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## Article

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## **Influence of Socio-environment Factors towards Acceptance of Renewable Energy Products**

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### ABSTRACT

Socio-environment is considered as one of the acceptance factors which plays a major role in customers' decision making before purchases. Study based on socio-environment behaviour of an individual might differ from product to product and from place to place. Thus, research is conducted keeping in mind the renewable energy products, such as, solar water heater, biomass stove and solar street lamps domain and how the users and non-users display acceptance-based socio-environment inclination while purchasing renewable energy products. Results showed that users of renewable energy are more inclined towards socio-environment as compared to non-users of renewable energy products.

*Keywords: Renewable Energy Products, Socio-Environment, Users and Non-Users, Himalayan Region, Purchase Intention*

## I. Introduction

Renewable energy has become the need of the hour for all the countries across the globe. The usage and acceptance of renewable energy must not be limited to industries and few domestic customers as it needs to expand in all possible sectors across the industries and domestic usage around the world. Hence, social acceptance of the renewable energy products requires in-depth research covering every demographic, topographic and psychographic segmentation. Recently,

Government of India has been focusing on the implementation of renewable energy through various schemes and encouraging research and development. For implementation of renewable energy there is a need to create public awareness. When we say public awareness, it includes society, thus the question arises as to what society consist of. Societies have patterns of social relationships between individuals who share same culture and an institution. One research emphasized on social research of acceptance of renewable energy technologies provided that a classification of personal, psychological and contextual factors must bring together public acceptance (Devine, 2008). Some studies have suggested the importance of visual appearance of the renewable energy products. In California, 40% installers of solar panel mentioned that the aesthetics

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of solar panels was a key factor for selecting a panel and recommending it to other homeowners (Chen et al., 2013). US survey reported that 17% of respondents were not interested in installing solar panels as they found the panels unattractive<sup>1)</sup>.

In society, people have different tastes and preferences based on their demographics and personality, which is psychography. It is the study of personality, values, opinions, attitudes, interests, and lifestyles of individual consumers (Senise, 2007). Furthermore, the study based on ecocentrism has also been carried out by a few researchers. Ecocentrism in a broadest term recognizes intrinsic value in all lifeforms and ecosystems. It is highlighted that ecocentrism is essential for solving environmental crisis, while arguing its importance from four perspectives: ethical, evolutionary, spiritual and ecological (Curry, 2011). Other researchers stated that environmental orientation is both direct and an indirect drivers of purchase intentions of low-involvement environmental goods (Coşkun et al., 2017). Another study conducted in Mexico, found that environmental attitudes of consumers influenced their willingness to pay a premium price for an environmentally-certified products. It is also observed that price may not be a common hindrance for the acceptance of the products (Husted et al., 2014). Another study found that knowledge of young consumers about green products determined their actual purchase, thereby, highlighting the importance of awareness related to renewable energy products (Kanchanapibul et al., 2014). It is also suggested that marketing managers and policymakers might consider a blend of customers ecological behaviors along with demographic and attitudinal variables, such as, perceived consumer effectiveness, environmental and social values, instead of myopic outlook, viz, high or low adoption levels of pro-environmental behaviors (González et al., 2015). Similarly, another researcher stated that eco-centric and anthropocentric contributes in explaining conservation behavior, membership in environmental organizations

and the indifference towards environment (Thompson and Barton, 1994). Another study related to Altruism refers to voluntary behavior that benefits others (Krebs, 1970). A strong positive correlation between altruistic orientation and individuals' willingness to pay for environmental goods (Kumakawa, 2017). Women places more value in altruism as compared to men. Hence, gender differences in altruism is the basis of gender differences in environmentalism (Dietz et al., 2002). Similarly, there are other variables affecting green consumption, viz, altruistic values, environmental concern, environmental knowledge and being skeptical towards environmental claims (Mostafa, 2009). Another study conducted on green restaurant, found that high-altruism group showed a strong positive attitude towards consumption in green restaurants (Shen, 2017). While analyzing sample contributing to a Voluntary Contribution Mechanism based program, author found that altruism and egoism motives as underlying contributors (Oberholzer, 2001). In another study, authors had created a social-psychological model of environmental concern, where, social and institutional structure, values outlining general beliefs and worldviews, such as environmental concerns and altruistic norms were included (Stern et al., 1995). Studies regarding *global identity* showed that individuals with a glocal cultural identity exerted a positive relationship between materialism and environmentally friendly behaviour (Strizhakova & Coulter, 2013). Significantly, individuals with higher global identity also projected pro-environmental activism (Renger & Reese, 2017). Another study related to local identity revealed a sacrifice aspect, where it was found that core argument of local identity among consumers evoked sacrifice mindset (Xu et al., 2007). In simple words, people were ready to accept and purchase locally made products as against non-local products. Sometimes companies resort to positioning their products as having local roots with the aim of reducing consumers' price sensitivity (Loureiro & Hine, 2002). Studies regarding environment-based purchasing behaviour, as conducted by authors on green tariff mechanism revealed that an individual's contributions were directly linked with their spending pattern on private goods (Mitra & Moore, 2018). Advertising

