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Factors influencing buying behaviour of green energy consumer

Deepak Sangroya [a, *], Jogendra Kumar Nayak [b]

[a] SCMHRD, Symbiosis International University, Pune, India
[b] Indian Institute of Technology, Roorkee, India

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ABSTRACT

Green energy has gained significant research attention across the globe due to its ability to reduce environmental damage. However, for complete acceptance of green energy, only government regulations are not enough; the willingness to use green energy and contribute to the wellbeing of the environment should spring from within consumers. Such willingness may be developed by enhancing consumers' perceived value of green energy. However, in order to do so, it is necessary to assess existing levels of consumers' perceived value towards green energy. The present study develops a multidimensional green perceived value scale to measure existing levels of consumers' perceived value. The scale considers green perceived value as a multidimensional second order construct comprising functional value, social value, conditional value and emotional value dimensions. Such an attempt has not been made before which highlights the originality value of the present study. The scale can be used to assess consumers' perception towards green energy. Such information would help in formulating strategies that encourage consumers to voluntarily adopt green energy. The study also reveals that it is not only the financial aspects that lead consumers to decide on adoption of green energy; consumers are also driven by emotional and social considerations. Thus, policy makers could formulate pro-green energy programmes and mass messages that appeal to consumers' sense of responsibility to voluntarily adopt green energy without having to rely on financial incentives. Researchers could examine the considered dimensions of the scale further with respect to other constructs related to consumer behaviour.

1. Introduction

Over the last two decades, climate change has emerged as a major concern for academics, practitioners and governments due to the threat it poses to existence (Shove et al., 2015). Researchers around the world have, in no uncertain terms, stated that countries must reduce the emission of greenhouse gases or suffer potentially catastrophic effects from climate change (Chandel et al., 2016; Kondoh, 2009; Sarzynski et al., 2012). Since combustion of fossil fuels for energy generation is the prime source of greenhouse emissions, many scholars assert that a shift towards green energy is imperative to achieving environmental goals (Sarzynski et al., 2012).

Zarnikau (2003) has defined green energy as "electricity generated using renewable energy sources, and including technologies such as photovoltaic solar panels, biomass projects, geothermal projects and wind farms" (p.1661). The usage of green energy sources for electricity generation involves zero greenhouse gas emission, thereby offering a lasting solution to climate change (Kostakis and Sardianou, 2012). Hence, green energy has attracted significant research attention around the globe. According to Herbes and Ramme (2014), renewable sources of energy may be utilized to successfully fight global warming. Governments around the world also have shifted focus towards generating electricity from renewable sources of energy (Shrimali and Kniefel, 2011). In several countries, incentive programs such as feed-in-tariffs, captive generation, and favoured access to grids for renewable energy producers have been initiated to encourage private investment. In fact, the Dutch government liberalized the green electricity market and offered relatively generous fiscal incentives to stimulate demand for green energy in the residential customer segment also.

The Government of India has also, along similar lines, launched various incentives schemes such as generation based incentives, accelerated depreciation benefit, renewable energy certificates and captive generation to encourage establishment of renewable

* Corresponding author.
E-mail addresses: sangroyadeepak@gmail.com (D. Sangroya), joginder.nayak@gmail.com (J.K. Nayak).

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energy generating facilities (Shrimali et al., 2013). Further, following the examples of countries of North America, Europe and the Asia Pacific region, The Government of India decided to liberalise the Indian electricity market (Schmid, 2012). This is evident from the Indian Electricity Act 2003, which lays down a liberalized procedure for setting up electricity generation plants. The Act allows private corporations, persons or cooperative societies to own or operate electricity generation plants. Legislations have also been formed to facilitate investment in residential-scale electricity generation systems (solar photovoltaic systems or thermal for example) as utilities agreed to purchase if any excess energy is generated. In many Indian cities (Mumbai, Ahmedabad, Surat, New Delhi, Bangalore, etc.) today, due to liberalisation of the electricity market, consumers can choose from which provider to purchase electricity while considering whether the power has been generated from renewable sources.

