

Critical Factors of Social Acceptance for Solar PV Rooftop in Thailand

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Abstract. The objective of this research is to identify the critical factors of social acceptance for Solar PV Rooftop in Thailand. The research methodology refers to Diffusion of Innovations theory based on Thai culture and Thai social. There are two sample groups in the study consist of accepters, and rejecters group with a critical factor in each group. Global Warming is a critical factor for the accepters and Installation Cost is for the other.

Keywords: critical factor, social acceptance, solar pv rooftop, diffusion of innovations

1. Introduction

In Thailand energy nowadays, electricity is generated by natural gas mainly to 67% [1] and one-third are imported from abroad while power plant project of various types of fuel such as coal, and nuclear power is heavily opposed in environmental issues by Thai society. The domination of specific fuel type is too much impact on energy security of the country so the government is looking to solve this serious situation.

Solar power is a type of energy that has great potential to be generated and there are many ways to deal with it such as solar pv farm, and interesting solar pv rooftop. On 16 July 2013 the National Energy Policy Commission (NPS) of Thailand adopted new Feed-In Tariff scheme supporting rooftop and community ground-mounted solar installations. The goal of the scheme is to support installation of 1 GW of new small scale system in Thailand by 2014 [2]. Particularly The goal of solar rooftop pv system is 200 MW by December 2013 with three categories target [3], details are shown in Table 1.

Table 1 Feed-In Tariff for rooftop solar installations to be operational by December 2013

Renewable Source	Power Plant Capacity	Period of Time	Feed-In Tariff rate in BHT/kWh	Cap
Residential Rooftop Solar	0 – 10 kW	25 years	6.96	100 MW
Small Commercial Building	10 – 250 kW		6.55	100 MW
Middle and Large Commercial Building / Factory	250 kW – 1MW		6.16	

The goal of residential rooftop solar has not been achieved yet [4] because the solar pv rooftop is a very new idea for Thai social. About 99% of solar power capacity in Thailand is based on large-scale installations, sized > 1 MW [5]. The comparison of solar power installations between Thailand and the others countries is shown on Fig. 1.

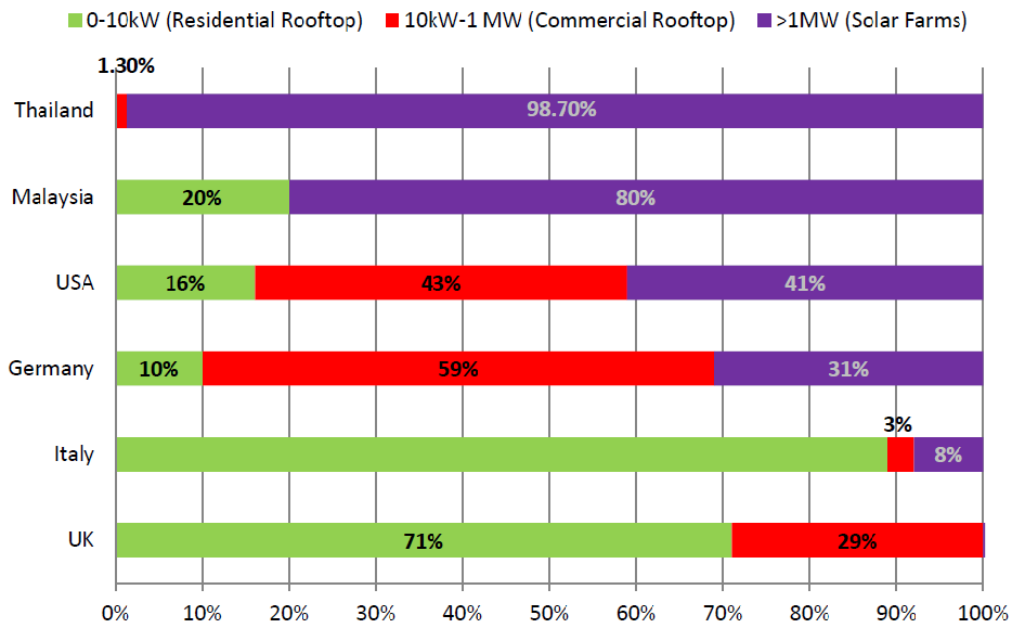


Fig. 1: comparison of solar power installations between Thailand and the others countries

2. Objective

As above information solar pv rooftop not yet implement in residential sector in Thailand and the perception of Thai people on solar pv rooftop has not been conducted yet then bring to this research objective to identify critical factors of social acceptance on solar pv rooftop acceptance in Thailand.