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1) Utility Customer Reasons for lack of Interest in Solar Panels in the United States, as of March 2016, from <http://www.statista.com/statistics/567212/reason-for-solar-panel-disinterest-in-the-us-among-utilitycustomers/> (Accessed 01 April 2017).

campaigns which are directed towards increasing consumer demands for green energy should emphasize on psychological brand benefits along with environment and utilitarian benefits as it may lead to positive influence in purchase behaviour as suggested (Hartmann et al., 2012). In terms of attitudinal factors, adopters of eco-innovation exhibited high levels of pro-environmental values, beliefs and personal norms, similarly study related to environmental beliefs revealed that the adoption group had higher awareness related to consequences of using fossil fuels as compared to other groups (Jansson et al., 2011). And may be encouraged to do so by providing temporary subsidies for early adopters (consumers) where people need not wait (Ansar et al., 2009). Economist developed theoretical models to study external conditions of public goods, which indicated that individuals have little incentive to privately pay for public goods and that they chose to free ride without paying any costs (Olson, 1965). Meaning, they would want to get the benefits of renewable energy products which is purchased by neighbours. Coming to the studies related to environment based sustainable development, researcher mentioned that effective energy conservation nudges must be targeted (Costa et al., 2013). Also, that peoples' biospheric values are related to moral obligation of reducing household energy (Steg et al., 2005). Another study revealed that paternalistic altruism is another form, where, an individual is concerned about satisfaction that others derive from a particular public good (McConnell, 1997). In simple words, it means that people get satisfied when they see others enjoying walk at the park. This outlook if adopted by every individual where everyone is working for the satisfaction of public, might help in achieving holistic sustainable development. However, according to Massachusetts Department of Environmental Protection, consumers' may perceive green products to be of inferior quality due to low technical performance as compared to other conventional brands<sup>2)</sup>. For studies related to energy consciousness, the researcher

mentioned that attitude towards green electricity was associated to awareness of consequences of environmental problems to oneself and self-transcendent (Hansla et al., 2008). Several studies which has used demographical factors, socio-economic factors and psychology factors have shown that environmentally conscious consumers are better educated, have higher income, have higher socio-economic status and are politically liberal (Balderjahn, 1988).

Research conducted on renewable energy is pan world addressing topics related to technology, designs and understanding its demand based on geographical and topographical configuration. However, when the focal point of research is on human behaviour and its probable connection towards adopting renewable energy, results vary ranging from one city to other and from one country to another as demographics are diverse and peoples' taste and preferences alters from one product provider to another product provider. Suggestions, findings and recommendations based on renewable energy of one researcher based on one particular country may not be applicable to another country or city as there are differences in living standards and different demographics.

It is clear from the literature review that most of the studies related to renewable energy are based on technical as well as behavioral perspective of customers. Also, there are wide research being carried on technology aspect of renewable energy in North East India, however, there are few researches related to understanding of consumer behaviour towards renewable energy has been carried out that too with a smaller number of parameters.

Hence, present research is an attempt to understand, identify and close the gap between purchase decision and influence of socio-environment towards renewable energy products, which is equally important as it may help policy makers, manufacturers and marketers to modify strategies accordingly.

The study is focused on Sikkim. This region is important as the political emphasis in the state of Sikkim is to conserve the phenomenal ecology of the state. The Government policies, unlike other regions of India, are significantly far ahead in ecological emphasis. This

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2) Massachusetts Department of Environmental Protection (2002). Barrier/Motivation Inventory No. 3. Retrieved July, 2003 from <http://www.state.ma.us>.

was the first State in India to ban usage of plastic. The coverage of forest in the State is 47.62% which is highest in India and is the only State where the forest coverage has increased in the last twenty years. It has also won award for Dhara Vikash Programme for conserving the rivers and streams of the State. It has also been declared as India's most progressive state. Sikkim is the only region in the world which practices organic farming as declared by UN. In the year 2018, it has won the Future Policy Gold Award by Food and Agriculture organization of United Nation. The Government policies may have influenced Sikkimese people to be more eco-centric and therefore, this study is focused in this tiny region.

## II. Methodology

The research undertaken is empirical and descriptive in nature. The relationships between variables have been explored to test the hypothesis in this study. This empirical research is data-based followed by formulation and testing of the hypothesis to draw definite conclusions. The population for this research work constitutes of users and non-users of renewable energy of the chosen geographic region. The list of individuals using renewable energy products under study was obtained from Sikkim Renewable Energy Development agency (SREDA) which is the only agency supplying these products in Sikkim and from West Bengal Renewable Energy Development Agency, (WBREDA). The principle of Judgement and convenience sampling has been used to collect the samples. Despite its criticism, most researchers in humanities rely upon convenience sampling method (Fabrigar, L. R et al., 1999). However, samples have been collected from all the four districts of the State of Sikkim and two districts (namely Darjeeling and Kalimpong) of west Bengal which geographically are a part of Sikkim Himalayas. Non-users were also identified using a screening questionnaire. Total sample size is 600 with following breakup:

