

HOUSEHOLD INVOLVEMENT ON SMART ELECTRICITY MANAGEMENT: IS IT POTENTIAL FOR ENERGY SAVING?

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Abstract

Smart Electricity (SE) that introduced by State Electricity Company (SEC) is potentially expected to save the energy at household level. Energy save hence is determined by household's involvement that based on value adopted. Hence the purpose of this research is to examine the relation between household involvement, value adopted and the function of SE. Data gathering used structured questionnaire that based on probability sampling technique. Meanwhile, qualitative approach was implemented to reveal local SC descriptions, progress, coordination, and institution that relate to the policy. Data analysis is used SEM that purposed to examine the pattern relationship between the variables examined. Research result shows that household psychology on SC attributes has significance correlation with value adopted but functional attribute has no significant relation. Furthermore, household value adopted has significance relation with household involvement, the higher value adopted the higher the household involvement that potentially to save energy. Hence, in order to empower the household involvement, they have to be enlightened to through SEC marketing communication practice.

Keywords: Smart electricity cost, Self-custom, Convenient goods, household value

INTRODUCTION

Electricity problems in Indonesia will be more crucial in the future due to excessive demand that increase much greater than its supply. Based on Power Report, it's noticed that until the year of 2022, electricity demand growth is 7.21 percent and slowly decrease to be 6.17 percent yearly (Business Monitor International, 2013). Hence, demand could not be fulfilled by supply that increases by 5, 6 percent yearly. This situation will worsen industrial and business performance that requires more electricity year by year.

Government solution to overcome the electricity problems is more focused on increasing supply, build new power plant and looking after renewable resources instead of directing household manage electricity consumption through SE devices for instance. The effective solutions perhaps are also available, managing electricity consumption at the household. If household consumption succeed be managed, it will decrease electricity consumption. Hence, SEC as the institution has a responsibility to do that. The campaign for example turn of two lamps by household in the peak hours, using energy saving lamp, has not significant impact yet. It was started by the 2004 year, SEC (*State Electricity Corporation*) introduced product innovation to the customers that is called as Smart Electricity (SE). SE is a device that installed at the customer house that enabling customer to examine electricity consumption anytime through the monitor. In doing so, customer could manage their consumption to their own need. It is expected that SE could overcome household problems; particulally cost payment delayed for they could solve it esier.

Based on payment method SE is categorized as prepaid payment service, but smart electricity is better known in Indonesia. It uses technology more dominant where the electrical equipment could inform signals as feedback to the customer; in UK it is known as smart meter while in other countries it is call smart monitor (Martis Kainen, M and Coburn, J, 2014). Moreover, SE appliance makes customers could accostumed themself due to their own purpose. SE electricity feedback consists of price information, frequencies, and channel used to deliver the information (Fischer, C, 2008). Based on energy efficiency, Hansen K., Gram (2013) emphasized the important role of technology and behavioral aspects. He concluded that the role of behavioral is the most. He recommends that in energy efficiencies consideration, behavioral consideration is important including psychology aspects. Furthermore, it also noticed that beside economic consideration, phycology should be considered too. Murtagh, et.al. (2014) remarked three kinds of electricity user respond 1) monitor enthusiast, 2) aspiring energy save, and energy importance. Otherwise, Dale (2014) said the poor household involvement in smart electricity due to the lack of consumer awareness and knowledge.

Benefits received by implementing SE actually are more than noticed by SEC. For SEC the main benefits is omitting field monitoring task that often makes unfair counting monthly cost. So, it also avoiding conflict to the customer. According to customer viewpoint, main benefit is the efficiencies purpose. The possibility to reduce energy consumption could be done because the SE appliance informs user automatically. Electricity efficiencies usage could be practiced through home appliances recognition, such as air conditioning, refrigerator, washing machine and others that use more electricity (Tewahia, N, 2014).

