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AWARENESS AND ACCEPTABILITY OF THE FILIPINO PEOPLE ON RENEWABLE ENERGY TECHNOLOGIES

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ABSTRACT

The study aimed to determine the attitude of the Filipino people towards renewable energy technologies. The study is quantitative in nature which used descriptive survey as means of data collection. Four hundred seventy three (473) respondents from thirteen municipalities of the province of Zambales were selected for this study. Results indicate that majority of the respondents were male, below 21 years old, married, with elementary level as the highest educational attainment, have household size of 3-4 members, and monthly income of below Php15,000 to Php above 50,000.00.Findings of the study revealed that majority of the respondents are moderately aware of the renewable technologies in the locality and indicated moderate acceptability on the different technologies such as solar panel and windmill however, showed slight acceptability on biogas and ramp pump. Solar panel and wind mill were more acceptable than ramp pump and biogas.

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INTRODUCTION

In the Philippines, since 2008 after Renewable Energy Act of 2008 was implemented, there are more than 300 renewable energy projects established in the country (Phil Daily Inquirer, 2015). Renewable energy has become a top priority for several countries due to increasing global concerns about climate change and scarcity of fossil fuels (Smith, 2013 and Krupp, 2007). Concerns about energy security and climate change are enforcing significant changes on how energy and electricity are generated, transmitted, and consumed. With that said, series of formal and informal policies, directives, legislations, etc. are developed to encourage use of renewable energy in order to reduce emissions of greenhouse gases, decrease the energy consumption throughout the European Union (Tol, 2012; European Parliament and Council, 2010), and increase energy efficiency.

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This demonstrates that many people are already aware of the consequences of using fossil energy sources. Certain targets require low carbon technologies for generating energy which include renewable energy technologies that generate electricity from wind, sun, biomass and sea thermal. These become commonplace rather than 'alternative', as is currently often the case. As energy consumption rises alongside with increases in population and living standards, awareness on the environmental costs of energy and the need to expand access to energy in new ways is growing. Renewable energy has gained increased recognition because of the benefits it provides to rural development which is tantamount to lower health costs with regard to air pollution. On that note, efforts to mitigate energy independence and climate change is shifting renewable energy from the fringe to the mainstream of sustainable development (RECIPE, 2006). The renewable energy technologies for energy generation are diverse, encompassing solar photovoltaic panels; wind turbines of different scale, designs and on offshore location; energy from waste plants; biomass fuelled plant at scales from small combined heat and power plant to large scale power stations; hydro schemes and ocean technologies (e.g. tidal and wave

devices). Considering the fact that each technology captures different natural resources in different ways, the environmental, economic and social impacts of each technology vary (Devine-Wright, 2008). Thus, the need to assess social acceptability of renewable energy technology is fundamental to understand a community's social perspectives in terms of using renewable energy technology and climate change issues (Batel et al., 2013). This study aimed to examine the level of awareness on energy efficiency in terms of renewable energy sources, technologies, and climate change in the Finnish Society. Additionally, this study explored how the level ofperception and level of acceptance on renewable energy technologies vary especially for respondents' personal use in their households or near environment. This study highlightedparticipant's awareness and opinion about the cost of renewable energy applications, willingness to pay for clean energy, and renewable energy acceptability.

METHODOLOGY

The study is quantitative in nature which utilized a descriptive research design.Considering the fact that this is a quantitative study, this research utilized surveys as a method of data gathering from the research participants and used descriptive questionnaire as the instrument of the study to measure the awareness and acceptability of renewable energy technologies (RETs) in Zambales. Group meetings were organized and each participants were interviewed. The questionnaire is composed of three parts: part A of the survey schedule focused on gathering information relating to participants' background variables, part B aimed to collect data on awareness of renewable energy technologies, and lastly, the survey focused on respondents' willingness to invest in Renewable Energy Technologies. Data were collected from 260 respondents fromthirteen municipalities of Zambales which include Subic, Castillejos, San Marcelino, San Antonio, San Narciso, San Felipe, Cabangan, Botolan, Iba, Palauig, Masinloc, Candelaria and Santa Cruz (Figure 1).

To ensure the validity and reliability of the instrument, the researchers pre-tested the instrument with few respondents who share the same characteristics with the intended research participants in the province of Zambales prior to the actual data gathering. Data collected were analyzed using descriptive statistics such as frequency and percentages. Test for central tendencies were computed which include means to better understand the data collected. For a more empirical standpoint, the researchers utilized T-Test to identify significant differences between the variables.