1. User/Non-user:174 non-user 426 users
2. Marital Status: 263 married 337 unmarried
3. Age (Years): 18-35 (115) 35-50 (250)  
Above 50 (235)
4. Income (Rs.): below 25,000 (233)  
25,001-50,000 (225) Above50,000 (142)

Existing validated tools have been used to measure socio-economic belief factors such as Ecocentrism, energy consciousness, environmentalism (purchasing behaviour and sustainability importance), global self-identity and altruism<sup>3</sup>). The meaning of above-mentioned psychographic factors is given hereinunder;

- a) Eco-centrism: is a degree to which a person is nature-centered in his/her system of values.
- b) Energy Consciousness: a measure of the degree to which a consumer's sense of energy conservation influences his/her lifestyle.
- c) Environmentalism (Purchasing Behaviour): a measure as to how a person chooses to buy products that are considered least harmful for people and environment.
- d) Environmentalism (Sustainability Importance): is a degree to which a person values care towards environment and believes in making environmentally responsible decisions.
- e) Global Self-Identity: is the extent to which a person identifies himself with people around the world.
- f) Altruistic: importance a person places in his/her value system on social goals such as equality and cooperation.

## III. Hypotheses Development

Hypothesis is a specific testable prediction which describes what researcher expects will happen in a certain circumstance. Based on the objectives set,

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3) [www.marketingscales.com](http://www.marketingscales.com), an official website of Dr. Gordon C. Bruner II, where books, individual scale reviews, and the website is published and managed by GCBII Productions, LLC.

**Table 1.** Socio-economic belief of respondents.

Socio-economic belief	User Status	Mean	Significance	Null Hypothesis
Eco-Centrism	Non-user of RE	11.03	0	Rejected
	User of RE	13.20		
Energy Consciousness	Non-user of RE	10.13	0	Rejected
	User of RE	12.02		
Purchase behaviour based on environment	Non-user of RE	10.43	0	Rejected
	User of RE	11.90		
Environment based on sustainable development	Non-user of RE	14.30	0	Rejected
	User of RE	16.94		
Global Self-Identity	Non-user of RE	29.33	0	Rejected
	User of RE	36.74		
Altruism	Non-user of RE	13.75	0	Rejected
	User of RE	17.61		

the following hypotheses have been formulated for this study. Hypotheses generated are as under:

H<sub>01</sub>: Users of renewable energy products do not have significantly higher socio environment friendly belief than non-users.

H<sub>1</sub>: Users of renewable energy products have significantly higher socio environment friendly belief than non-users.

H<sub>02</sub>: There are no factors influencing buying decision of users than non-users.

H<sub>2</sub>: Users buying decision related to renewable energy products is influenced by various factors.

Independent sample t-test method was used for analyzing data for socio-economic belief with the user status. This test is useful to determine if significant differences exist across two independent samples (users and non-users in this instance). The data was checked and found to follow normal distribution. For the hypothesis testing, the confidence limit was set at 95%. t-test was used to determine the significance of beliefs. The means selected for one sample test was taken as 3 being the mid value of the Likert scale. At 95% confidence limit for t-test is considered significant if it is Z value is beyond  $\pm 1.96$  and Significance (Sign.) less than 0.05. The significance level, ( $\alpha$ ), is the probability of rejecting the null hypothesis when it is true. For example, a significance

level of 0.05 indicates a 5% risk of concluding that a difference exists when there is no actual difference. Alternately, there is a 5% risk of concluding that no differences exist when there is actual difference. Discriminant analysis has been used to determine the possibility of differentiating users and non-users on the basis of variables undertaken for the study. Result and discussion have been provided in next section.

## IV. Result and Discussions

### A. Analysis based on user status and socio-environment belief of respondents.

Based on the questionnaire, the data were collected on socio-economic beliefs, such as, eco-centrism, energy consciousness, purchase behavior based on environment, environment based on sustainable development, global self-identity and altruism for both users and non-users of renewable energy products. Furthermore, mean value was computed, and significance level is analyzed. For this Independent T-test was conducted for analyzing data of Table 1, where, mean of two samples are compared, namely, for the same socio-economic belief for users of renewable energy products and non-users of renewable

energy products. All correlations are statistically significant ( $p < 0.05$ ), refer significance column for  $p$  value.

For **eco-centrism**, mean value of users (13.20) is high as compared to non-users (11.03), which indicates that users of renewable energy are nature centered in their values. It was found in one of the studies that early adopters of eco-innovation were confirmed of holding higher level of education as compared to non-adopters (Jansson et al., 2011). Hence, education may influence an individual's inclination towards eco-centrism, as higher education suggests open mindset and increased learning ability. Powersa & Kocakuuml (2015) focused on wellness programs of employees in order to control rising health care premiums. Research assumes that as eco-centrism is important, Companies may adopt products of renewable energy as a first step towards employees wellness program.