3. Methodology

The studies related to this research have been conducted in various fields. The first one is from Phatthira Teeraswasdi [6] in 2003. The study focuses on factors affecting the adoption of gasohol to replace gasoline. Key factors has been analyzed and indentified by demographic characteristics and opinions about the attributes of gasohol. The most effective is the comparative price advantage that gasohol is cheaper than gasoline so makes people adopt it easily. Another study is from Supanitta Suwansaard [7] in 2009. The objective is focuses on the access of the energy information and factors related to the decision in order to use Natural Gas for Vehicle (NGV) and Liquefied Petroleum Gas (LPG) instead of oil of drivers in Bangkok Metropolitan. The most effective factor to the decision of the drivers is the comparative price advantage that NGV and LPG are cheaper than oil.

The study process utilized in this work is adapted from the methodology proposed by [6] and [7]. The process diagram is illustrated in Fig. 2.

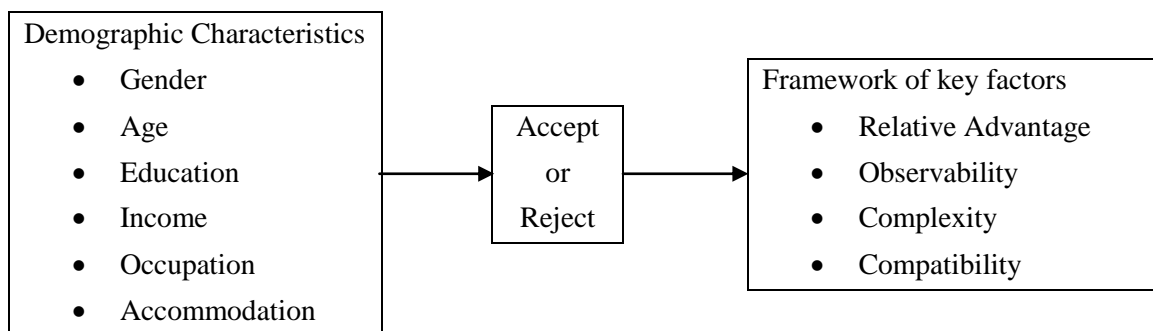


Fig. 2: Process of the study

The input information in this work is obtained from questionnaire with 400 samples classify by gender, age, education, income, occupation, and accommodation. The questionnaire ask for individuals decision

which accept or reject the solar pv rooftop then find out what is critical factor of acceptor and rejecter refer to four attributes of the innovation consist of relative advantage, observability, complexity, and compatibility. The definitions of each attributes are referred to diffusion of innovations theory [8] described below.

Relative Advantage – is the degree to which an innovations is perceived as being better than the idea it supersedes. The degree of relative advantage is often expressed in economic profitability, in status giving, or in other ways. The nature of the innovation largely determines what specific type of relative advantage (such as economic, social, and the like) is important to adopters, although the characteristics of the potential adopters also affect which dimensions of relative advantage are most important.

Observability – is the degree to which the results of an innovation are visible to others. The results of some ideas are easily observed and communicated to others, whereas some innovations are difficult to describe to others.

Complexity – is the degree to which an innovation is perceived as relatively difficult to understand and use. Any new idea may be classified on the complexity-simplicity continuum. Some innovations are clear in their meaning to potential adopters while others are not.

Compatibility – is the degree to which an innovation is perceived as consistent with the existing values, past experiences, and needs of potential adopters. An idea that is more compatible is less uncertain to the potential adopter. An innovation can be compatible or in compatible with sociocultural values and beliefs, with previously introduced ideas, or with client needs for innovations.

3.1. Demographic Characteristics and Percent Share of Acceptance

The first step is to create three part questionnaire for obtaining information of the study. First part of the questionnaire is personal data questions consist of gender, age, education, monthly income, occupation, and accommodation. Second part of the questionnaire is just a question of decision making that is “will you accept or reject Solar PV Rooftop?” to analyze the percent share of acceptance. The information of this study has been obtained from 400 samples in the Central of Thailand. The results of both part questionnaire are shown on Table 2.

Table 2 Results of first and second parts of the questionnaire

Demographic Characteristics	Total	Accept	Reject	Percent share of acceptance
Gender				
• Male	179	124	55	69.27%
• Female	221	139	82	62.9%
Age				
• Under 20	38	23	15	60.53%
• 21-30	99	70	29	70.71%
• 31-40	95	68	27	71.58%
• 41-50	101	55	46	54.46%
• Over 50	67	47	20	70.15%
Education				
• Under Graduate	121	77	44	63.64%
• Graduate	190	130	60	68.42%
• Postgraduate	80	56	34	70%
Monthly Income (Baht)				
• Under 15,000	107	74	33	69.16%
• 15,001-50,000	211	144	67	68.25%

