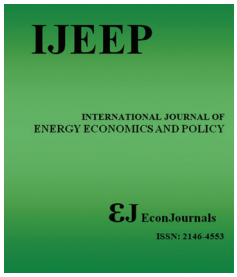

International Journal of Energy Economics and Policy

ISSN: 2146-4553

available at http: www.econjournals.com

International Journal of Energy Economics and Policy, 2021, 11(1), 193-199.

Determination of Consumer Switching Barriers to Use Prepaid Electricity Systems in the Household Sector in Makassar, Indonesia

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Received: 25 June 2020 **Accepted:** 28 September 2020 **DOI:** https://doi.org/10.32479/ijeep.10237

ABSTRACT

A new alternative of electricity bill payment exists in Indonesia at present, namely prepaid systems. The system is intended to facilitate customers in electricity saving where the electricity utilization could be adjusted. In reality, however, post-paid electricity system utilization still receives great demand. As a consequence, it could not suppress electricity consumption. This research aims to learn factors inhibiting consumers to switch to prepaid electricity systems for their electricity consumption. A descriptive research carries out to answer the research problems. Sample consists of 100 people determined via a snowball sampling technique. Data collection is conducted using questionnaires and measured using Likert Scale of 1-5. Factory analysis is used as an analysis tool. The research results indicate that the main factor that becomes a barrier for electricity customers to switch to prepaid systems is habitual using factor. Switching cost factor, lack of prepaid system information, and relationship and reputation of post-paid products are the second, third, and fourth factors, respectively.

Keywords: Switching Barrier, Electricity, Prepaid, Household Sector
JEL Classifications: C42, D10, M00, O30

1. INTRODUCTION

Household group is currently the largest customers of electricity consumption in several countries especially since COVID-19 pandemic that causes all activities are conducted at home, such as school, office and other activities. Electricity demand for business, public, and household groups indicate an increase every year (Romadhoni and Akhmad, 2020). The importance of electricity for households also affects increase in income (Bridge et al., 2016). It suggests that electricity plays an essential role in business, learning, and others to support family income. The significance of electricity energy for households' livelihood and income as well as education has been studied by Leach, 1987; 1988; Matinga and Annegarn, 2013; Shahbaz et al., 2013; Phoumin and Kimura, 2019; Birol, 2007; Gebru and Bezu, 2014; Amaluddin, 2020. Elfaki et al. (2020) state that there is a reciprocal relationship between electricity consumption, international trade openness, and economy in Sudan. Chimbo, (2020) expresses that there is a link between energy consumption, human capital development through communication and information technologies and a nation's economic growth.

An agency in Indonesia that manages electricity supply is PT. Perusahaan Listrik Negara (Persero) or PT. PLN. It is a state-owned enterprise (BUMN) serves to provide electricity energy for the society. The Government of Indonesia entrusts the PT. PLN with a monopoly right in accordance with the constitution of the Republic of Indonesia, otherwise known as the UUD 45, article

33 to fulfill electricity demand of Indonesian people and to arrange distribution. In addition, it is the only source of electricity supply in Indonesia (UUD, 1945).

Society's electricity consumption up to now uses post-paid electricity system. It means that payment is made a month after the electricity energy has been used. In terms of electricity consumption payment arrangement, the government instructs the payment to be conducted through counters at the PT. PLN. The payment system, however, changes with time which is via banks in the area.

PT. PLN conducts monthly recording and billing based on account issued. The system, however, holds some limitations in the consumers' view. It is related to discrepancy in recording between the consumers and those billed by the PT. PLN. As a consequence, there are customers who have to pay a certain amount that is not in accordance with the consumption. Customers who are in arrears will experience power outage (Wahyuningtiyas, 2013).

For PT. PLN, however, there is an increase in electricity power loss (electrical energy losses) every year. According to a study by Dalam (2013), in an electricity distribution network, electric power losses (energy losses) is the largest energy losses in an electric power network system. Report of the Indonesian Central Bureau of Statistics (BPS), in 2003 the national grid energy loss reached 16.84%, that consist of: (a). 2.375% energy losses in transmission network and (b) 14.47% in distribution network. Estimation of energy losses value is Rp. 558 billion for 1% energy losses (BPS). It implies that the PT. PLN carries a loss of Rp. 9.396 trillion when network losses of 16.84% occur (Dalam, 2013). It is supported by Setyawan and Wardhana, (2020) stating that electricity efficiency inequality and gap exists between provinces in Indonesia. Provincial energy consumption per capita is an illustration of gap level in energy consumption between regions in Indonesia. Several provinces have larger energy consumption than the national average, such as the capital city, DKI Jakarta. It is supported by Handayani et al. (2017) that overconsumption of energy has a tendency to threaten environment and bears a potential conflict with the principle of justice in Indonesia.