Similarly, for **energy consciousness**, mean value of users (12.02) is higher than non-users (10.13), indicating that their sense of energy conservation influences their lifestyle. According to a researcher, it is important to understand both psychological and economic perspective of why an individual participates in a premium priced, green electricity program (Clark et al., 2003).

For **purchase behaviour based on environment**, mean value for user (11.90) is slightly higher than non-user (10.43), showing that users choose to buy products that are less harmful for people and environment. This was also found in the study on green tariff mechanism that an individual's contributions are directly linked with their spending habits on private goods (Mitra & Moore, 2018). When it comes to behaviour of an individual, one of the authors suggested that study based on analysis of attitude, normative and control perceptions of leaders and their decision making could also be beneficial (Westaby et al., 2010). Also, that consumers are price sensitive toward green products and price affects consumers' purchase decision (Anderson & Hansen, 2004; Ottman, 2000). Consumers may feel that they will not get value for money (Glegg et al., 2005).

For **environment based on sustainable development**, mean value for user (16.94) is higher than non-users (14.30), indicating that users believe in making environmentally responsible decision. Similar studies indicated environmental benefits, potential of reducing long-term electricity costs and reduced risk of interruptions fuel supply in future of green electricity production (Wiser & Pickle, 1997). Several studies too suggested that consumers are prepared to pay more money for products labelled as 'green' (Biggsby & Ozanne, 2002; Vlosky et al., 1999). Thus, people might buy renewable energy products if it is promoted for sustainable development.

Nonetheless, for **global self-identity**, mean value for users (36.74) are comparatively much higher than non-users (29.33), and that users identifies themselves with people around the world. There has been research related to global vs. local identity, where people buy products if it is locally made. Researcher opined that if consumers have a stronger local identity than they are willing to pay more for locally produced products (Loureiro & Hine, 2002).

Finally, mean value for users (17.61) under **altruism** is also higher than that of non-users (13.75), signifying that users places value system on social goals. However, contradicting the result under pure altruism, the author revealed that an individual consider others contribution as a perfect substitute for their contribution (Mitra & Moore, 2018). In other words, some people do not feel obliged towards environment as other people are working for environmental benefit.

Hence, null hypothesis ( $H_{01}$ ) is rejected and alternate hypothesis ( $H_1$ ) is accepted for all the factors under socio economic beliefs. In other words, users of renewable energy products have higher eco-centrism, shown higher energy consciousness, higher environment related purchase behaviour, have higher responsible decision towards environment, have high global self-identity and places more values on social goals.

To further confirm the result from Table 1, discriminant analysis was conducted in order to identify potential users and non-users of renewable energy. We begin by checking the Eigen value. The larger the eigenvalue, the more of the variance in

the dependent variable is explained by that function. We get an Eigen value to be 1.287 which is very not high but still acceptable. An eigenvalue indicates the proportion of variance explained. (Between-groups sums of squares divided by within-groups sums of squares). The larger the eigenvalue, the more of the variance in the dependent variable is explained by that function. Thus, it may be interpreted that it is worthwhile to use discriminant analysis in this instance. The value of corresponding Wilk's Lambda is 0.437. Wilk's Lambda is the ratio of the within-groups sum of squares to the total sum of squares. This is the proportion of the total variance in the discriminant scores not explained by the difference among groups. Value of Lambda varies between 0 and 1 and a small Lambda indicates that the difference is significant. In this case we find it to be weakly low. Chi-square is also the measure of whether the two levels of function significantly differ from each other based on the discriminant function. A high value (In this case it is 493.3 which is significantly high) indicates that the function discriminates well. The associated significance value indicates whether the difference is significant. In our case this is further confirmed as the significance value is near 0 - much below 0.05.

In order to find the top three factors leading to the purchase of renewable energy, canonical discriminant function coefficient was conducted based on the result from Table 1.

Table 2 enlisted standard canonical discriminant for socio-environment beliefs. The scores listed in Table 2 implies that global self-identity is the main socio-economic variable followed by altruism and eco-centrism and subsequently other variables follows. For this study a threshold of 0.4 differentiates meaningful functions from the non-meaningful ones. From the ranking it is understood that users of renewable energy identify themselves as the citizens of the world and is not limited to any State or a Country, followed by higher value on altruism and that their attitude towards energy conservation (eco-centrism) influences their lifestyle too. Their purchase decision seems to be influenced by these socio-economic variables. Hence, while promoting the renewable energy products,

marketers might highlight testimonies of satisfied users while focusing on how their choice enabled them to synchronize their lifestyle and simultaneously uphold their global identity.

To further validate whether these three variables, i.e., global self-identity, altruism and eco-centrism, are correct in the true sense, structure matrix test was performed as tabulated in Table 3.

The result from Table 3 validate and confirm the first three socio-economic variable's, namely, global self-identity, altruism and eco-centrism. This correlates the fact that the above socio-economic factors have influence on the purchase decision related to renewable energy products.

