International Journal of Research and Review
Vol.7; Issue: 5; May 2020
Website: www.ijrrjournal.com
Research Paper *E-ISSN: 2349-9788; P-ISSN: 2454-2237*

Factors Affecting Customers' Decision on Installing Rooftop Solar Power in Binh Thuan Province, Vietnam

Pham Thanh Phuong[1], Nguyen Quoc Nghi[2]

[1]Binh Thuan Power Company, Vietnam
[2]Can Tho University, Vietnam

Corresponding Author: Nguyen Quoc Nghi

ABSTRACT

The objective of the study is to determine the factors influencing customers' decision to install rooftop solar power in Binh Thuan Province, Vietnam. The study used a convenience sampling method to collect the data from 233 customers who installed rooftop solar PV (photovoltaic). The exploratory factor analysis and multivariate linear regression were applied. The research result has proved the factors that positively affect customers' decision to install rooftop solar PV as follows, Nature of product, Customer service, Social awareness, and Reference resource. Among factors, the reference resource has the most decisive influence on customers' decision to install solar PV on the rooftop in Binh Thuan Province, Vietnam.

Keywords: rooftop solar power, decision, customer

1. INTRODUCTION

Binh Thuan Province has typical natural and geographic conditions such as average hours of sunshine reaches 1800-2100 hours/year, the annual radiation level is 1,961 kWh/m2, and the moderate intensity of the solar radiation every year is from 4.1 to 4.9 kWh/m2/day. Binh Thuan Province has the potentials and opportunities to develop solar power systems which bring high economic efficiency. As of early 2020, there are more than 700 rooftop solar power projects in the province with a total capacity of over 10,000 kWp, and this tends to overgrow. Remarkably, the decision No. 13/2020/QD-TTg dated 06/04/2020 of the Prime Minister on the promotion of solar power development in Vietnam is a significant turning point. It promotes the installation of solar power of individuals and organizations in Binh Thuan Province and Vietnam in general. There are few studies on customers' decision to install rooftop solar power in Vietnam, and there is no study carried out in Binh Thuan Province yet. Therefore, this study is conducted to determine factors affecting customers' decision on the installation of rooftop solar power in Binh Thuan Province. The research results may provide a scientific basis and help business administrators develop strategies for their customers in Binh Thuan Province, Vietnam.

2. THEORETICAL FRAMEWORK AND RESEARCH HYPOTHESES

2.1 Theoretical framework

According to Kotler et al., (2008), the decision-making process has 5 steps, including problem recognition, information search, evaluation of alternatives, purchasing decision, and post-purchase behavior. With different types of products, consumers have other buying decisions, namely complex buying behavior, dissonance-reducing buying behavior, habitual buying behavior, and variety-seeking buying behavior (Kotler and Keller, 2012).Theoretical foundations are used as

the basis for this study are (1) Maslow's hierarchy of needs (1954), (2) Theory of reasoned action (TRA) (Ajzen and Fishbein, 1975), (3) Theory of planned behavior (TPB) (Ajzen, 1991), and (4)Technology acceptance model (TAM) (Davis, 1989).

Base on the above scientific arguments, this study was conducted to identify factors affecting customers' decision in installing solar power on the rooftop in Binh Thuan Province

2.2. Research hypotheses

The research results of Sweeney and Soutar (2001), Lejon et al., (2005), Sanchez et al., (2006), Mihart (2012), and Lay-Yee et al., (2013), have proved the factors of nature of the product, product price, cost, customer service, social awareness, and reference resource affect customer purchase decisions.