While government regulations do play a major role in promoting and encouraging adoption of green energy, only legislations may not be enough to bring about the desired change; consumer involvement and willingness are essential to successful adoption of green energy. As an example, German policy makers discovered that even after almost ten years of promoting renewable energies through legislative means (EEG), no considerable integration of renewables into the market occurred (Herbes and Ramme, 2014). USA and UK may be quoted as other examples: The Cape Wind project in Massachusetts, USA was delayed for many years due to organized resistance against the proposal. A study on applications of onshore wind farms in the UK, found that two out of three applications were rejected over an 18 month period in 2006–2007 (Thøgersen and Noblet, 2012). Thus, wind energy generators called for action "to win over a 'not in my back yard' element campaigning against new projects" (Thøgersen and Noblet, 2012). This shows how important social acceptance was for the future expansion of green energy (Upham et al., 2015).

On the basis of the discussion above, it can be said that it is the combination of energy policies of governments and environmental concerns of users that contributes towards the development of a green power market. According to Hartmann and Apaolaza-Ibáñez (2012), "Green energy's future success depends on effective branding and marketing communication strategies designed to enhance consumers' benefit perception" (p.1254). In other words, the extent to which green energy would be accepted or adopted by consumers would depend on the value the consumers perceive would accompany it (Wüstenhagen et al., 2007). Consumer value has been acknowledged as an important driver of consumers' product evaluations and future purchase decisions (Barlow and Maul, 2000; Gale, 1994). Recently, energy researchers in social sciences highlighted the need to understand how consumers made decisions about energy when those decisions necessitated trade-offs between various benefits and costs (Yang et al., 2015).

Perceived customer value is considered a decisive factor for determining product or service attractiveness (Lindgreen et al., 2012). In environmental and green marketing literature, Chen and Chang (2012) introduced the unidimensional green perceived value (GPV) construct and defined it as "a consumer's overall appraisal of the net benefit of a product or service between what is received and what is given based on the consumer's environmental desires, sustainable expectations, and green needs" (p. 505). However, this definition does not consider the complex nature of perceived value (Sweeney and Soutar, 2001; Holbrook, 2006). In fact, no previous study systematically developed an analytical model for determining the multidimensional nature of the perceived customer value construct pertaining to green energy. The present paper considers GPV as a multidimensional second order formative construct made up of functional value, conditional value, emotional value and social value. This assertion has been made on the basis of the study carried out by (Hartmann and Apaolaza-Ibáñez, 2012; Masini and Menichetti, 2012) which stated that a green energy consumer considers various types of benefits (utilitarian, psychological and social) from the use of green energy. Also, situational factors influencing green energy use may either advance or hinder green energy usage (Tanner and Sybille, 2003). Milne and Boardman (2000) categorised these factors into group (e.g., social norms), internal (e.g., personal attitudes) and external (e.g., situational) dimensions. It is clear that a construct (here, green perceived value) that influences a customer on several levels cannot be considered unidimensional.

It has been mentioned above that combining energy policies of governments and environmental concerns of users would be more effective in developing a market for green energy. Incentivising purchase of green energy might be a short term strategy, but cannot be considered a long term and lasting solution (Herbes and Ramme, 2014). For lasting change (to make green energy business sustainable), the willingness to accept, purchase and use green energy must come from within consumers (Hartmann and Apaolaza-Ibáñez, 2012). To achieve this, their perception of value towards green energy must be enhanced (Kaenzig and Wüstenhagen, 2008). However, formulating marketing/awareness programmes directed at enhancing green perceived consumer value towards green energy would require measuring existing levels of consumers' green perceived value. With the help of a tool that measures such perceived value, policy makers could identify the elements that appeal to consumers the most and influence their decisions with respect to purchase of green energy. Such identification would help in formulating effective policies and marketing programmes that address consumers in a way that they feel motivated to use green energy and like contributing to the environment and society through green energy usage. This way, their concern for the environment can be translated into voluntary action (green purchase behaviour). Authors such as (Lindgreen et al., 2012; Sánchez-Fernández and Iniesta-Bonillo, 2007) have also suggested that customer perception of value in any given context should be measured through a scale specifically designed to guage such perceived value in that context. The current study proposes a multidimensional GPV scale to assess green perceived value of consumer specifically in context of green energy.