To classify and to predict groups of users and non-users of renewable energy, the data was further analyzed and listed in Table 4. The table listed checks the count percentage, it is confirmed that 95.4% count for non-users and 95.3% count for users were confirmed, which is a satisfactory percentage of count. Hence it can be concluded that the results obtained

**Table 2.** Canonical Discriminant Function Coefficients for socio-environment beliefs

Standardized Canonical Discriminant Function Coefficients	
	Function
Eco-centrism	<b>0.429</b>
Energy consciousness	0.299
Environment (Purchase Behavior)	0.160
Environment (Sustainable Development)	0.062
Global self-identity	<b>0.595</b>
Altruism	<b>0.463</b>

**Table 3.** Structure matrix for confirming socio-environment variable

Structure Matrix	
	Function
Global self-identity	<b>0.682</b>
Altruism	<b>0.599</b>
Eco centrism	<b>0.520</b>
Environment based on sustainable development	0.443
Energy consciousness	0.408
Environment based on purchase behavior	0.347



is satisfactory and may be scientifically accepted.

Further, for testing hypotheses H<sub>02</sub> and H<sub>2</sub>, as mentioned in III and IV in hypotheses development section, is dealt here under.

**B. Analyzing factors leading to purchase based on user status of respondents.**

All correlations are statistically significant ( $p < 0.05$ ). From Table 5, researcher found that mean value for users (6.56) is more than non-users (5.78) when it comes to **saving money**. Under product **beneficial factor**, mean value for user (6.49) is less than non-user (7.30) which indicates that product benefit is an attractive factor for non-users of renewable energy. Similar result obtained for other factors too

showed users mean value was higher than non-users. A study conducted by Wessells opined that assessing environmental attributes of products are difficult for consumer as compared to other product attributes (Wessells et al., 1999). Though consumers might find it difficult to assess but this factor must not be ignored. For **convenient** as a factor, users mean value (6.69) is higher than non-users (5.25), as that consumers purchasing decision is not grounded on environmental concern alone, but on convenience, availability, price and quality as revealed (Johri & Sahasakmontri, 1998). **Low price** as another factor too gained high mean value (5.41) of users as against non-users (4.40), study conducted by other researcher revealed that respondents are willing to sacrifice environmental certification for the sake of low price of the products (Anderson & Hansen, 2004). Another

**Table 4.** Classification result

User status		Classification Results			
		Predicted Group Membership		Total	
		Nonuser	User		
Original	Count	Non-user of RE	166	8	174
		User of RE	20	406	426
	%	Non-user of RE	95.4	4.6	100.0
		User of RE	4.7	95.3	100.0
95.3% of original grouped cases correctly classified.					

**Table 5.** Factors leading to purchases of the renewable energy products

Factors	User Status	Mean	Significance	Null Hypothesis
Saves money	Non-user of RE	5.78	0.008	Rejected
	User of RE	6.56		
Beneficial	Non-user of RE	7.30	0.033	Rejected
	User of RE	6.49		
Convenient	Non-user of RE	5.25	0	Rejected
	User of RE	6.69		
Lower price	Non-user of RE	4.40	0	Rejected
	User of RE	5.41		
Buy if protects environment	Non-user of RE	5.26	0	Rejected
	User of RE	7.76		
Buy if provides local employment	Non-user of RE	5.17	0	Rejected
	User of RE	7.70		

study too confirms with the result that consumers would purchase green products if it is cheaper as compared to normal products (Ng et al., 1993). Other factors, such as, product involvement, consumer innovativeness, brand parity, and brand loyalty may also affect consumer price sensitivity (Bijmolt et al., 2005; Tellis, 1988). Thus, price of the renewable energy products advertently affects purchase decision, which needs to be carefully decided by policy makers and manufacturers of renewable energy. However, result also shows that users would buy the product if it **protects environment** and **provides local employment**. This result indicates that respondents are more inclined towards advancement of society and is not always thinking about personal benefits. Users showed high mean value of 7.76 towards positive purchase if it **protects environment** as against non-users, thereby showing that businesses and consumers realize that their production, consumption and purchasing behaviour will have direct impact on the environment [48]. Also, some wants to become a role model in preserving the environment (McCarty & Shrum, 2001; Hallin, 1995).

Hence, based on the significance value as shown in Table 5 indicates that null hypothesis ( $H_{02}$ ) is rejected and alternative hypothesis ( $H_2$ ) is accepted. Thus, factors like, saving money, product convenience, low price, will buy if it protects environment and if it provides **local employment** are the factors which will enable the users to purchase renewable energy products, thereby, accepting alternate hypothesis. Kwon et al., (2017) opined that internal marketing related to psychological ownership of workers towards their organization would reduce employee turnover. Hence, employees must be made to feel that they are a crucial part of any company, for this research RE industry. If adopters of eco-innovation are represented and recognized as valued citizen for choosing environment friendly products than non-adopters may also be encouraged to follow them (Jansson et al., 2011). Another study showed that respondents' intention to use new woodstove depended on economic benefits, its heating performance, perceived time and effort to operate the stove and environmental effects of

heating (Nyrud et al., 2008), this also supports and strengthens our study regarding the presence of some factors influencing buying decision.