Based on the literature review, the study used a group discussion (qualitative research) with customers who have installed rooftop solar PV in Binh Thuan Province. The discussion result set out research hypotheses and scales appropriate for the research model. The research hypotheses proposed are H1: The nature of the product positively influences customers' decision in installing rooftop solar power. H2: Perceived value positively affects customers' decision on rooftop solar power installation. H3: Customer service positively impacts customers' decision to install rooftop solar power. H4: Social awareness has a positive influence on customers' decision to install rooftop solar power. H5: Reference resource positively affects customers' decision on rooftop solar power installation. Thus, the research model is stated as follow:

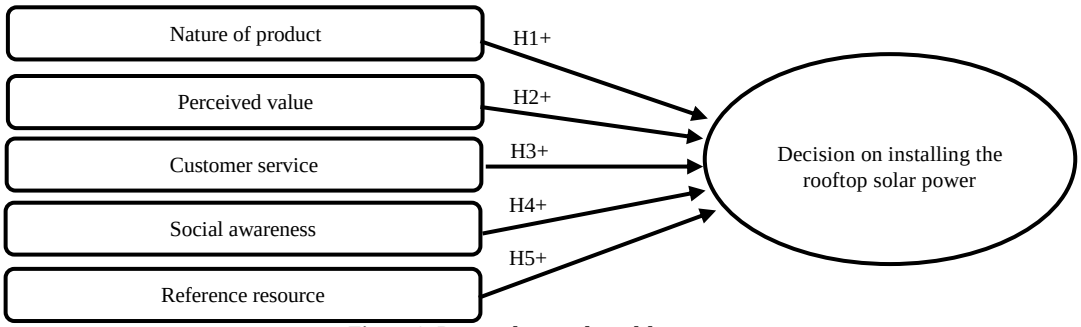

Figure 1: Proposed research model

Table 1: Interpretation of observationsin the research model

Factor	Observations	Sign	Scale
Nature of product	The product operates stably and continuously.	NOP1	Likert 1-5
	The battery quality of the solar system reaches international standards.	NOP2	Likert 1-5
	Basic information about the product is appropriate.	NOP3	Likert 1-5
	The product is easy to install and does not occupy much space.	NOP4	Likert 1-5
	Various types of batteries (single crystal, polycrystalline, thin-film, etc.)	NOP5	Likert 1-5
Perceived value	The price is consistent with product quality.	PV1	Likert 1-5
	The product price is consistent with customers' income.	PV2	Likert 1-5
	The product price and installation costs are not too different among competitors.	PV3	Likert 1-5
	The pricing policy is flexible.	PV4	Likert 1-5
Customer service	Consultants are enthusiastic and qualified.	CS1	Likert 1-5
	Many support services for customers.	CS2	Likert 1-5
	The staff is accommodatingand attentive.	CS3	Likert 1-5
	The terms and conditions of payment are diverse.	CS4	Likert 1-5
	Customers are supported in paperwork.	CS5	Likert 1-5
Social awareness	The house becomes more modern after installing rooftop solar power.	SA1	Likert 1-5
	The installation of rooftop solar power helps protect the environment.	SA2	Likert 1-5
	Installing rooftop solar power is ahead of the trend.	SA3	Likert 1-5
	Feel relaxed because there is a backup power source when the main power goes out.	SA4	Likert 1-5
Reference resource	Lots of information on media.	RR1	Likert 1-5
	Incentive from the government and local authority.	RR2	Likert 1-5
	Information exchange from friends and colleagues.	RR3	Likert 1-5
	Enthusiastic consultation from the company.	RR4	Likert 1-5
Installation decision	The decision to install the rooftop solar power was right.	ID1	Likert 1-5
	Willing to recommend the rooftop solar power to friends and colleagues.	ID2	Likert 1-5
	Encourage friends and colleagues to install rooftop solar power.	ID3	Likert 1-5
	The decision to install rooftop solar power was better than expected.	ID4	Likert 1-5

3. RESEARCH METHODOLOGY

3.1. Data collection method

The study used a convenience sampling method to investigate 233 customers who have installed rooftop solar power in Binh Thuan Province. According to Hair et al. (1998), to apply the exploratory factor analysis (EFA), the ratio between observations and the measured variable is 5:1, meaning that 1 measured variable requires at least 5 observations. As reported by Tabachnick and Fidell (2007), the appropriate sample size for regression analysis is $N \geq 50 + 5*m$ (where m is the number of independent variables). Therefore, the sample size achieves the reliability requirement for the research hypotheses test.