RESULTS AND DISCUSSION

Socio-demographic Profile of the Respondents

A total of four hundred seventy-three (473) respondents from thirteen (13) municipalities were chosen to be research participants. The respondents are generally male (317, 67.01%) and below 21 years old which make up of 34.9 percent of the research population. More than half of the respondents are married (332, 70%) while the remaining are widow, single, and annulled. In terms of educational attainment, a great number of the respondents finished elementary education, followed by college levels, and high school graduates. Almost half of the respondents have a household size of 3-4 (206, 43.55%) while the number of respondents with the household size of 11-12 are recorded to be the smallest (2, 0.42%). In terms of their monthly income, respondents are by and large earning a monthly income of below Php15,000 (381, 80.55%) while the remaining respondents' monthly income are sparsely distributed from Php15,000 to Php50,000 and above. Table 1 presents the socio-demographic characteristics of the respondents.

Level of Awareness Towards Climate Change and Renewable Energy

The respondents' level of awareness about climate change and renewable energy was measured by their mean scores.

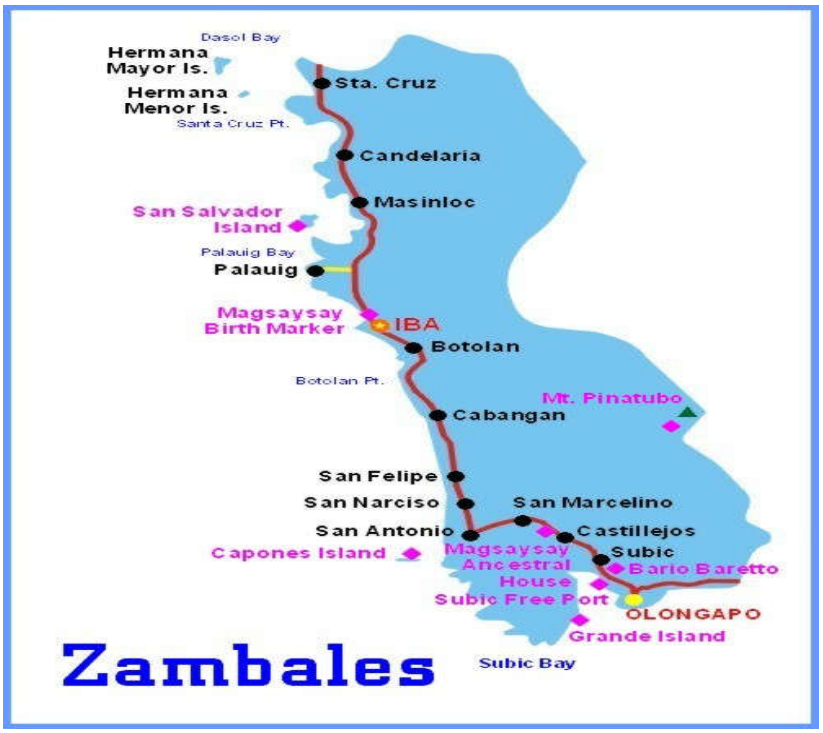

Figure 1. Map of Zambales where data collection was done

Table 1. Profile of Respondents

Sex	Frequency	Percent
Female	156	32.98
Male	317	67.01
Total/Mean	473	100.0
Age of respondents	Frequency	Percent
below 16 years old	8	9.7
16 - 20 years old	46	1.7
21 - 25 years old	7	1.5
26 - 30 years old	25	5.3
31 - 35 years old	18	3.8
36 - 40 years old	59	12.5
41 - 45 years old	62	13.1
46 - 50 years old	86	18.2
51 - 55 years old	53	11.2
56 - 60 years old	55	11.6
61 years old and above	54	11.4
Total/Mean	473	100.0
Civil status of respondents	Frequency	Percent
single	40	8.5
married	332	70.2
widow	75	15.9
annulled	26	5.5
TotalMean	473	100.0
Highest educational attainment	Frequency	Percent
elementary	159	33.6
high school level	12	2.53
high school graduate	114	24.1
college level	144	30.4
college graduate	44	9.3
TotalMean	473	100.0
Occupation of respondents	Frequency	Percent
Barangay. Captain	11	2.32
Barangay Councilor	200	42.3
Barangay Secretary	8	1.7
Driver	3	0.6
Farmer	16	3.4
No work	207	43.76
Others	15	3.17
TOTAL/Mean	473	100.0
Respondents' household size	Frequency	Percent
1-2	86	18.18
3-4	206	43.55
5-6	174	36.79
7-8	21	4.04
9-10	4	0.84
11-12	2	0.42
Total/Mean	473	100.0
Respondents' Monthly Income	Frequency	Percent
Php 50,000.00 and above	38	8.0
Php 45,000.00 - Php 49,999.00	7	1.5
Php 40,000.00 - Php 44,999.00	5	1.1
Php 35,000.00 - Php 39,999.00	4	.8
Php 30,000.00 - Php 34,999.00	3	.6
Php 25,000.00 - Php 29,999.00	2	.4
Php 20,000.00 - Php 24,999.00	11	2.3
Php 15,000.00 - Php 19,999.00	22	4.7
Below Php 15,000.00	381	80.55
Total/Mean	473	100.0