Discriminant analysis was conducted separately to find out the top three factors out of the four factors, i.e., save money, beneficial, convenient and lower price which might lead to the purchase of the renewable energy products and enlisted in Table 6.

From the result of Table 6, researcher found that convenience, lower price and saving of money are the top three factors which might motivate customers to have positive purchase decision towards renewable energy products.

It is also desirable to test the prediction of users and non-users of renewable energy towards their intention to buy renewable energy products. As such further analysis were carried and classification result based on purchase decision are listed in Table 7.

Based on the result, 54.6% of non-user and 69% of user were grouped, which is not a satisfactory percentage of classification. Hence, these factors, i.e., save money, Convenient/convenience and Lower price may not be an ideal factor for confirming the purchase decision of users. Thus, leaving a scope for future studies and research.

Additionally, separate discriminant analysis was conducted only for two factors, i.e., (1) buy if it protects environment and (2) buy if it creates local employment. Where the value of Correlation showed 0.951 with eigen value 1.701, thereby indicating strong correlation among these two factors.

Table 8 shows the result based on Canonical Discriminant Function Coefficient among two factors, where values of coefficient for environment protection is high while making purchase decision as compared

**Table 6.** Canonical Discriminant Function Coefficients for purchase decision.

Standardized Canonical Discriminant Function Coefficients	
	Function
Save money	<b>0.272</b>
Beneficial	-0.520
Convenient	<b>0.528</b>
Lower price	<b>0.281</b>

**Table 7.** Classified group based on purchase decision.

Classification Results					
User status			Predicted Group Membership		Total
			Non-user	User	
Original	Count	Non-user of RE	95	79	174
		User of RE	132	294	426
	%	Non-user of RE	<b>54.6</b>	45.4	100.0
		User of RE	31.0	<b>69.0</b>	100.0
a. 64.8% of original grouped cases correctly classified.					

**Table 8.** Canonical Discriminant of factors leading to purchase decision.

Standardized Canonical Discriminant Function Coefficients	
	Function
Buy If It Protects Environment	0.796
Buy If It Provides Local Employment	0.226

**Table 9.** Structure matrix for factors leading to purchase decision.

Structure Matrix	
	Function
Buy If It Protects Environment	0.994
Buy If It Provides Local Employment	0.923

**Table 10.** Table of classification result.

Classification Results					
User status			Predicted Group Membership		Total
			Non-user	User	
Original	Count	Non-user of RE	174	0	174
		User of RE	0	426	426
	%	Non-user of RE	100	0	100.0
		User of RE	0	100	100.0
100% of original grouped cases correctly classified.					

to providing local employment. One of the researchers opined that female exhibited higher level of environmental awareness as compared to men (Gronhoj & Olander, 2007). Thereby, indicating that manufacturers of renewable energy products needs to include testimonies of satisfied consumers (women) while advertising their products.

To further confirm the result based on the two factors, analysis using structure matrix was conducted, where protecting environment and provision for local employment showed higher correlation towards positive purchase decision of respondents, as shown in Table 9.

The classification result from Table 10 shows 100%

count for users and non-users, thereby depicting that the result was based on the 100% responses and that they are true representative of the population for our study. Hence these two factors, i.e., protecting environment and provision for local employment may be considered among other factors leading to the positive purchase of the renewable energy products.

## V. Conclusion

The researcher carried out detailed study on

influence of socio-environment towards acceptance of renewable energy products by developing and testing hypotheses followed by data analysis based on statistical tool. Following are the findings and conclusions of the present research;

- i . The renewable energy products yearn for more research in both technical and marketing aspects, providing scope for future studies.
- ii . It was found in our study that users of the renewable energy products have significantly higher socio-environment belief than non-users.
- iii . Users displayed eco-centrism, altruism and global self-identity approach, which was further confirmed in structure matrix (Table 3).
- iv . Factors leading to purchase from renewable energy was identified as; will buy it is saves money, if it is convenient to use, has low price, will buy if it protects environment and if it provides employment.
- v . Researcher assumes that if the product is compatible with the erratic weather condition of Sikkim and Darjeeling than, its acceptance might be accelerated.
- vi . In short, the socio-economic status of the consumers influences the purchasing affinity of renewable energy products.

As suggested by one of the researchers that public authorities and producers while marketing modern technology must consider users perception about bioenergy or environmental concern (Nyrud et al., 2008). Also, that behavior of green consumers is related to factors, such as, socio-demographics, values, beliefs, and norms (Jansson et al., 2011). Finally, further research can also be extended in other parts of the region to consolidate the customers' behaviour which influences decision making to purchase or discard renewable energy products.