3.2 Analytical method

The analytical methods used to test the research hypotheses include the reliability test by Cronbach's Alpha, exploratory factor analysis, and multivariate linear regression. The analysis process was conducted in the following order, Step 1: Use Cronbach's Alpha to test the correlation among observed variables; Step 2: Use the exploratory factor analysis (EFA) to assess the convergent and discriminant validity of observed variables; Step 3: Use the multivariate linear regression to test the research hypotheses.

4. RESEARCH RESULTS AND DISCUSSIONS

4.1. Evaluate the reliability of the scales

The Cronbach's Alpha coefficient is used to eliminate variables with an item-total correlation of less than 0.3, and a rankingis satisfactory if its Cronbach's Alpha value is greater than 0.6 (Nunnally and Bernstein, 1994). Based on Table 2, the item-total correlation of every observed variable meets the requirement (the minimum is 0.523). All scales have high reliability (the minimum is 0.807). Thus, all variables can be used in the subsequentexploratory factor analysis (EFA).

Table 2:Reliability test result

Factor	Number of observed variables	Minimum item-total correlation	Cronbach's Alpha
Nature of product	4	0.637	0.832
Perceived value	4	0.523	0.807
Customer service	4	0.687	0.853
Social awareness	4	0.628	0.826
Reference resource	4	0.623	0.841
Installation decision	4	0.718	0.876

Source: Survey data, 2020

4.2 Exploratory factor analysis (EFA)

In this study, exploratory factor analysis (EFA) was carried out twice. The first EFA is for all independent variables (product nature, perceived value, customer service, social awareness, and reference resource) and the second EFA is for the dependent variable (installation decision of rooftop solar power). The first EFA result is as follows: Significance level Sig. = 0.00 ≤ 0.05 and KMO = 0.851 (in the range of $0.5 \leq KMO \leq 1$). The factor loading of all observed variables is greater than 0.5. The cumulative variance reaches 67.43%> 50%. This shows that the research data is satisfactory (Anderson and Gerbing, 1988). This result sets out 5 factors, F1, F2, F3, F4, and F5. The observed variables are the same as in the proposed model, so there is no change in factors' names. Similarly, the EFA result for the dependent variable is guaranteed: Significance level (Sig) is less than 0.05 and the KMO = 0.834 (in the range 0 to 1); the factor loading of all observed variables is greater than 0.5; the cumulative variance is 72.88%> 50%. This means the research data is appropriate (Anderson and Gerbing, 1988). The result forms 1 factor which is F6 (installation decision of rooftop solar power).

Table 3: Factors formed from the exploratory factor analysis (EFA)

Sign	Observed variables	Factor
F1	4 variables: NOP3, NOP2, NOP5, NOP1	Nature of product
F2	4 variables: PV3, PV2, PV1, PV4	Perceived value
F3	4 variables: CS3, CS4, CS1, CS2	Customer service
F4	4 variables: SA4, SA3, SA2, SA1	Social awareness
F5	4 variables: RR1, RR3, RR4, RR2	Reference resource
F6	4 variables: ID2, ID4, ID1, ID3	Installation decision

Source: Survey data, 2020

4.3 Multivariate linear regression

The multivariate linear regression was used to determine the factors that influence customers' decision to install rooftop solar power in Binh Thuan Province. The result is shown in Table 4.

Table 4:Multivariate linear regression result

Variable name	Standardized coefficient	Significance level(Sig.)	Variance inflation factor (VIF)	Hypothesis
Customer service	0.182	0.000	1.213	H1: accepted
Nature of product	0.199	0.000	1.284	H2: accepted
Social awareness	0.113	0.015	1.187	H3: accepted
Perceived value	0.088	0.059	1.184	H4: rejected
Reference resource	0.468	0.000	1.821	H5: accepted
Adjusted R^2				0.588
Durbin-Watson stat				2.185
Sig.F				0.000

Source: Survey data, 2020

Table 4 indicates that the adjusted R2 is 58.8%, meaning that the factors explain customers' decision to install rooftop solar power in the model at a level of 58.8%. The Sig.F = 0.00 is much smaller than the significance level with α = 5%, so the proposed model is statistically significant. Durbin-Watson coefficient reaches 2.185 and VIF < 4, and this proves that the model has no autocorrelation and multicollinearity. The 4 independent variables in the model (customer service, nature of the product, social awareness, and reference source) are statistically significant at the 99% significance level. In other words, if customers appreciate the customer service of the company, the decision to install rooftop solar will be enhanced. If customers have a high evaluation of the solar power quality, their intention to install the solar system will increase. As customers are aware of the importance and social benefits of installing the rooftop solar system, they tend to buy the product. Besides, if customers approach different reference resources, the demand to install rooftop solar power will be higher. In which, reference resource is the most influential factor affecting the decision to establish the rooftop solar power of customers in Binh Thuan Province.

