perceptions can impact customer satisfaction and loyalty (Solomon, 2009). Quality of service plays a pivotal role in shaping these perceptions; responsive service provision enhances satisfaction and loyalty, while poor handling of complaints can tarnish public opinion of PLN (Tjiptono, 2006). Solomon's sensory marketing theory underscores that sensory experiences during electricity usage profoundly affect customer perceptions, emphasizing the importance of effective education on energy conservation and safety to bolster public awareness and maintain a positive image of PLN (Kartono & Gulo, 1987).

Smart Meters, capable of detecting building installation conditions and providing additional accessible information, offer affordability in connection fees. Unlike postpaid electricity with its concept of arrears and potential service disconnections for overdue payments, prepaid electricity mitigates these risks

by requiring only connection fees and initial credit, without the threat of credit expiration or unauthorized usage. There are no disconnection or dismantling processes associated with prepaid electricity, unlike the consequences often faced with overdue payments in postpaid systems.

Hypotheses

H1: There is a perceptual difference between the use of prepaid and postpaid electricity.

H0: There is no perceptual difference between the use of prepaid and postpaid electricity

Survey Results of Odd and Even Number Testing on the Analysis of Satisfaction Differences Between Prepaid and Postpaid Electricity Usage Based on Community Perceptions in Bandar Sribhawono

$$N = 10, Mg^1 = \frac{174}{10} = 17,4$$

$$Mg^2 = \frac{170}{10} = 17$$

Calculation of the Survey Results on the Difference in Satisfaction Between Prepaid and Postpaid Electricity Usage Based on Community Perceptions in Bandar Sribhawono

Mean G1 = 174 & mean G2 = 170 with N = 10, while g12 = 28.4 and g22 = 30, and g1.g2 = 24. The next step involves inserting these calculated results into the Karl Pearson formula as follows:

$$R_{gg} = \frac{\sum g_1 g_2}{\sqrt{(g_1)(g_2)}} = \frac{24}{\sqrt{(28,4)(30)}} = \frac{24}{29,1890} = 0,8222$$

From the calculations above, the obtained $R_{gg}=0.8222R_{\{gg\}} = 0.8222R_{gg}=0.8222$. It is further tested using the reliability coefficient formula by Spearman-Brown.

$$R_{xx} = \frac{2(0,8222)}{1 + 0,8222} = \frac{1,6444}{1,8222} = 0,902$$

Table 1. Results of Questionnaire Processing Regarding Differences in Satisfaction Between Prepaid and Postpaid Electricity Use Based on Community Perceptions in Bandar Sribhawono

No	NO QUESTION ITEMS															Total
	1	2	3	4	5	6	7	8	9	1	1	1	1	1	1	
1	2	1	1	2	3	2	1	1	1	3	3	2	1	2	1	26
2	2	3	2	2	2	1	2	3	2	1	3	3	3	3	3	35
3	2	2	3	2	2	3	3	3	3	3	2	3	3	3	3	40
4	3	2	2	2	2	3	2	2	2	2	2	2	2	2	2	32
5	1	2	2	2	1	2	2	2	2	3	2	2	2	2	2	29
6	1	2	2	1	1	2	2	2	2	3	1	1	3	3	1	27
7	2	2	1	1	3	3	2	3	2	2	3	3	1	1	1	30
8	2	3	3	1	2	2	2	2	3	3	3	2	2	3	3	36
9	3	3	2	2	3	1	2	2	3	3	2	2	2	3	3	35
10	2	3	3	3	2	3	2	2	3	3	3	2	2	3	3	38
11	2	2	3	2	1	1	2	2	1	1	1	2	2	1	2	25
12	2	3	2	3	2	1	1	3	2	2	3	2	3	3	2	34
13	2	3	3	2	2	3	2	3	3	2	3	3	3	3	3	41
14	1	3	3	1	2	1	2	2	2	3	2	2	2	2	2	25
15	2	3	3	1	2	2	1	2	3	2	2	2	1	3	2	34
16	2	2	3	1	2	1	1	1	1	2	1	1	2	2	2	32
17	1	2	3	3	2	1	2	2	3	3	3	2	3	3	3	41
18	1	3	3	3	2	1	1	2	3	3	3	2	3	3	3	26
19	2	2	3	2	3	2	1	2	3	3	3	2	3	3	2	34

20	2	2	3	2	2	2	2	3	3	3	1	1	1	2	3	32
21	2	2	3	2	2	3	2	2	3	2	3	2	2	3	2	31
23	2	2	3	1	2	2	2	2	3	2	3	1	2	3	3	37
21	2	2	3	1	2	2	2	3	2	2	1	2	1	3	3	33
22	2	2	3	1	2	2	2	3	2	2	2	2	1	3	3	31
23	1	2	3	1	2	1	2	2	2	3	2	2	2	2	2	35
24	1	3	2	2	2	1	2	3	2	1	2	2	2	2	3	29
25	2	3	3	2	2	1	2	3	3	3	3	3	3	3	3	35

$$I = \frac{(NT - NR) + 1}{K}$$

$$= \frac{(41 - 25) + 1}{3}$$

$$= \frac{17}{3}$$

$$= 5,6$$

$$= 6$$

Table 2. Table of Distribution on Survey Scores Regarding Satisfaction Differences Between Prepaid and Postpaid Electricity Usage

No	Class Interval	Frequency	Criteria	Percentage (%)
1.	37 – 42	5	High	20
2.	31 – 36	14	Moderate	56
3.	25 – 30	6	Low	24
Total		25		100

Based on the table above, it can be understood that out of 25 customers using prepaid and postpaid electricity, 5 customers or 20% rated their satisfaction as high, 14 customers or 56% rated it as moderate, and 6 customers or 24% rated it as low

Therefore, the calculation above indicates that the questionnaire used to assess the difference in satisfaction levels has a very high validity and reliability of 0.902, as it falls between 0.810 – 1.000.