Table 2. Awareness of the respondents towards climate change and renewable energy

		Weighted Mean	Description
1	Climate change results from the different activities of man	3.75	Moderately aware
2	Global climate is currently changing	3.79	Moderately aware
3	Renewable energy reduces carbon dioxide emissions (CO_2) which causes climate change	3.43	Moderately aware
4	Greenhouse gas emissions cause climate change	3.33	Slightly aware
5	The use of renewable Energy can slow down climate change	3.47	Moderately aware
6	reduce dependence on current power sources	3.39	Slightly aware
7	Environment friendly	3.71	Moderately aware
8	High maintenance needed	3.64	Moderately aware
9	It can be the answer to our electricity problem	3.51	Moderately aware
10	It is the new technology used by the other leading countries	3.42	Moderately aware
	Mean	3.54	Moderately aware

Table 3. Acceptability of the Renewable Energy Technology

	Acceptability	Solar Panel		Wind Mill		Ramp Pump			Biogas	
		Weighted Mean	Description	Weighted Mean	Description	Weighted Mean	Description		Weighted Mean	Description
1	Easy to install	3.40	Moderately acceptable	2.99	Slightly acceptable	3.03	Slightly acceptable		3.08	Slightly acceptable
2	Experts are needed to install the Solar Panel	3.76	Moderately acceptable	3.66	Moderately acceptable	3.41	Moderately acceptable		3.42	Moderately acceptable
3	high capital needed	3.60	Moderately acceptable	3.56	Moderately acceptable	3.34	Slightly acceptable		3.32	Slightly acceptable
4	Easy to maintain	3.40	Moderately acceptable	3.28	Slightly acceptable	3.11	Slightly acceptable		3.20	Slightly acceptable
5	Provides unlimited electricity	3.49	Moderately acceptable	3.51	Moderately acceptable	3.22	Slightly acceptable		3.40	Moderately acceptable
6	Long life-span	3.45	Moderately acceptable	3.74	Moderately acceptable	3.25	Slightly acceptable		3.52	Moderately acceptable
7	Large spaces needed	3.34	Slightly acceptable	3.67	Moderately acceptable	3.32	Slightly acceptable		3.29	Slightly acceptable
8	Reduces electricity/water bill	3.78	Moderately acceptable	3.47	Moderately acceptable	3.30	Slightly acceptable		3.07	Slightly acceptable
9	Afforded by rich people	3.04	Slightly acceptable	3.15	Slightly acceptable	3.03	Slightly acceptable		3.24	Slightly acceptable
10	Afforded by ordinary people								2.93	Slightly acceptable
	Mean	3.47	Moderately acceptable	3.45	Moderately acceptable	3.22	Slightly acceptable		3.25	Slightly acceptable

At large, the respondents are moderately aware to slightly aware which are indicated by their mean scores of 3.33 to 3.79. Based on the statements on awareness of the respondents towards climate change and renewable energy, eight (8) out of ten (10) statements revealed that the respondents have moderate awareness. These are reflected on the statements which highlights the general conditions of climate change and renewable energy. The respondents overall mean score on awareness towards climate change and renewable energy is 3.54 demonstrate moderate level of awareness. Since 2014, UNESCO has been providing capacity building programs for several years to increase adaptation and mitigation capacities of communities in many developing countries.However,the level of awareness of the communities remained moderate. Table 2 shows the level of awareness of the respondents about climate change and renewable energy.