It can be stated that issues are occurred from user communities and bring impact on PT. PLN's ability to operate. PT. PLN addresses the issues by providing pre-paid electric products to improve its services, efficiency, and quality reliability. The products are offered in 2009. This service is provided to deal with complaints related to payment that is not in accordance with consumptions, incorrect meter reading, and meter registrars are not on time. Through the pre-paid product customers will be able to control their own consumption. It is one of ways to overcome overconsumption. Moreover, it could prevent PT. PLN from loss due to large electric power losses (electrical energy losses) causes by community's behavior of electricity overconsumption. Additionally, payment target from customers could be achieved with the system (Wibowo et al., 2013).

The prepaid electricity system is an electrical energy purchase where customers pay or purchase the electrical energy consumption upfront. It is another form of PT. PLN services to the communities so the communities could control their own electricity consumption. The customers thus have control in regulating how much electricity will be utilized. As a consequence, they will no longer receive large electricity bill. It could also minimize incorrect recording by meter registrars during meter reading. The electricity is strictly consumed for activities needed in a month; thus, no energy waste.

With the prepaid electricity service customers could find out how much electrical energy left and consumed. This won't be found in post-paid electricity users since customers learn about their electricity consumption after the payment date or once they pay the electricity bill at the payment counters provided by PT. PLN. It is not surprising that customers often shock with the large amount of their electricity bill due to uncontrolled consumption.

The prepaid electricity system is utilized similarly to cellphone credit recharge. The customers buy a credit (voucher/recharge electricity token) and input them into a prepaid electricity meter (Measuring and Limiting Tools/MLT). The tool has been installed in the customer's house or office. Customers could increase the amount of energy at any time and at any amount required. Through the system, meter recording is no longer needed and customers are no longer required to memorize monthly electricity payment schedule (Ekasaria and Edwar, 2013; Wahyuningtiyas, 2013).

Easiness provided by the prepaid electricity system services and capability to control electrical energy consumption are among factors that should encourage the society to embrace the system and switch their product from the current post-paid system to the pre-paid system. The facts, however, there are enormous electricity customers who still utilize the post-paid system that is likely due to the support of digital payment. Despite the digital payment that facilitates electricity bill payment, many customers, however, are still forget the payment due.

This study will enrich literatures since no studies that aim to find out the causes of societies that have not switched to prepaid electricity system despite its virtuous goal in saving electricity usage and minimizing errors in recording that result in an increase in bill. Many studies on prepaid electricity system usage in Indonesia are existed but none of them examine consumer behavior that has not switched from post-paid electricity to prepaid electricity and learn on barriers in the establishment of the switching behavior.

Therefore, this research is expected to enrich literatures by examining inhibiting factors that influence consumers to continue using post-paid electricity system. The research starts its analysis with a question: What factors are inhibiting the consumers from switching to prepaid electricity system? In turn, it could benefit PT. PLN to prepare prepaid electricity marketing strategies and suppress electrical energy waste in Indonesian households especially in Makassar City.

2. LITERATUR REVIEW

2.1. Prepaid Electricity (Electricity Consumption using Token)

Azwar (2012) states that prepaid electricity, also known as smart electricity, defines as purchasing electricity upfront using

"credit (pulsa)" purchasing system that contains the amount of electrical energy to be consumed. In the prepaid electricity system, customers could control their electricity consumption. In the consumer location a prepaid meter (MPB) is installed and "pulsa" is entered into the meter. The MPB will provide information on the electrical energy available to consume. Customers could add their electrical energy at any time as needed; thus, electricity consumption is more optimal. The electricity consumption could optimal since it is utilized for activities conducted; hence, it avoids waste. The prepaid electricity utilization will negate contact with electricity meter registrar; therefore, it prevents problems due to differences in recording between those utilized by customers and that of recorded by PT PLN officer every month. The customers will no longer concern about late payment fine every month.

The prepaid electricity (LPB), as PT PLN's new service, could save energy consumption thus it guarantees energy sufficiency and enhances PT PLN ability to expand its marketing areas to regions with no access to electricity. The enhancement in ability to expand is due to arrears by customers are no longer existed. Customers could use electrical energy as needed due to the prepaid electricity. In other words, customers will be more comfortable and their electricity consumption is under control by using the prepaid electricity (Fatin, 2014; Nugroho et al., 2017).