In this study, GPV is proposed as a multidimensional second order formative construct with four first order dimensions: social value, functional value, emotional value and conditional value. Primary data were collected through a nationwide survey and were statistically analysed with the help of exploratory factor analysis (EFA) and confirmatory factor analysis (CFA).

2. Understanding GPV and associated value dimensions (functional, conditional social and emotional)

Extant literature recognizes perceived value as the "foundation of all effective marketing activity" (Holbrook, 2006, p. 715) and a key determining factor of consumer buying behaviour (Sweeney and Soutar, 2001). Consumer perceived value is a subjective construct as it depends on the various contexts that determine the distinctive properties of different products (Sanchez et al., 2006). Several dimensions of perceived value have been recognised by researchers (Lindgreen et al., 2012) in context of both consumer and industrial markets. Appendix A lists some of the dimensions that have been associated with perceived value by previous studies and shows perceived value in terms of the following functional aspects: utilitarian (Babin et al., 1994); price and quality (Sweeney and Soutar, 2001); functional value (Sanchez et al., 2006); utilitarian–quality and price (Tsai, 2005; Walsh et al., 2014). Perceived value has also been viewed in terms of hedonic value (Babin et al., 1994), social and emotional aspect (Sweeney and Soutar, 2001), fun play and aesthetics (Holbrook, 1999), aesthetics and playfulness (Mathwick et al., 2002) and affective and symbolic (Tsai, 2005). In terms of conditional value, Sheth et al. (1991) observed situational aspects of perceived value such as benefits, incentives and subsidies.

In context of environmental and green marketing, Chen and Chang (2012) introduced the unidimensional green perceived value (GPV) construct. However, as has been discussed earlier, this uni-dimensional perspective does not explain the complex and multi-dimensional nature of perceived value (Holbrook, 2006; Sweeney and Soutar, 2001). In line with the work of Hartmann and Apaolaza-Ibáñez (2012) and Masini and Menichetti (2012), the present study considers GPV as a multidimensional formative construct of second order comprising emotional value, functional value, conditional value and social value. In context of green energy, the aforementioned values have been discussed in the following sub-sections.

2.1. GPV dimensions

2.1.1. Functional value

Sheth et al. (1991) defined functional value as "the perceived utility acquired from an alternative's capacity for functional, utilitarian or physical performance" (p. 160). Sweeney and Soutar (2001) viewed "functional value in terms of the utility derived from the product due to the reduction of its perceived short term and long term costs". This value is estimated after a rational analysis on the part of the consumer which involves weighing various costs and benefits accompanying the purchase of the product. It is generally believed that a rational consumer would try to achieve maximum benefits at the minimum possible cost. The study of Long et al. (2014) on domestic consumers found that price was the prime factor behind consumers' energy saving behaviour. Kaenzig et al. (2013), in Germany, examined role of various green energy attributes in creating customer value, and they concluded that environmental attributes of green energy is of vital for green energy consumers and they can even pay a high premium for using green energy.

Green energy products not only offer benefits that are similar to the advantages offered by conventional energy products, but also provide additional functional benefits, such as saving on electricity bills (Ibáñez et al., 2006), and reducing generation of harmful waste and pollution in the long term (Prakash, 2002). Clark et al. (2003) found that green energy users in U.S.A. perceived environmentally friendly and reducing reliance on imported oil as some functional benefits of green energy. It is thus clear that functional value is a key aspect of GPV.