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## References

- Anderson, R. C., & Hansen, E. N. (2004). The impact of environmental certification on preferences for wood furniture: A conjoint analysis approach. *Forest Product Journal*, 54(3), 42-50.
- Ansar, J., & Sparks, R. (2009). The experience curve, option value, and the energy paradox. *Energy Policy*, 37(3), 1012-1020.
- Balderjahn, I. (1988). Personality variables and environmental attitudes as predictors of ecologically responsible consumption patterns, *Journal of Business Research*, 17 (August), 51-56.
- Bigsby, H., & Ozanne, L. C. (2002). The purchasing decision: Consumers and environmentally certified wood products. *Forest Product Journal*, 52(7/8), 100-105.
- Bijmolt, T. H., Heerde, H. J. V., & Pieters, R. G. (2005). New Empirical Generalizations on the Determinants of Price Elasticity. *Journal of Marketing Research*, 42(May), 141-56.
- Clark, C. F., Kotchen, M. J., & Moore, M. R. (2003). Internal and external influences on pro-environmental behavior: Participation in a green electricity program. *Journal of Environmental Psychology*, 23, 237-246.
- Chen, H. Q., Honda, T., & Yang, M. C. (2013). Approaches for identifying consumer preferences for the design of technology products: A case study of residential solar panels. *Journal of Mechanical Design*, 135(6), 061007.
- Coşkun, A., Vocino, A., & Polonsky, M. (2017). Mediating effect of environmental orientation on pro-environmental purchase intentions in a low-involvement product situation. *Australasian Marketing Journal (AMJ)*, 25(2), 115-125.
- Costa, D. L., & Kahn, M. E. (2013). Energy conservation “nudges” and environmentalist ideology: Evidence from a randomized residential electricity field experiment. *Journal of the European Economic Association*, 11(3), 680-702.
- Curry, P. (2011). *Ecological Ethics: An introduction* (2nd ed). Polity Press, Cambridge, UK.

- Devine-Wright, P. (2008). Reconsidering public acceptance of renewable energy technologies: a critical review. Chapter for inclusion In T., Jamasb, M. Grubb, M. Pollitt (Eds), *Delivering a Low Carbon Electricity System: Technologies, Economics and Policy*. Cambridge University Press.
- Dietz, T., Kalof, L., & Stern, P. C. (2002). Gender, values, and environmentalism. *Social science quarterly*, 83(1), 353-364.
- Glegg, G., Richards, J., Heard, J., & Dawson, J. (2005). Barriers to green buying: Household chemicals, A report for the Clean Water Initiative. *Marine and Coastal Policy Research Group*, University of Plymouth.
- González, E. M., Felix, R., Carrete, L., Centeno, E., & Castaño, R. (2015). Green shades: a segmentation approach based on ecological consumer behavior in an emerging economy. *Journal of Marketing Theory and Practice*, 23(3), 287-302.
- Grønhoj A, O'lander F. (2007). A gender perspective on environmentally related family consumption. *Journal of Consumer Behavior*, 6(4), 218-235.
- Hallin, P. O. (1995). Environmental concern and environmental behaviour in Foley, a small town in Minnesota. *Environment and Behaviour*, 27(4), 558-578.
- Hansla, A., Gamble, A., Juliusson, A., & Gärling, T. (2008). Psychological determinants of attitude towards and willingness to pay for green electricity. *Energy policy*, 36(2), 768-774.
- Hartmann, P., & Apaolaza-Ibáñez, V. (2012). Consumer attitude and purchase intention toward green energy brands: The roles of psychological benefits and environmental concern. *Journal of Business Research*, 65(9), 1254-1263.
- Husted, B. W., Russo, M. V., Meza, C. E. B., & Tilleman, S. G. (2014). An exploratory study of environmental attitudes and the willingness to pay for environmental certification in Mexico. *Journal of Business Research*, 67(5), 891-899.
- Jansson, J., Marell, A., & Nordlund, A. (2011). Exploring consumer adoption of a high involvement eco-innovation using value-belief-norm theory. *Journal of Consumer Behaviour*, 10(1), 51-60.
- Johri, L. M., & Sahasakmontri, K. (1998). Green marketing of cosmetics and toiletries in Thailand. *The Journal of Consumer Marketing*, 15(3), 265-281.
- Kanchanapibul, M., Lacka, E., Wang, X., & Chan, H. K. (2014). An empirical investigation of green purchase behaviour among the young generation. *Journal of Cleaner Production*, 66, 528-536.
- Krebs, D. L. (1970). Altruism - An examination of the concept and a review of the literature. *Psychological Bulletin*, 73, 258-302.
- Kumakawa, T. (2017). Altruism and Willingness to Pay for Environmental Goods: A Contingent Valuation Study. *Journal of Geoscience and Environment Protection*, 5(06), 61.
- Kwon, I. S., Lee, S. H., & Seo, M. K. (2017). The Role of Psychological Ownership in Internal Marketing. *Global Business and Finance Review*, 22, 82-91.
- Laroche, M., Bergeron, J., Tomiul, M., & Barbaro-Forleo G. (2001). Targeting consumers who are willing to pay more for environmentally friendly products. *Journal of Consumer Marketing*, 18(6), 503-520.
- Loureiro, M. L., & Hine, S. (2002). Discovering Niche Markets: A Comparison of Consumer Willingness to Pay for Local (Colorado Grown), Organic, and GMO-Free Products. *Journal of Agricultural and Applied Economics*, 34(3), 477-87.
- McCarty, J. A., & Shrum, L. J. (2001). The influence of individualism, collectivism and locus of control on environmental beliefs and behaviour. *Journal of Public Policy and Marketing*, 20(1), 93-104.
- McConnell, K. E. (1997). Does altruism undermine existence value? *Journal of Environmental Economics and Management*, 32, 22-37.
- Mitra, A., & Moore, M. R. (2018). Green electricity markets as mechanisms of public-goods provision: theory and experimental evidence. *Environmental and Resource Economics*, 71(1), 45-71.
- Mostafa, M. M. (2009). Shades of green: A psychographic segmentation of the green consumer in Kuwait using self-organizing maps. *Expert Systems with Applications*, 36(8), 11030-11038.
- Ng, B. C., Png, H. L., & Tan, E. W. K. (1993). Purchase intentions for eco-labelled products. *Final year project submitted to the School of Accountancy & Business, Nanyang Technological University*.
- Nyrud, A. Q., Roos, A., & Sande, J. B. (2008). Residential bioenergy heating: A study of consumer perceptions of improved woodstoves. *Energy Policy*, 36(8), 3169-3176.
- Oberholzer-Gee, F. (2001). Your contribution counts! an empirical analysis of the decision to support solar energy. *Environmental voluntary contracts: comparative approaches to regulation innovation in the United States and Europe*. *Kluwer Law International, London*, 425-434.
- Olson, M. (1965). *The logic of collective action*. Cambridge, MA: Harvard University Press.
- Ottman, J. A. (2000). *It's not just the environment, stupid*. Retrieved August, 2004, downloadable at [http://www.greenmarketing.com/articles/IB\\_Sept00.html](http://www.greenmarketing.com/articles/IB_Sept00.html)
- Powers, J., & Kocakuml, M. C. (2015). Cost saving strategy and wellness programs featuring decision tree, utility and analytical hierarchy analysis. *Global Business and Finance Review*, 20, 105-122.
- Renger, D., & Reese, G. (2017). From Equality-Based Respect to Environmental Activism: Antecedents and Consequences of Global Identity. *Political Psychology*, 38(5), 867-879.
- Senise, J (August 29, 2007), Who Is Your Next Customer? *Strategy & Business*. Issue 48 (originally published by Booz & Company). Retrieved September 28th,2007, from <https://www.strategy-business.com/article/07313?gko=1428c>
- Shen, Y. P. (2017). Consumption Intentions toward green