2.2. Switching Behavior

Switching behavior is behavior where customer changes their activities, preferences or consumptions of a product or brand in favor of another product or brand (Zikienė and Bakanauskas, 2007). On the other hand, (Bolton and Bronkhurst, 1995) explain that customer behavior to switch is a decision made by customers to stop buying from certain firms due to an ever increasing demand for quality; therefore, if a firm is unable to provide the desired quality, it will be abandoned by the customers (Colgate and Lang, 2001). Customers' switching behavior is related to customer disloyalty as a consequence of their dissatisfaction, increase in price, or customers' superficial thought characteristics (Zikien, 2012).

Switching behavior between intangible and tangible products has different characteristics. Electricity service is an intangible product and it is inseparable from the service provider, perishability, heterogeneity, and ownership (Oogarah-Pratap and Heerah-Booluck, 2005; Keaveney, 1995). In addition, it is also determined by customer participation (Grace and O'Cass, 2004).

It is common for customers to switch from one product to another; therefore, a marketer should have a strategy to attract prospective consumers to switch to their products. Current studies mostly examine consumers switch in phone card, tangible product, and banking services. In a service product, consumers could demonstrate positive as well as negative behavior towards the service providers or services consumed. If their response is negative, they will switch to other service providers or service products. Consumers could switch to other services due to excess in supply, quality perception, brand reliability, satisfaction, and suitability to the needs. This condition is known as customer switching behavior. The customer switching behavior is a concept in contrast to customer loyalty which is consumer loyalty toward a product that has been used (Noviana, 2017; Njite et al., 2008; Salman and Siddiqui, 2011).

Further, previous studies (Mandal, 2017; Bansal et al., 2005; Aslam and Frooghi, 2018) states that dimensions of consumer switching include product price, service quality, customer commitment, service quality, response to service failure, reputation, involuntary switching, and effective advertising competition.

2.3. Switching Barriers

Switching barriers are barriers for customers for not using products other than product they are currently consumed; in other words, customers will not switch to other brands (Amiq, 2018; Blut et al., 2007; Astogini et al., 2011). This condition does not reflect customer dissatisfaction of a product but it is likely that there are factors that inhibiting them to switch. If the factors are stronger, then customer decision to stay with their old product also stronger. A firm sometimes strives to create a product that could make customers switching. It is not easy, however, to switch although the new product has distinctive features. According to Noviana, (2017) customer switching behavior is the opposite of loyalty. A loyal person will not switch, whereas disloyal person will switch to other products. Numerous studies find that satisfaction affects loyalty. Different result, however, found by Miranda et al. (2005) stating that satisfaction is not always a key to establish loyalty. Thus, it could be stated that although consumers are dissatisfied with a product/service, they hesitate to switch. It could occur due to barriers to switch. Likewise in the case of PT PLN Indonesia, despite dissatisfaction with the post-paid system service customers do not switch to the prepaid electricity system.

Several opinions state barriers to switch to other products include: more complex new technology, very intensive marketing, consumer specification related, such as perceived switching cost (Hashim et al., 2015; Jones et al., 2000; Supriyanto and Siswoyo, 2013), and difficulties to adopt with a product (Hashim et al., 2015), attractiveness of alternatives, relation switching cost, and social benefits (Tung et al., 2011).

3. RESEARCH METHOD

The research population consisted of all households that subscribe electricity to PT PLN (Persero) in Makassar City, Indonesia but had not utilized the prepaid system product. The population spread in North Makassar, West Makassar, East Makassar, and South Makassar regions. Cluster random sampling technique was used as a sampling method and 100 samples were selected. Next, sample was randomly selected in each household group in the selected regions. Questionnaires were distributed to the selected samples to elicit data using Likert Scale measurement.

3.1. Analysis Method

Factor Analysis was used to identify factors inhibiting the PT PLN customers to switch to the prepaid electricity systems. The research was an explorative in nature using factor analysis. It aimed to find out factors that were established from several observed variables

(in Amerieska and Nurhidayah, 2014 quoting Solimun, 2002), the formula is:

$$X_i = A_{i1}F_1+A_{i2}F_2+A_{i3}F_3+\ldots\ldots+A_{im}F_m+V_iU_I \text{ (Malhotra, 2013)}$$

where:
$X_{i:}$ The i^{th} standard variable
A_{ij}: Multiple regression coefficients of variable i in common factor j
F: common factor
V_i: Regression coefficients of variable i in unique factor (unique) i
U_i: unique factor of variable i
m: Total common factors