2.1.2. Social value

This dimension of perceived value is noted as "the perceived utility of an alternative resulting from its image and symbolism in association or disassociation with the demographics, socioeconomic and cultural-ethnic referrent groups" (Smith and Colgate, 2007, p. 161). Social value implies individual perception about what the society would think or how it would respond if a purchase was made by the individual. As per Merton and Rossi (1949), "consumers' behaviour is shaped with a frame of reference produced by the social groups to which each individual belongs". Douglas (2002) stated that consumers buy products not only for economic reasons, but also to create and retain social relationships. Status-seeking in society was also found to be one of the objectives behind consumers' use of a particular product (Nelissen and Meijers, 2011). Thus it is vital for the policy makers to comprehend the dynamics of social practice/norms and anticipate changes in people behaviour towards energy (Shove and Walker, 2014). It has been found that local communities positively view investments made in green energy which in turn enhances the individual's positive self-image (Ek and Matti, 2014; Ozcan, 2014). Previous studies have noted that social norms significantly motivate consumers to invest in pro-environmental activities (Ek and Matti, 2014). Salazar et al. (2013) found the positive effect of social groups like family, friends and colleagues on an individual's decision to use green products. The adoption of green product does not depend exclusively on their instrumental/functional attributes but people gets motivated to use them because of positive symbolic attributes (Noppers et al., 2014). Positive symbolic attributes refer to "shaping a positive image of ourselves by purchasing and displaying products" (Fennis and Pruyn, 2007). For example, designer clothing and caviar represent class and wealth, and their purchase signals good taste. Symbolic attributes may encourage the adoption of sustainable products because they enable a person to signal their status and identity. To illustrate, adoption of sustainable products may signal that one cares for the environment. Mignon and Bergek (2012) showed that economic incentives were not the only institutional factor influencing new investors towards green energy; society norms and values also affected them. In context of energy efficiency products, Faiers et al. (2007) noted a strong positive impact of various societal factors on consumer choice. Masini and Menichetti (2013) revealed that pressure of peer groups forced investors to concentrate their investments on green energy technologies. According to Gerpott and Mahmudova (2010), intention to use green electricity was most strongly affected by endorsement of green electricity by close social contacts. On the basis of the discussion above, it can be said that social value forms a vital dimension of GPV.

2.1.3. Emotional value

Emotional value is the "perceived utility acquired from an alternative's capacity to arouse curiosity, provide novelty, and/or satisfy a desire for knowledge" (Sheth et al., 1991, p. 161). This dimension of GPV is related to the feelings and emotions that a buyer experiences while purchasing a product. Today, emotions are considered a key factor in every stage of the buying process. Researchers have emphasized the importance of including the emotional dimension in multidimensional models designed for assessing perceived value (Wiedmann et al., 2007). According to Hartmann et al. (2005), when a consumer is buying green products, the effect of emotions is much stronger than that of functional benefits. In case of using environmental friendly products, consumers feel a sense of warm well-being due to the moral satisfaction gained by contributing to the environment (Nunes and Schokkaert, 2003). Wüstenhagen and Bilharz (2006) supported this assertion by empirical research on existing green energy consumers and concluded that only reason for buying green electricity at premium is to feel better with themselves. Although society as a whole gains from green electricity, customers' experience additional emotional benefits by contributing to energy independence and climate change (Hartmann and Apaolaza-Ibáñez, 2012; Menges et al., 2005). Thus, Hartmann and Apaolaza-Ibáñez (2012) further emphasized the overall psychological benefits of green energy and suggested that green energy marketing campaigns should focus on psychological benefits such as warm glow, nature experiences and self-expressive benefits. Several other studies have also, in different contexts, established a relationship between emotional benefits and green electricity usage (Hansla, 2011; Hansla et al., 2008). The discussion above establishes emotional value as a significant dimension of GPV.