Demographic Characteristics	Total	Accept	Reject	Percent share of acceptance
<ul style="list-style-type: none"> • 50,001-100,000 • 100,001-200,000 • Over 200,000 	61 13 8	34 8 3	27 5 5	55.74% 61.54% 37.5%
Occupation				
<ul style="list-style-type: none"> • Public Servant • State Enterprise Personnel • Employee • Business Owner • Freelancer • Others 	132 80 50 39 39 60	91 42 33 28 29 40	42 38 17 11 10 20	68.94% 52.5% 66% 71.79% 74.36% 66.67%
Accommodation				
<ul style="list-style-type: none"> • Detached House • Townhouse • Others 	288 72 40	190 50 23	98 22 17	65.97% 69.44% 57.5%
Total	400	263	137	65.75%

The percent share of acceptance show us that more than a half of each sample group accept and interest to install the solar pv rooftop on their house except the samples with more than 200,000 baht monthly income. The point in this part we should to focus on is the samples with education. We can see the increase of acceptance is related to education levels of the samples. As the results let we know that high educated people will much more easily accept than the lower.

3.2. Attributes of Solar PV Rooftop

After the first part we have already known the number of accepters and rejecters then this part will question to both sample groups with the rating scale questionnaire for the critical factor of the decisions. The factors in this questionnaire are referred to the Diffusion of Innovations Theory [8]. Twenty factors have been identified by four attributes of Solar PV Rooftop those affect to the acceptance consist of Relative Advantage, Observability, Complexity, and Compatibility. There are five factors in each of these shown on Table 3.

Table 3 Factors affect to the acceptance

Elements	Factors	Definition
Relative Advantage	• Revenue	Sell solar electricity
	• Environment Protection	Reduce GHG emission
	• Unlimited Power	Infinite power from the sun
	• Global Warming	Solving climate change situation
	• Technology Development	Solar power technology will be developed steadily in the future
Observability	• Income Statistics Monitoring	Income from selling electricity can be monitored
	• Neighbor Attitudes	Attitude about environmental protection image
	• Power Production Monitoring	Power generation can be

Elements	Factors	Definition
		monitored
	<ul style="list-style-type: none"> • GHG Reduction Monitoring 	GHG emission can be monitored
	<ul style="list-style-type: none"> • Solar Energy Knowledge 	System installation will make people know how to use it.
Complexity	<ul style="list-style-type: none"> • Installation Space 	Area for system installation
	<ul style="list-style-type: none"> • Availability of Service Providers 	Difficulty of access to the service providers
	<ul style="list-style-type: none"> • Building Location 	Solar radiation potential of the location
	<ul style="list-style-type: none"> • Maintenance 	Difficulty of maintenance
	<ul style="list-style-type: none"> • Building Structure 	Strength of the roof and building structure for system installation
Compatibility	<ul style="list-style-type: none"> • Power system 	Effect of the new system on the recent one.
	<ul style="list-style-type: none"> • Land Use 	Area of the system effect on living of installer
	<ul style="list-style-type: none"> • Installation Cost 	The installation cost is too high and effect to living cost
	<ul style="list-style-type: none"> • Global Trends 	Renewable energy is worldwide popularity
	<ul style="list-style-type: none"> • Social Value 	Solar energy is decent technology for their social value

3.3. Results

The prioritization of these factors has been performed by rating scale questionnaire as above mentioned. The results of accepters and rejecters are illustrated in Fig. 3 and Fig. 4 respectively.