5. CONCLUSION AND MANAGERIAL IMPLICATIONS

In general, the study has pointed out the factors affecting customers' decision to install rooftop solar power in Binh Thuan Province. These factors are customer service, nature of the product, social awareness, and reference resource. Among factors, reference resource has the most decisive influence on customers' installation decision. From the above findings, some administrative implications are proposed as follows: Firstly, promote communication programs on socio-economic benefits of rooftop solar power; Secondly, continually improve the quality of customer service and the customer satisfaction index (CSI); Thirdly, control product quality and evaluate the performance of the product; also, continuously update the latest technologies; Fourthly, enhance the professional qualifications and communication skills for the staff consultant.

REFERENCES

1. Ajzen, I., & Fishbein, M. (1975). *Belief, Attitude, Intention and Behavior: An Introduction to theory and research.* Reading, MA: Addison - Wesley.

2. Ajzen, I. (1991). The Theory of Planned Behavior. *Organizational Behavior and Human Decision Processes, 50*(2), 179-211.
3. Anderson, J. C., & Gerbing, D. W. (1988). Structural equation modeling in practice: A review and recommended two-step approach. *Psychological Bulletin, 103*(3), 411-423.
4. Davis, F. D. (1989). Perceived Usefulness, Perceived Ease of Use, and Use Acceptance of Information Technology. *MIS Quarterly, 13*(3), 319-340.
5. Lay-Yee, K. L., Kok-Siew, H., & Yin-Fah, B. C. (2013). Factors affecting smartphone purchase decision among Malaysian generation Y. *International Journal of Asian Social Science, 3*(12), 2426-2440.
6. Lejon, E., Wahlund, L. M., & Berggren, J. (2005). What Influences B2B Buying Behaviour?: An empirical study of Fläkt Woods and its customers. *Bachelor's thesis.* Jönköping University.
7. Kotler, P., Armstrong, G., Wong, V., & Saunders, J. (2008). *Principles of Marketing* (5th ed.). Harlow: Financial Times Prentice Hall.
8. Kotler, P., & Keller, K. L. (2012). *Marketing Management: Philip Kotler, Kevin Lane Keller*. New Jersey: Pearson Prentice Hall.
9. Hair, J. F., Black, W. C., Babin, B. J., Anderson, R. E., & Tatham, R. L. (1998). Multivariate data analysis. *Prentice Hall 5*(3), 207-219.
10. Maslow, A. H. (1954). *Motivation and personality*. New York: Harper & Row.
11. Mihart, C. (2012). Impact of integrated marketing communication on consumer behaviour: Effects on consumer decision-making process. *International Journal of Marketing Studies, 4*(2), 121-129.
12. Nunnally, J. C., & Bernstein, I. H. (1994). *Psychometric Theory* (3rd ed.). New York: McGraw-Hill.
13. Sanchez, J., Callarisa, L., Rodriguez, R. M., & Moliner, M. A. (2006). Perceived value of the purchase of a tourism product. *Tourism management, 27*(3), 394-409.
14. Sweeney, J. C., & Soutar, G. N. (2001). Consumer perceived value: The development of a multiple-item scale. *Journal of retailing, 77*(2), 203-220.
15. Tabachnick, B. G., & Fidell, L. S. (2007). *Experimental designs using ANOVA* (p. 724). Belmont, CA: Thomson/Brooks/Cole.

How to cite this article: Phuong PT, Nghi NQ. Factors affecting customers' decision on installing rooftop solar power in Binh Thuan Province, Vietnam. International Journal of Research and Review. 2020; 7(5): 137-141.

******