2.1.4. Conditional value

This value is defined as the "perceived utility acquired by an alternative as the result of the specific situation or set of circumstances facing the choice maker" (Sheth et al., 1991, p. 162). According to Sánchez-Fernández and Iniesta-Bonillo (2007) "the conditional value of a product is contingent upon various physical, economic, social or environmental situations which may enhance the product's social and functional value". Biswas and Roy (2015) defined "conditional value as the utility derived in a specific situation" (p. 464). Various infrastructural and contextual factors create structural and situational environments that may facilitate or restrain pro-environment behaviour (Lorenzoni et al., 2007). Conditional value is the utility derived by consumers from a particular situation. Examples of such situations could be government incentives & subsidies towards developing green energy (Muñoz et al., 2009; Sovacool and Ratan, 2012; Tsoutsos et al., 2009), rules, laws & regulations (Haas et al., 1999; Mignon and Bergek, 2012), physical availability/accessibility of green products, environmental concerns, etc. Discounts, grants, incentives, subsidies and other incentives motivate customers to invest in energy efficient projects (Caird et al., 2008). Lin and Huang (2012) studied the role of various physical (ease of access) and environmental contingencies (unsustainable environmental conditions) in enhancing conditional value of green products. The study concluded that specific conditions mentioned above are the prime factors which influence consumer green product buying behaviour. It is clear that conditional value forms a major aspect of GPV.

2.2. GPV as formative second order construct

It has been established earlier that GPV is a formative multidimensional second order construct. The present study uses criteria laid down by Jarvis et al. (2003) to determine the nature of GPV construct. The criteria provide four decision rules based on theory to ascertain whether a construct is formative or reflective: (1) the direction of causal effect from construct to measure should be theoretically founded; (2) measurement variables should not be interchangeable; (3) covariance among variables should not be present; and (4) the construct variables may have a different nomological network. Various studies in the past have used this criteria to determine whether a construct is reflective or formative (Kim, 2010; Lin et al., 2005).

According to aforementioned criteria, this study conceptualized GPV as a formative second order construct due to the following reasons. First, as per the theoretical definition of GPV, direction of causality is expected to move from the dimensions to the GPV construct. A small variation in the value of any of dimension will have an effect on GPV, but not certainly GPV will have an effect on its dimension. Then, every first order construct of the GPV captures a distinctive and possibly distinctive form of the GPV (Ruiz et al., 2008). Elimination of any of the dimensions would have a significant effect on the theoretical framework of the GPV. Hence, the dimensions of GPV cannot be interchanged. Third, it can be assumed that covariation does not exist amongst the GPV dimensions, because Sheth et al. (1991) mentioned that dimensions of perceived value are academically independent. For example, a green energy consumer may perceive green energy low on functional dimension but high on emotional dimensions due to their environmental concern. As a consequence of this diverse nature, GPV dimensions do not require to covary. Lastly, each dimensions of GPV may have different nomological network. A study by Williams and Soutar (2009) on relationship between various dimensions of consumer perceived value and behavioural intentions found that emotional value is positively related to behavioural intention but social value does not have any relation with behavioural intention. This potentially divergent nomological network of the GPV dimensions indicates that it is formative specification.

2.3. Existing scales for measuring value and GPV

Zeithaml (1988) developed a unidimensional scale of perceived value which assessed consumers' perceived utility of an offering according to what was received versus what was given up. Grewal et al. (1998) developed scale for the B2B market that grouped consumer perceived value into two dimensions: perceived acquisition value and perceived transaction value. In this model, Parasuraman and Grewal (2000) added redemption value, in-use value and post purchase evaluation.

Gradually, consumer research started including more intrinsic facet in the consumer decision making process along with cognitive aspects. Sweeney and Soutar (2001) developed PERVAL scale which incorporated both psychological and physiological dimensions necessary to "discern the complex nature of perceived value" (Lin et al., 2005, p. 321). García-Acebrón et al. (2010) attempted to measure customer value with respect to energy through a measurement instrument inspired mainly from Patterson and Spreng (1997) and Lapierre (2000). This scale has three items each for perceived benefits and perceived sacrifice. Walsh et al. (2014) developed and validated two shorter versions i.e. 8-item and 12-item scale of the 19-item PERVAL scale using the original data of Sweeney and Soutar (2001).