According to product understanding, Peter, J.P., and Olson, J.C., (2010) introduce means-end chain that links consumption, knowledge attributes with knowledge consequences (functional and psychological) and values. This concept explains the relation of SE attributes that has two consequences and value that could be prepare by product consumption activities. The three components of this link are categorized as cognitive perspective that explains the construction of customer knowledge. Hence, SE has two categories, functional and psychological. Functional is related with offering promised and psychological related with many substances that comes to customer's mind. Furthermore, he emphasized the importance of customer involvement in any marketing activities. The more customers involved the easier is the marketer do their task. One of the determinants that explain customer involvement is value. Value has a large concept that could be built by marketer as well as by the households or the user. As the matter of fact, value that built by consumer is larger because it is created by customer both individually and socially.

Marketing practice that oriented on customers existed and social sustainability is recognized as social marketing (Kotler, P., and Keller, K., 2012), where its focus is direct customers behavior to achieve certain goals that socially benefitted. Schiffman & Kannuk (2007) identified it as part of consumer behavior that explains the way customer to consume. Academic basis to consider smart electricity behavior is relevant with social marketing where customer involvement is important to establish firm goal. Bezencon, V and Blili (2009) explained five dimensions of customer involvement 1) hedonic value, 2) agreed value, 3) possible risk, 4) risk impact, and 5) the importance. This involvement makes customer affected toward goods and services they consumed. The more consumer involvement, the more value creates that not only for the firms but to the society (Svendson, M., Freng, 2009). Therefore, to make customer more involve, good relationship between customer and firms should be built as antecedent as requirement to build customer satisfaction (Fatima, K., Johra and Razaque, Mohammed, A, 2013).

The importance of involvement as noticed by Lundkvist, A., & Yakhlef, A (2014) is needed to prepare customer as social agent and make them be firm's partner. It could be

occurs due to the information exchange between customers. Value has important role to customers that influencing their behavior. Value encourage customer to do something due to internal encouragements. Anana, E., Da Silva and Nique, W., Meucci (2007) remarked value as antecedent for customer position to be involved. Value belong to customer behaviour determinant, it emerges both through product attributes and household value adopted. The more value adopted toward certain product, the more the household be involved. In relate with electricity consumption, value is not only determining by product function but also determine by household value adopted or to his/her surroundings.

This Research focused on SE customer involvement on smart electricity that still rarely conducted in Indonesia even though electrical problems are important and crucial. Several previous related researches focuses on marketing mix and customer satisfaction (Johannes, et.al. 2015); Tamauka V and Salindehos (20014); Nasution, B., Erda W. *et.al.* (2013); and Anggraini, S (2013). Furthermore, Foran, et.al. (2010), emphasized that the purposes of SE program should be prioritized on efficiencies target at the household level. Hence, the study is aim at household involvement especially toward energy saving on the household level.

THEORETICAL AND METHODOLOGICAL FRAMEWORK

SE is an innovative product that promises some attributes that could provides many benefits to the customers. Olson J., Peter P. (2010) explains two kinds of attributes in relate with the customer, i.e. functional and socio psychological where value has important role to household involvement. SE installation at the customer's house had a set of appliances that make household established promised benefits. Johannes, et.al. (2015) found customer perception on SE appliances is good; it was work as it promised. Anonym (2008) listed some SE benefits as customer use it; more efficient, controllable, safety, accurate, and free from monthly cost. If customers manage the appliances properly, benefits not only received by them but by all stakeholders.

Value has large dimensions that could be found both to the individual and household or group. Olson, Jerri, C and Peter, J. Paul (2010) said that value related to broad life of customer and one of satisfaction determination. Value involves the emotions and affection that could be basis to behave. Value that adopted by household determined SE management at the household level. Kotler, P and Armstrong, G (2014) identified value as a consideration on sustainable marketing. Value has dynamic substance that makes marketers pay their attention whenever they deliver goods and services. Value bridges between the product functions to the household involvement. Suitable value between marketer and customer will help marketer sustain marketing effort and establishes corporation goal.