All variables in the factor analysis should correlate and form a unique factor by referring to the common factor values. The common factors are stated as a linear combination of variables studied, the formula is:

$$F_i = W_{i1}X_1+W_{i2}X_2+W_{i3}X_3+\ldots..+W_{ik}X_k$$

where:
F_i = estimated i^{th} factor
W_i = weight or coefficient score factor
X_k = Total variable X in the k^{th} factor

There were 20 variables examined in the research regarding the inhibiting factors, namely: unknown product service (X_1), lack information on prepaid electricity product (X_2), unknown benefits (X_3), economic risk cost (X_4), evaluation cost (X_5), Learning cost (X_6), Safety Cost (X_7), Discount (X_8), Monetary loss cost (X_9), Personal Relation Cost (X_{10}), Brand Relationship loss cost (X_{11}), look for a variation (X_{12}), Reputation (X_{13}), Image (X_{14}), Commitment (X_{15}), lack of knowledge (X_{16}), technological ability (X_{17}), satisfaction with a product (X_{18}), environment (X_{19}), Habits (X_{20}).

Validity and reliability tests were carried out to find out whether or not the instruments were feasible for further analysis. The model fitness was identified using Bartlett's test of sphericity and KMO served as sample feasibility measurement.

4. RESEARCH RESULTS

4.1. Data and Model Testing

Instrument testing was the initial step prior to data analysis. It aimed to find out the data validity and reliability. Sugiyono (2013) stated that research instruments are valid if the correlation value is (r) > 0.3. Malhotra, n.d., (2013) explained that reliability test could be observed from the Cronbach's Alpha values, if it is >0.60, then it is reliable. The analysis is presented in Table 1.

The research instrument feasibility test results indicated that the overall data had met the valid and reliable criteria since the validity value was >0.30 and the reliability value was >0.60. As for the model feasibility test, the KMO value was >0.50 and the Bartlett's test of sphericity had significance value of 0.000 indicating correlation between variables.

4.2. Determination of the Number of Inhibiting Factors to Switch

Factors inhibited consumers to switch to prepaid electricity could be identified from the Eigen values that were >1 based on calculation from 1. The analysis results suggested four factors were formed as indicated in Table 2.

There were variable grouping into four main factors, namely:

1. The first factor was Habitual Using Factor. Variables that formed the main factor of consumer switching barrier consisted of: image of old products (X_{14}), lack of new product knowledge (X_{16}), satisfaction with old products (X_{18}), the surrounding environment that still used old products (X_{19}), and a habit (X_{20}).

The electricity customers in Makassar City already accustomed to post-paid electricity systems and they were satisfied with the products; thus, they did not have to look for information on the utilization of prepaid electricity products. Moreover, it was supported by their surrounding environment including their family that still utilized the postpaid electricity. Some studies, such as Nugroho et al., (2017) suggested that family, age, education, and income influenced decision to utilize prepaid electricity. Likewise, Bove and Mitzifiris (2007); Kasnaeny and Sudiro, (2013); Miranda (2009), stated that habitual buying affected consumers' decision to use a product. Radam et al. (2008); Hahn and Kean (2009); Kavkani et al. (2011) found that consumer habits to certain brand will influence their decision to use a product. Saha et al. (2010), in another study object which was barriers in switching from kerosene to LPG gas found that habits in using kerosene inhibited the communities to switch to gas fuel.

PT - PLN thus must change their approach to the communities to alter their habits, especially households as the largest electricity users to achieve opportunity equality in electricity access in all regions.

2. The second factor that became a barrier for customers to switch to a new product was Switching Cost factor that consisted of: Economic risk cost (X_4), Evaluation cost (X_5), Learning cost (X_6), Variation cost (X_{12}), and lack of technological knowledge (X_{17}).

The second switching barrier was caused by the high cost incurred due to switching. Customers will perceive economic impacts of switching since they had to incur more cost to purchase prepaid electricity whilst they previously had paid the installation of the post-paid electricity tool. Customers were unwilling to evaluate the strengths and weaknesses of the new product and spent specific time to learn how the new product works. As a consequence, they were lack of knowledge of the new product advantages.

The results supported several previous studies in different object. For example, an examination on a tangible product by Njite et al. (2008); Aslam and Frooghi (2018); and Blut et al. (2007) found that switching cost was an inhibiting factor for interest to switch both to a new brand, new firm, or other banks. Moreover, the influence of education and knowledge of prepaid electricity utilization was found by (Nugroho et al., 2017).