Acceptability of the Renewable Energy Technologies

The level of acceptability is shown in Table 3. Based on the table presented below, the findings of the study revealed that windmill and solar panel ad higher acceptability than ramp pump and biogas. The overall mean score of 3.47 entails a moderate level of acceptance on solar panel. The respondents indicated moderate level of acceptance on renewable energy on the following statements which are reduces electricity/water bill (3.78), experts are needed to install the solar panel (3.76), high capital needed (3.60), provides unlimited electricity (3.49), long life span (3.45), easy to maintain (3.40), and easy to install (3.40). On the other hand, respondents found these two statements: large spaces needed (3.34) and afforded by rich people (3.04) to be slightly acceptable. Reduction in electricity ranked first as their response to indicate that renewable energy through the use of solar panel as moderately acceptable. On the contrary among the Europeans, solar technology is the most acceptable renewable energy technology (DTI, Scottish Executive et al., 2003). McGowan and Sauter's review (2005) cited several personal and contextual factors explaining public attitudes towards renewable energy.Table 3 presents the level of acceptability of the renewable energy using solar panel as source of energy. The overall mean score gleaned based on the collective mean scores of the respondents is 3.45 which suggest that respondents of this study have moderate level of acceptability of windmill as a source of renewable energy. The level of acceptability in this study ranges from 3.15 to 3.74 where respondents demonstrated moderate level of acceptability on windmill as a source of renewable energy on seven (7) out of ten (10) statements. This can be attributed to the fact that the province is windy especially during the months of January to March. Hence, windmill is suitable. According to Corbus et al (1994), in developing countries like Mexico, one of the four technologies with the highest ranking is the use of wind. This method can improve air quality and reduce fossil fuel use and carbon dioxide emission. This finding contrasts the finding in European countries that Wind energy, being a clean and renewable energy source in a global context of increasing social concerns about climate change and energy supply, is traditionally linked to very strong and stable levels of public support. The most recent empirical evidence on public opinion towards wind energy at both the EU and the country level fully supports such favourable perception of this energy source among European citizens. Nevertheless, experience in the implementation of wind projects shows that social acceptance is crucial for the successful development of specific wind energy projects (Johansson and Laike, 2007). Table 4 shows the level of acceptance of respondents on renewable energy specifically the windmill.

Germane to this study is the level of acceptance on ramp pumps. The study revealed that respondents' overall mean score of 3.22 indicate slight acceptance on ramp pumps as a source of renewable energy (see Table 5). Ramp pumps as source of renewable energy is deemed slightly acceptable by respondents. Nine (9) out of ten (10) statements yielded mean scores of 3.34 to 3.03 which are all interpreted as slightly acceptable. Only one (1) statement which states experts are needed to install the wind pump generated a moderate level of acceptance with a mean score of 3.41 One plausible explanation why respondents find ram pump slightly acceptable and unpopular is because the area where their houses are located is not hilly. Ramp pump is more popular in hilly areas where the water is brought uphill. The finding is in support to the recommendation of IDRC (2015) that the social acceptance of ramp pump must be established and how these devices fit into the local needs of the communities.

Based on the mean scores of the respondents, it can be inferred that generally, respondents exhibited slight acceptance on biogas as source of renewable energy with overall mean score of 3.25. Respondents exhibited slight acceptability on the following statements: high capital needed (3.32), suitable in raising livestock, poultry, and the like, long life span (3.24), easy to maintain (3.20), easy to fabricate and install (3.08), practical for household (3.07), and afforded by ordinary people (2.93). On the other hand, respondents exhibited moderate level of acceptance on three (3) out of ten (10) statements which are practicing the proper waste management disposal (animal and human manure) (3.52), experts are needed to do the biogas (3.42), and use as alternative source for cooking like LPG (3.40).This study revealed the level of acceptability of respondents ranges from slightly to moderately acceptable with means ranging from 2.93 to 3.52. Since the use of biogas may entail a large capital and has to be put up if there is a ready source of waste manure from plants or animals, they indicated that it is slightly acceptable. This finding does not conform with the study of Corbus et al (1994) which postulated that in developing countries like Mexico, the installation of biogas is one of the most popular renewable energy technologies. On the other hand, results of Mojares (2015) study showed that biogas technology contributed to socio-economic improvement of the barangay in the form of job creation, technological and skills transfer through training in biogas production, contribution to continuous pursuing of energy neutrality and encouraged sustainability development at the community level. Aside from these, the technology was a source of organic fertilizer for the farming community.

Conclusion

Solar panel and wind mill are more acceptable that ramp pum and biogas. The respondents are moderately aware in terms of climate change and renewable energy technologies. The respondents are predominantly male, older, married elementary graduate and no occupation, with 3-4 household size and with income below Php15,000.00

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