H₁: Household perceptions on functional of smart electricity attributes have positive correlation with household adopted value

Physiological factor is important to determine consumer behavior. In social consideration, psychological terms is identified as psychosocial that implies how is individual feel comfort, feeling good to others in connection with product consumption (Olson, Jerri, C and Peter, J. Paul, 2010). Kotler, P., and Keller, L, (2012) identified marketing perspective that consider social sustainability as sustainable marketing. So, in this point of view, customer satisfaction is not only originates by the product consumed, but by customer relation to his/her neighbors. Hence, based on that consideration, Schiffman and Kanuk (2009) emphasized the importance of consumer behavior to formulate public policy. Furthermore, it could be concluded that smart electricity is recognized as public marketing where the purpose is to direct the certain consumer behavior instead of establish profit.

H₂: Household psychosocial perception on smart electricity has positive relation to household value adopted

Customer involvement is important to marketer to make marketing program be succeed. Customer involvement is a large concept in consumer behavior discipline that dynamically developed by academicians to do research. Broderick, Amanda, J and Mueller, Rene, D., (1999) quote Mc. Kennell remarked three areas of involvement: 1) content, 2) structure, and 3) context. Furthermore, it is identified some involvements, subjective risk, and probability of main a mistake purchase. M. Freng (2009) said that customer involvement consider as part of the marketing strategy to bring maximum benefit. Fatima, J., Kayeser and Razzaque, M. Abdur (2013) emphasized that consumer involvement is antecedent variable to rapport relationship that encourage to consumer satisfaction. He remarked that consumer involvement is the basis for social treatment. Santosa et.al. (2005) concured with them by noticed that situational motivator that encourage user to be more involve has stronger effect than intrinsic motivator. Furthermore, Fandos (2009) classified customer to be higher and lower involvement, he noticed that the higher involvement has more quality signal compare to the lower.

H₃: household's value adopted has positive relationship to household involvement on smart electricity usage.

METHODOLOGY

Research population is households that use smart electricity in Jambi City, Indonesia. They are listed at SEC service administration, it comprises of 11 districts or three service areas. So customer list is used as sampling frame to choose sample with simple random sampling technique. Sample size consists of 225 household, its refers to Malhotra, Naresh K. & Birks, David.F., (2007) that recommend sample size for new product test minimally is 200 units. In this point of view, SE could be considered as new product that provide for special market segment. Data gathering used structured questionnaires, used close question as well as open question. Research is also used FGD (*Focus Group Discussion*) with household and SEC official. Measurement used nominal and ordinal scale. Ordinal scale specially use to variables that related to hypothesis and constructs (Beraden, W. O. and Netemeyer, R.G. 1999). Data analysis uses SEM (*Structural Equation Model*) that addressed to propose model for household involvement in smart electricity (Schumacker, Randal, E. & Lomax, Richard, G. 2012).

ANALYSIS AND RESULTS

Smart electricity (SE) policy is started at 2008 year that linked to several institutions. It used pulse to activate electrical appliance. The electrical connection is automatically stopped as the pulse is expired. In order to establish pulse transaction, SE is supported by banks, preparing SEC account to ensure transactions are secure. In line with this, bank has cooperation with technology institution that called Switching Company (SC) which has a function to prepare technology to enable customer to buy pulse online, and its function is called up line. SEC then, opens an opportunity to Collection Agent (CA) as down liner in the system that sell pulse to the customers. Cost is imposed to every transaction as much as Rp 2, 000. In doing so, pulse transaction is more conveniently purchased for retailer is increasing day by day. Cost is allocated for provider (bank) and retailer as their income. The other cost that charged to every transaction is street light taxes.

Due to product differentiation perspective, SE creates several benefits such as: 1) eliminate meter counter, 2) decrease electricity loss, 3) avoiding conflict that often emerge when SEC cut off the electricity connection, and 4) increasing electricity effectiveness delivered from power plants. Based on transaction cost, customer perceived unfair practices. Pulse transactions expense is perceived "expensive" by the customer, due to items that should be paid, they are administration expense and street light taxes. Furthermore, administration cost is flat, so the more often customer buy pulse the higher administration expense is paid. This condition is revealed for customers prefer to buy pulse in small amount being lack of informations. Research descriptive result about the respondent is described in Table 1 below.