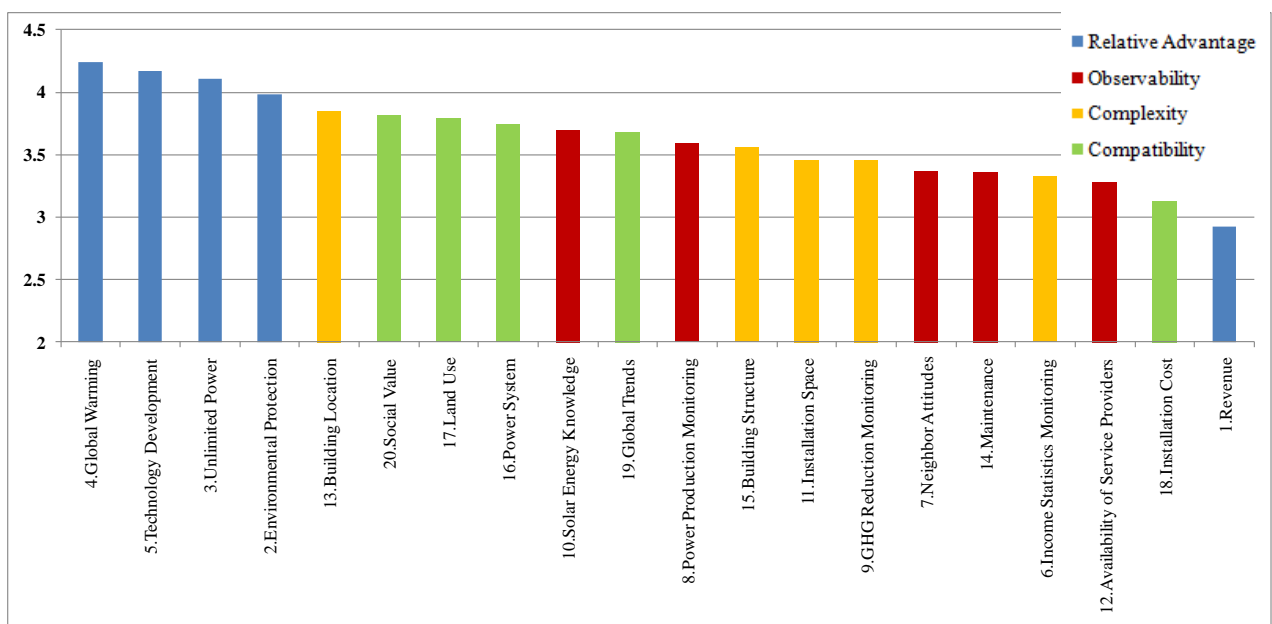


Fig. 3: Prioritization of factors for accepters

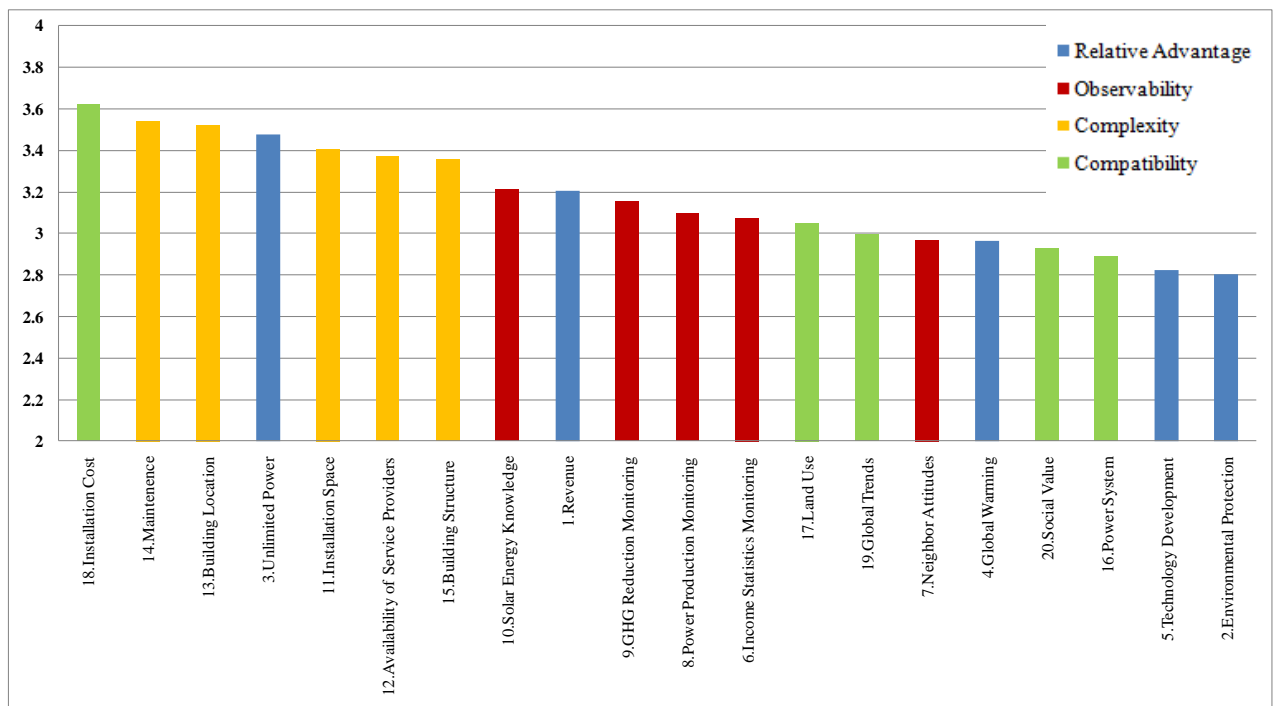


Fig. 4: Prioritization of factors for rejecters

3.4. Conclusion

The first part of this study is to present the relations of demographic characteristics and percent share of acceptance on Solar PV Rooftop. The acceptance is related to the education levels that people with high educated will much more easily accept than the lower one.

Second part identifies the critical factors affect to the acceptance those accepters emphasize to encouraging renewable energy for solving the global warming situation. The rejecters think that installation cost is too high and unacceptable.

These results offer information that would be useful for policy development in speeding up the diffusion of residential solar pv rooftop.

4. References

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