- restaurants: Application of theory of planned behavior and altruism. *International Journal of Management, Economics and Social Sciences (IJMESS)*, 6(3), 121-143.
- Steg, L., Dreijerink, L., & Abrahamse, W. (2005). Factors influencing the acceptability of energy policies: A test of VBN theory. *Journal of environmental psychology*, 25(4), 415-425.
- Stern, P. C., Dietz, T., & Guagnano, G. A. (1995). The new ecological paradigm in social-psychological context. *Environment and Behavior*, 27(6), 723-743.
- Strizhakova, Y., & Coulter, R. A. (2013). The “green” side of materialism in emerging BRIC and developed markets: The moderating role of global cultural identity. *International Journal of Research in Marketing*, 30(1), 69-82.
- Tellis, G. J. (1988). The price elasticity of selective demand: A meta-analysis of econometric models of sales. *Journal of marketing research*, 25(4), 331-341.
- Thompson, S. C., & Barton, M. A. (1994). Ecocentric and anthropocentric attitudes toward the environment. *Journal of Environmental Psychology*, 14, 149-157.
- Vlosky, R. P., Ozanne, L. K., & Fontenot, R. J. (1999). A conceptual model of US consumer willingness-to-pay for environmentally certified wood products. *The Journal of Consumer Marketing*, 16(2), 122-136.
- Wessells, C. R., Johnston, R. J., & Donath, H. (1999). Assessing consumer preferences for ecolabeled seafood: The influence of species, certifier and household attributes. *American Journal of Agriculture Economics*, 81(5), 1084-1089.
- Westaby, J. D., Probst, T. M., & Lee, B. C. (2010). Leadership decision-making: A behavioral reasoning theory analysis. *The Leadership Quarterly*, 21(3), 481-495.
- Wiser, R., Pickle, S. (1997). *Green marketing, renewables, and free riders: Increasing customer demand for a public good*. Berkeley, CA: Lawrence Berkeley National Laboratory, LBNL-40632.
- Xu, A. J., & Wyer Jr, R. S. (2007). The effect of mind-sets on consumer decision strategies. *Journal of Consumer Research*, 34(4), 556-566.
- Anonymous. (2017). Forest and Forestry. Retived from <http://www.sikkimforest.gov.in/forest.htm>
- Anonymous. (2019). Awards to Sikkim. Retived from <http://pawanchamling.in/awards/>