Table 1: Instruments and model feasibility tests

UJi	Variabel																			
	X_1	X_2	X_3	X_4	X_5	X_6	X_7	X_8	X_9	X_{10}	X_{11}	X_{12}	X_{13}	X_{14}	X_{15}	X_{16}	X_{17}	X_{18}	X_{19}	X_{20}
X_1 validitas	0.44	0.48	0.43	0.62	0.47	0.51	0.32	0.35	0.30	0.45	0.32	0.42	0.57	0.43	0.34	0.38	0.52	0.52	0.48	0.53
Reliabilitas	0.777																			
KMO	0.662																			
Bartlett's test. Sig	0.000																			

Table 2: Determination of the number of factors and factor naming

Component	Eigen value	Factor	Component score	Name of factor
1	4,135	F1	X_{14}, X_{16}, X_{18}, X_{19}, X_{20}	Habitual using
2	1,806	F2	X_4, X_5, X_6, X_{12}, X_{17}	Switching cost
3	1,656	F3	X_1, X_2, X_3, X_8, X_9, X_{10}	Lack information
4	1,573	F4	X_7, X_{11}, X_{13}, X_{15}	Relationship and reputation

As regards customers who were reluctant to switch due to the barrier an approach is needed to explain on the cost effective of the switch for a long term in comparison to continuing using the old product. Customers' busyness in their livelihood activities along with lack of information on the current technology prevented them to pay attention on beneficial information.

3. The third factor as a barrier for consumer switching was lack of information factor. This factor was a group of variables: service from old product (X_1), undistributed information (X_2), lack of knowledge of new product benefits (X_3), concern about discount lost (X_8), monetary lost (X_9), personal relation cost lost.

Undistributed information on prepaid system in terms of its advantages and benefits compared to the old product resulted in reluctance among customers to switch. Information on product along with its benefits, such as gift or price discount, was a determinant that basing the consumers to make a decision to use a product. The clearer the information or the better the marketing communication to the consumers, the more the impact on product purchasing decision (Schiffman and Kanuk, 2010; Sun et al., 2004; Rezayi and Abadi, 2013). Maliki and Rosyad (2019) suggested that information distributed through a variety of promotional forms is a means to socialize prepaid electricity utilization and the most effective method is information through personal approach that affects prepaid electricity utilization.

Derived from the findings, information provided by now had not effective yet in stimulating customers' interest to switch to prepaid electricity systems. Therefore, other forms of communication strategy especially that of personal strategy should be considered.

4. The fourth inhibiting factor was relationship and reputation factor. This factor was a group of the following variables: Safety cost (X_7), Brand Relation cost (X_{11}), old product reputation (X_{13}), and commitment to old products (X_{15}).

Consumers who were reluctant to switch considered the post-paid systems had a clear operational; thus it is saver and has a reputation. Despite errors in recording that often occurred customers were hesitant to switch since they viewed the error was not an issue. Consumers did not want to lose relationship with the old brand and committed to keep using the product instead of changing to something new that has unapparent performance. It was due to good relationship established with the officers both the meter registrar and the payment counter officers; thus they were disinclined to switch to the new systems. Moreover, Makassar people that are a family person and love to socialize with people they used to meet also became an inhibiting factor.

These finding explained that switching barriers in electricity utilization system by household industries in Makassar City had similarity in terms of barriers to other products. In this research, however, barriers to switch originated from internal factors of the individual as the main factors, namely habits in using the service product (habitual using).

5. CONCLUSION AND RECOMMENDATIONS

Factors inhibiting the household customers to switch to prepaid electricity product/system were mainly due to the customers themselves who were reluctant to switch. They were hesitant to learn something new because they were familiar with the current condition. This habit gained support from the surrounding environment and family that still utilized the old products (habitual using). Additionally, satisfaction with the old products did not reflect satisfaction to the existing services. They were satisfied due to their willingness to accept anything from the post-paid systems because it had been a habit. The research results implied that the existence of switching cost became a barrier for the household customers to switch to the pre-paid electricity systems. The cost, in this case, consisted of cost to be incurred as well as cost to learn and evaluate the new product. The third inhibiting factor was lack of information and socialization regarding the pre-paid electricity systems; hence, it was difficult for the customers especially those who were lack of knowledge of payment technology. The last inhibiting factor was established relationship with the post-paid electricity officer and commitment to keep using the old products as a result of lack of information on prepaid system reputation.

Recommendations proposed include:

1. PT - PLN must disseminate information and carries out more intensive communication to all regions since many customers are still unfamiliar with the advantages and benefits of the prepaid electricity systems, which is one of them is minimizing

electricity waste in household sector. Thus, it is necessary for PT PLN to select a personal approach to alter customer behavior by explaining the benefits of prepaid electricity systems to them.

2. Future research must perform further tests on factors found in the current research to identify their impact on household electricity utilization efficiency by testing based on other analysis models, such as multiple linear regressions.

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