Table 1 Some descriptive statistics measure summary

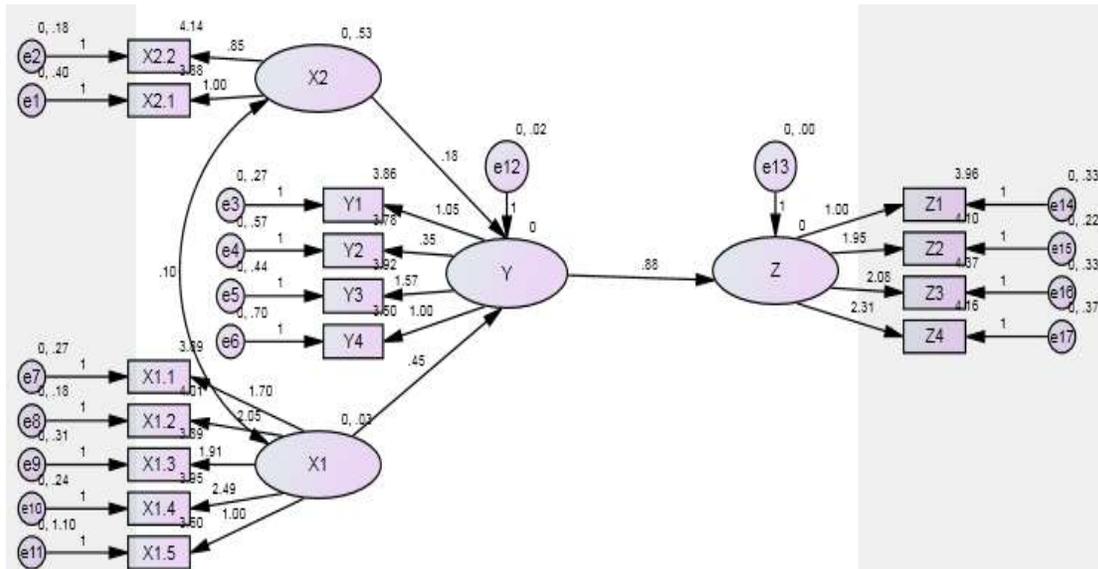
Description	Frequency (%)
• Firstly used	173 (76.9)
• Switched	52 (23.1)
Occupation	
• State Official Employee	33 (15.7)
• Private	100 (47,6)
• Military	2 (1,0)
• Others	76 (35,7)
Firstly/Switch over	
• Civil Official (firstly, switched)	(22,11)
• Privates (firstly, switched)	(85,15)
• Military (firstly, switched)	(2)
• others (firstly, switched)	(51,24)
Monthly Expense (modus)	
• 101000 - 200000	98 (46,7)
• 201000 – 500000	64 (30,5)

As an innovative product, SEC prioritizes it especially to new customers. It was supported by respondent's data above which is used SE for the first time is 173 (76.9%), otherwise customer switched to smart electricity is 52 (23.1 %). Furthermore, if it examined the user switch to smart electricity year by (2008 - 2015 year) is significantly increased. It is relevant to SEC explanation; there are 200 customers switch to smart electricity every month avaragely. The switchers are caused by some different motives: 1) customer who has been sentenced by SEC, 2) customers who built house for rent, and 3) customers which perceive SE is benefitted. The first and the second motive are related with customers prolems, for customer being sentenced by SEC. Customers who don't pay electricity cost timely will be sentenced, the connection will be cutoff. Otherwise, when they want to activate the connection officials direct them to use SE. For house owner, the motives to use SE mostly is avoiding conflict with tenants. In some cases, tenant do not pay the electricity cost, so household owner prefer to use SE for anytime pulse expired, officials do not have to sence owner. The switcher to SE is dominated by private household that supposed to be more considering cost efficiencies.