In context of green products, Chen and Chang (2012) took the study of Patterson and Spreng (1997) as basis to develop a five item GPV scale by collecting data from Taiwanese consumers. This scale mainly included items related to functionality and environmental concerns. Chen and Chang (2012) called for further research considering consumers in other countries to compare results of the study. Hur et al. (2013) measured consumer value in context of hybrid cars by using multiple item scales. This scale has two items each related to hedonic value and social value, and three represented functional consumer value. Hur et al. (2013) called for studies in other industries, especially household green product industry to generalise conclusions. Lin & Huang (2012) used the "theory of consumption values" developed by Sheth et al. (1991) and created customer value scale for green products adopting the following dimensions from previous scales: epistemic value; functional value; emotional value; social value and conditional value (Arvola et al., 2008; Dholakia, 2001; Hirschman, 1980; Sweeney and Soutar, 2001).

It is clear from the above discussion that several scales have been introduced to measure consumer value in various contexts. However, the authors did not find any study that assessed GPV in context of green energy. As mentioned in earlier sections, only study Chen and Chang (2012) has proposed a scale to measure GPV, but that study also considers GPV a unidimensional construct while it has been established above that GPV is a multidimensional second order construct. The present study proposes a multidimensional GPV scale to measure GPV with respect to green energy in an Indian context considering four dimensions (emotional value, functional value, conditional value and social value). Thus, this is the first study of its kind and contributes immensely to existing body of knowledge. While it offers a tool (which did not exist hitherto; no study has developed a customer value scale for green energy) to practitioners to assess consumers' green perceived value considering multiple dimensions of value (which makes the assessment of the scale more credible) with respect to green energy, it also offers a deeper understanding of value, its components and appropriate measurement to academics. The aforementioned facts underline the uniqueness and immense originality value of the present study.

3. Methods

3.1. Theoretical model and scale development

As mentioned above, in this study Green Perceived Value (GPV) has been considered as a multi-dimensional construct. This study uses four first order dimension; namely functional value, emotional value, conditional value, and social value to measure the GPV of green energy consumers. Fig. 1 depicts the conceptual model that has been empirically analysed through statistical methods. The four dimensions of GPV are operationalized as a first order latent construct for defining a higher order latent construct (GPV). According to Koufteros et al. (2009), “When there are several constructs, which can be meaningfully conceptualized at a higher order of abstraction, a higher-order modelling approach would be the most suitable technique that can represent such structures”.

In this study both exploratory (qualitative) and descriptive (quantitative) studies were used to develop a more comprehensive scale. For the purpose of development and validation of the scale authors used the processes and methods recommended by Churchill (1979). In the subsequent sections (as depicted in Fig. 2) all the stages of scale development process are discussed in detail.

3.2. Generation of measurement items

A preliminary list of measurement items has been created based on review of literature related to customer value (Hur et al., 2013; Papista and Krystallis, 2012; Sweeney and Soutar, 2001; Sheth et al., 1991). Thereafter, these items were screened by a team of experts that comprised three professors from the marketing field, two professors of green energy, and six managers from different green energy companies for examining content validity and suitability of measurement items associated with collecting information regarding customer value. These items were further modified according to the comments given by the reviewers. Total 20 measurement items related to different dimensions of GPV were finalized based on the review of literature and expert opinion. Dimensions of GPV items comprised emotional value, functional value, social value and conditional value.

3.3. Scale purification

At this stage of scale development process, the authors aims to observe the initial factor structure of the measurement variables and to further refine the scale. In the process of achieving this objective, firstly primary data were collected from respondents all over India and scale was pretested on a sample of 30 consumers using green energy to identify unrelated and ambiguous measurement items in the questionnaire. Respondents were clearly informed that this study aimed at analyzing various dimensions of GPV with respect to green energy. The items of scale were measured on a Likert scale, “where 1 indicated strongly disagree, 3 indicated neutral, and 5 indicated strongly agree”. The respondents were asked to give a rating to each statement of the questionnaire in relation to their degree of agreement. The exploratory factor analysis (EFA) with principal component analysis (PCA) method and varimax rotation is used to analyse the data collected from this scale. The use of EFA was preferred over confirmatory factor analysis (CFA) since the objective of the study was to the explore the green perceived value dimensions (Hair, Black, Babin and Anderson, 2010). This method produced a four-factor solution having eigenvalues of more than one. All the measurement items having more than 0.40 factor loading were retained for further study. In total, these twenty measurement items were explaining 61.4% of the total variance.