This research involved processing questionnaires from 25 respondents using prepaid and postpaid electricity. The data was classified based on questionnaire scores to determine the satisfaction levels:

High: 5 respondents (20%)

Moderate: 14 respondents (56%)

Low: 6 respondents (24%)

The distribution of questionnaire score results shows that out of 25 respondents using prepaid and postpaid electricity:

5 respondents (20%) experienced high satisfaction levels.

14 respondents (56%) experienced moderate satisfaction levels.

6 respondents (24%) experienced low satisfaction levels.

This research provides an overview that the majority of respondents experience moderate satisfaction levels in using prepaid and postpaid electricity in Bandar Sribhawono.

Table 3. Table of observed (Fo) and expected (Fe) frequency distributions:

Electricity Usage (Prepaid and Postpaid)	Satisfaction Level	Fo	Fe
High	0	5	1.2
	2	14	3.36
	3	6	1.44
Medium	5	25	1
	2	14	2.8
	7	6	1.2
Low	1	6	2.8
	1	14	7.84
	4	25	3.36
Total		25	25

This table combines the observed (Fo) and expected (Fe) frequency distributions based on satisfaction levels categorized

by the usage of prepaid and postpaid electricity in Bandar Sribhawono

Table 4. Chi-Square table for the analysis:

Electricity Usage (Prepaid and Postpaid)	Satisfaction Level	Fo	Fe	(Fo - Fe)	(Fo - Fe) ²
High	High	0	1.2	-1.2	1.44
	Medium	2	3.36	-	1.84
	Low	3	1.44	1.56	2.43
Medium	High	5	1	4	16
	Medium	2	2.8	-0.8	0.64
	Low	7	1.2	5.8	33.64
Low	High	1	2.8	-1.8	3.24
	Medium	1	7.84	-	46.78
	Low	4	3.36	0.64	0.40
Total		25	25		44.00

This table shows the observed (Fo) and expected (Fe) frequencies, the differences (Fo - Fe), and the squared differences ((Fo - Fe)²) used in the Chi-Square analysis for electricity usage (prepaid and postpaid) satisfaction levels in Bandar Sribhawono

Based on the Chi-Square analysis, a chi-square value (X²) of 44 was obtained using the formula. With 4 degrees of freedom, the critical chi-square value at 1% significance level is 13.3, and at 5% significance level is 9.49. Since the calculated X² value (44) exceeds the critical X² value (9.49), it can be concluded that there is a significant difference in satisfaction levels between prepaid and postpaid electricity usage based on public perception in Bandar Sribhawono.

Additionally, the coefficient of contingency (KK) was calculated to determine the strength of the relationship between these variables, resulting in a KK value of 0.7985. This indicates a moderately strong relationship between prepaid/postpaid electricity usage and the perceived satisfaction level among the community.

This analysis confirms that the variables of prepaid and postpaid electricity usage significantly influence the perceived satisfaction levels in Bandar Sribhawono.

To determine the closeness of the satisfaction difference between Prepaid and Postpaid Electricity Based on Community Perceptions in Bandar Sribhawono, the following formula was used:

$$\frac{KK \text{ hit}}{KK \text{ max}}$$

$$KK \text{ max}$$

Previously, the maximum KK (coefficient of contingency) was calculated as follows:

$$\begin{aligned}
 KK \text{ max} &= \sqrt{\frac{M-1}{M}} \\
 &= \sqrt{\frac{3-1}{3}} \\
 &= \sqrt{0,666666} \\
 &= 0,816
 \end{aligned}$$

Based on the maximum KK of 0.816 obtained earlier, the consultation results indicate the following:

$$KK = \sqrt{\frac{\chi^2}{\chi^2 + N}}$$

$$\begin{aligned}
 KK &= \sqrt{\frac{44}{44 + 25}} \\
 &= \sqrt{\frac{44}{69}} \\
 &= \sqrt{0,6376} \\
 &= 0,7985
 \end{aligned}$$

KK hit 0.7985 is within the range for M3 = 0.545-0.816. This indicates a difference in satisfaction levels between the use of prepaid and postpaid electricity based on public perception in Bandar Sribhawono. The analysis shows that KK hit 0.7985 falls under the criteria of M3 = 0.545-0.816 in the intensity criteria table, signifying that the analysis of satisfaction differences between prepaid and postpaid electricity usage based on public perception in Bandar Sribhawono falls under the category of "strong".

Conclusions And Suggestions

Based on the data analysis and hypothesis testing conducted, the results indicate a chi-square test statistic (X²hit) of 44, with critical chi-square values (X²tab) at 5% = 9.49 and 1% = 13.3. Additionally, the intensity analysis shows a KK hit value of 0.7985 falling within the M3 table criteria of 0.545 – 0.816, categorizing it as High, Low, and Moderate. This suggests that the contribution of prepaid and postpaid PLN services, rated at 0.7985, can significantly enhance public satisfaction perception in Bandar Sribhawono. Consequently, it can be concluded that the intensity of prepaid and postpaid PLN customers, based on public perception, can be maximized.

The data analysis confirms the research hypothesis, indicating differences in customer satisfaction between prepaid and postpaid PLN services based on public perception in Bandar Sribhawono. Based on the conclusions above, to effectively differentiate between prepaid and postpaid PLN customers based on public perception, the following recommendations are proposed: PLN should continue promoting energy-saving practices to address the electricity crisis, necessitating innovative strategies and alternatives. To address various customer complaints regarding the discomfort in new connection services, employees should be skilled and possess adequate knowledge. Therefore, it is advisable for employees to maintain their current work patterns, continuously improving their skills through various company-provided training sessions.

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