Based on research variables measurement that used five Likert scales, summary result is described as follow. Customer motives to use SE is consist functional and psychological that measured with of five indicators. The value for functional and its latent variable are efficiencies (3.9), controllable (4), safety (3.9), accuracy (3.95) and monthly cost elimination (3.6), the highest value is controllable. Otherwise, value for psychological consist of two indicators, they are efficient (3.9) and more beneficial (4. 1). Hence motive to control SE psychologically is more beneficial. Latent variable in this research is value; the result is described as follow: goal

(3.9), fairness (3.8), and insight (3.9) and solidarity (3.5). Another latent variable, consumer involvement on SE usage is respectively described as follow; display control (3.95), household appliance (4.0), energy saving light (4.1), and electronics devices (4.2). Statistical examination according to hypthosis is present in figure 1 below.

Figure 1 Result of Structural Equation Model (SEM) of data Analysis, 2015



Notes; X₁: psychological motives, X₂: functional motive, Y: value adopted, and Z: Smart Electricity Management

Figure 1 above depicts observed variables and unobserved variable (*latent*) correlation that compose structure of customer involvement. As the purpose of SEM is to propose model, the main consideration is examine the validity of variable to be fit each other, whether the observed variable fit to the latent variable. Figure 1 could also be present in Table 2 below.

Table 2 The Correlation of functional and psychological with value adopted by household.

	Estimate	S.E.	C.R.	P
X1 --> Y	0,455	0,324	1,402	0,161
X1 --> X1.1	1,700	0,808	2,105	0,035 *
X1 --> X1.2	2,046	0,952	2,149	0,032 *
X1 --> X1.3	1,910	0,905	2,111	0,035 *
X1 --> X1.4	2,487	1,155	2,153	0,031 *
X1 --> X1.5	1,000			
X2 --> Y	0,179	0,70	2,564	0,010 *
X2 --> X2.1	1,000			
X2 --> X2.2	0,852	0,084	10,159	***

Notes. *significant correlation, **highly significant correlation

As it has been shown at Table 2 there is insignificant correlation namely, between functional perceptions on smart electricity with value adopted by the household. Furthermore, the relation between household value adopted and consumer involvement is shown in Table 2.

Table 3 The correlation between household value adopted and consumer involvement

	Estimate	S.E.	C.R.	P
Y --> Z	0,882	0,286	3,081	0,002*
Y --> Y1	1,049	0,311	3,376	***
Y --> Y2	0,351	0,244	1,439	0,150
Y --> Y3	1,574	0,450	3,497	***
Y --> Y4	1,000			
Z --> Z1	0,179	0,70	2,564	0,010*
Z --> Z2	1,953	0,407	4,801	***
Z --> Z3	0,852	0,084	10,159	***
Z --> Z4	1,000			

Notes *significant correlation, **highly significant correlation

Table 3 shows all the correlations have significant relationship. As the SEM procedure that model could also consider the fit model condition as it has shown in Table 4.

Table 4 GOF (Goodness Of the Fit)

No	Criteria	Model Value (P Value)	Model FIT	Information
1	Chi-Square	191,014 (P=0,000)	0,000 (< 0,05)	Less FIT
2	RMSEA	0,074	< 0,08	FIT
3	CMIN/DF	2,22	< 2,00	Less FIT
4	NFI	0,706	> 0,90	Less FIT
5	CFI	0,80	> 0,90	Less FIT
6	TLI	0,830	> 0,90	Less FIT

DISCUSSION

Product attributes as Olson, Jerri, C and Peter, J. Paul (2010) remarked is consist of psychological and functional. The statistical significance result in Table 1 shows a different situation, psychological correlation is significance but functional. According to psychological attributes, respondents trust SE makes efficiencies at the household level. Perhaps, as they use SE, they do not perceives SE produce benefits (efficiencies, controllable, safety, accuracy, and monthly elimination). Hence, what the customer need is communication, managing the appliance properly to get the benefits promised.

In relation with SE appliance, Johannes, et. al, (2015) reveals that smart electricity appliance is good performed. It seems there is different result when the appliance is perceived good preformed, but the functions. Implicitly, it indicates that though physically the appliance is good performed, the function is depend on the customer behaviour, do they manage the appliance properly. All the function of smart electricity is not managed well by the customer, it depends on the customer characteristics are they enlighten or not. This situation is related with by the customer complaints, they told that SEC officials do not make enough communication to use appliance after contracts conducted.