3.4. Scale refinement

At this step, the aim of the study is confirm the factor structure of the scale. Thus, a nationwide survey was again conducted among green energy consumers to purify and examine the psychometric properties and stability of the scale. The procedure and steps involved in data collection are as follows: First, seven companies involved in production of green energy situated in Delhi, Chennai, Mumbai and Pune were contacted and requested to share information of their customers. The companies were told beforehand that this information will be used only for academic research. Details of objectives of the study were shared. This way, 929 contacts were received. A questionnaire and a cover letter were sent to these 929 customers between 1st December 2014 and 30th June 2015, and confidentiality of information shared by them assured.

A total of 713 questionnaires were collected from the survey, which exhibited a good response rate of 76.7%. 54 questionnaires were found incomplete, and thus, eliminated. Finally, data from 659 questionnaires were coded for further analysis. The theoretical model was examined using structural equation modelling (SEM). More detail about the SEM and methodology is included in Appendix A. Validity (convergent and discriminant) and reliability of data were examined through confirmatory factor analysis (CFA). Explanatory factor analysis (EFA) was carried out using SPSS 21 whereas testing of the measurement and structural model was performed using AMOS 21 software.

3.4.1. Results

3.4.1.1. Profiles of respondents. The descriptive statistics presented in Table 1 indicates that largely the respondents were male, which is inconsistent with past studies on green energy (Rowlands et al., 2003; Thøgersen and Noblet, 2012). The reason behind this may be that in India, males are traditionally considered head of the family and the decision to adopt (or not) green energy is generally taken by them (Bhide and Monroy, 2011). Furthermore, over 60% of the respondents were more than 40 years old, out of which 27% were between 41 and 50 years of age; 19.9% participants fell between 50 and 60 years of age; and approximately 12.5% of all respondents were more than 60 years old. The maximum number of respondents, approximately 31%, fell between 30 and 40 years of age. It was found that more than 77% respondents were graduates.

3.4.1.2. Descriptive statistics of variables. Data were examined for missing value, normality, outliers, and multicollinearity. Results revealed no major issue. During examination of standard deviation, no outliers were found. After the testing of skewedness and kurtosis, it was found that all the variables were normally distributed. Appendix B shows the descriptive analysis of GPV items. Descriptive statistics of data show that the mean value of various items was above three on the five point Likert Scale indicating that purchasing green energy is considered valuable by consumers. The highest value items were the following: “Green energy is well made for reducing environment distortion” (M = 4.69), “Using green energy would give me social approval” (M = 4.54), “Using green energy would make a good impression on others” (M = 4.48), and “I would use green energy over conventional energy if offered at a discount or with other promotional incentives” (M = 4.43)”.

3.5. Latent structure and scale purification

At this stage of study, authors aim was to discern the latent factor structure and the refinement of the developed scale. Thus, another exploratory factor analysis (EFA) was carried out along with varimax rotation to determine the dimensions of scale. All measurement variables having factor loadings more than 0.40 were