Value has broad characteristics where its construction still developed by behavioral scientist. Value however is important and strategic to build organizational competitiveness (Scridon, A. Mircea, 2013). Value could be intrinsic or extrinsic which is positioned customer into certain position, namely being feel comfort, participating getting the solution, consider the public problems, and participate to solve the problems. Value could be originates by the product consumed and the surrounding such as customer experienced for they consume certain product. The right value will make marketer easier to deliver product which fit to the customer value. Some values adopted in this research are; *individual goals, fairness, insight, and solidarity*. This value could be individually or being considers other in using electricity. Solidarity is one of the value that should be developed due to the customers' presfective where they have chance to help others to and government to prepare electricity for the save energy.

Involvement is considered by marketer as part of marketing strategy (Svendson, M., Freng, 2009) and Lundkvist, A., and Yakhlef, A (2014). They emphasized customer's involvement as social agent that help marketer to deliver offerings. Furthermore, Fatima, K., Johra and Macaque, Mohammad, A, (2013) noticed that involvement as antecedent to make consumer satisfied. The power of customer involvement build WoM (*Word of Mouth*) which makes customer deliver value with their own way horizontally, customer to customer. It is correspond with SE marketing program as public marketing consideration where the purpose is not to sell more, but to direct customer behavior to a certain position. Marketer hence should help customer to be enlighten in managing SE for the purpose is not only reducing electricity cost but make customer to be involved to solve public electricity problems. Customer involvement is important, Espejel. et.al, (2009) remarked different level of customer involvement that effect different consumer perception on perceived risk, trust, satisfaction, and loyalty. Furthermore, in terms of campaign, social networking has important role for customer involvement, it makes direct contact between the corporation and customer (Sigala, M, 2012).

Electrical campaign, particurally by local SEC is important to encourage household to be more involved. Hence, local SEC needs to determine influencer (people) who influencing

decision at the household. In correspond with household electrical saving, the amount saved is small but the potential is significant if customer do it together. Cebulla, Richard, J (2010), remark that one of the energy saving behavior is determine by the chance to control energy using. Customer, who managed appliance that installed at SE household customer, actually has potential to save the energy. To this point of view, Murtag, N., e.t. al., (2014) revealed that household involvement on saving energy is mainly shown by women involvement at the household, and the most important is collective action where households could be pushed (Hussaini, M., and Abdul, N and Galis V. & Gyberg P., 2011). In this consideration, household access should be prepared in order to make them doing their own action to save energy and social media is one of the potential instruments for their household (Ogwumike, et. al., 2014).

CONCLUSION

Smart electricity introduction is remarked as an innovation by SEC that create benefits to the primary stakeholder's namely SEC, social, and household as user. To the household, is enable them to make an efficiencies for themselves and save energy to the public.

Research result contributes to explain the household involvement to manage smart electricity where product attributes, functional and psychology as the basis that determine value household adopted. Value is part of consumer behavior determinant that should be considered to developed smart electricity management, where value is not merely emerging from product consumed. Value consideration will encourage customer to a certain behavior, to manage smart electricity; determine cost, turn off the connection, and switch off the electrical appliance. Chen, Shu-Ching and Quester, Pascale G., (2006) remarked value should be managed by firm both to create satisfaction and to implement market orientation purpose. In doing so, SEC should build integrative communication with customers in order to encourage them to manage SE appliance. Nelson, G, et.al. (2008) emphasized that value should be deliver with the offering, especially in public policy formulation, he recommend value should be practiced in order to get organization goal.

Hence customer's involvement should be considered as an instrument to implement marketing communication that has purpose to encourage more customers to be involved and attract new switcher. In this consideration, further research recommend is related with customer respond to SE electricity cost, both in money and non-money terms. For this research could inform what is customer respond to cost varied imposed by different consumer behavior who use smart electricity.

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