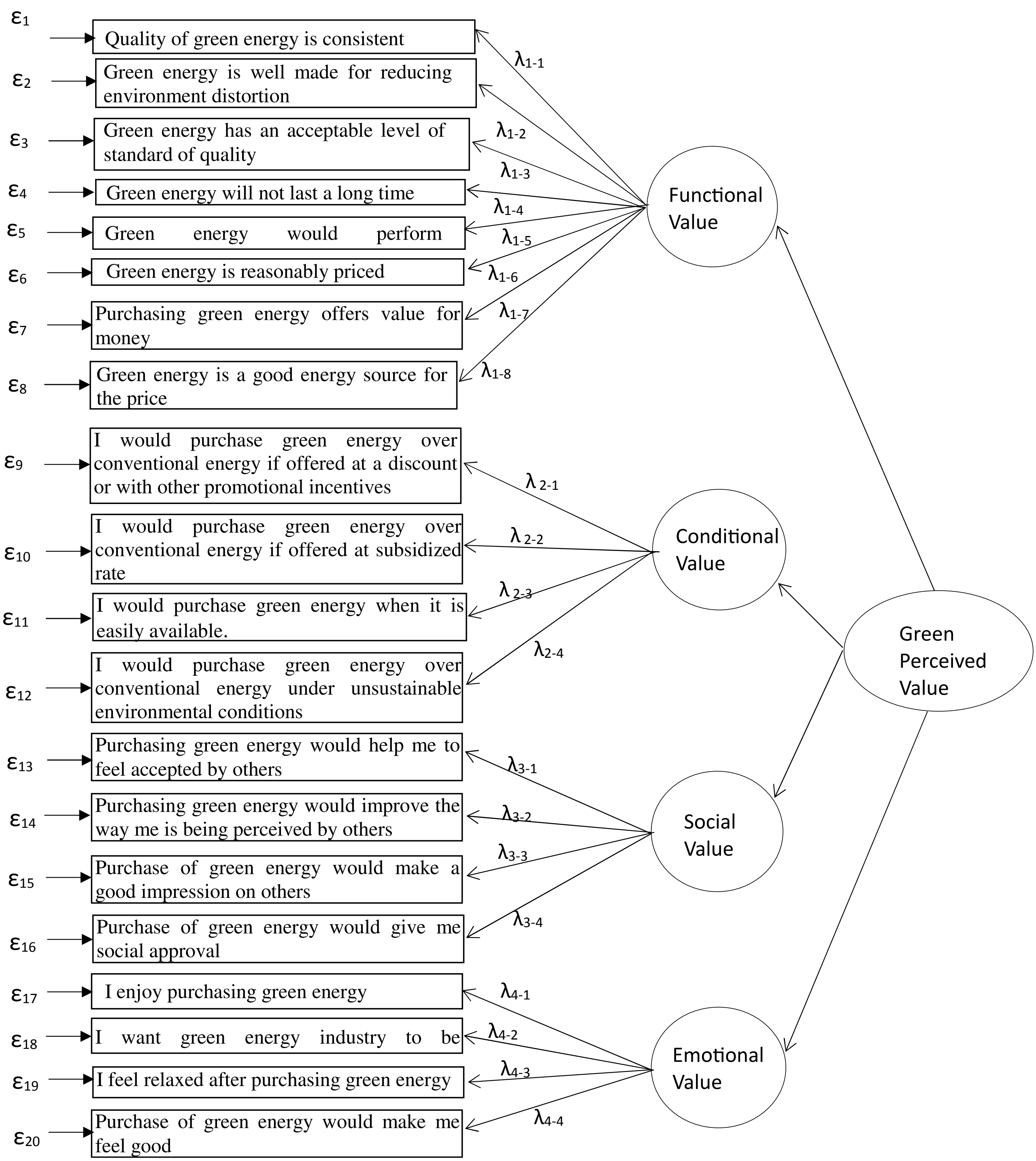

Fig. 1. Conceptual model of Green Perceived Value.

included in each factor. The eigenvalue of 1.0 was taken as the benchmark criterion for factor inclusion. KMO test for sample adequacy (KMO = 0.892) and Bartlett's test of sphericity ($p < 0.001$) indicated the appropriateness of conducting factor analysis.

The results of EFA are presented in Table 2. The measurement variables adequately captured four first order constructs and contributed to the expected constructs. All four dimensions met the unidimensionality criterion. The factor analysis divided 20 value items into four factors which were explaining 73.4% of the total variance. These factors were labeled as functional value (eigenvalue = 3.31, variance explained = 21.4%), emotional value (eigenvalue = 2.91, variance explained = 14.8%), social value (eigenvalue = 2.95, variance explained = 17.5%), and conditional value (eigenvalue = 3.23, variance explained = 19.7%). While carrying out factor analysis, it was observed that two items of functional value factor - "Green energy will not last a long time", and "Green energy would perform consistently" – showed factor loadings less than 0.40; hence, these items were removed from further analysis. EFA established that the items considered in final analysis belonged to the four dimensions of GPV. On the basis of

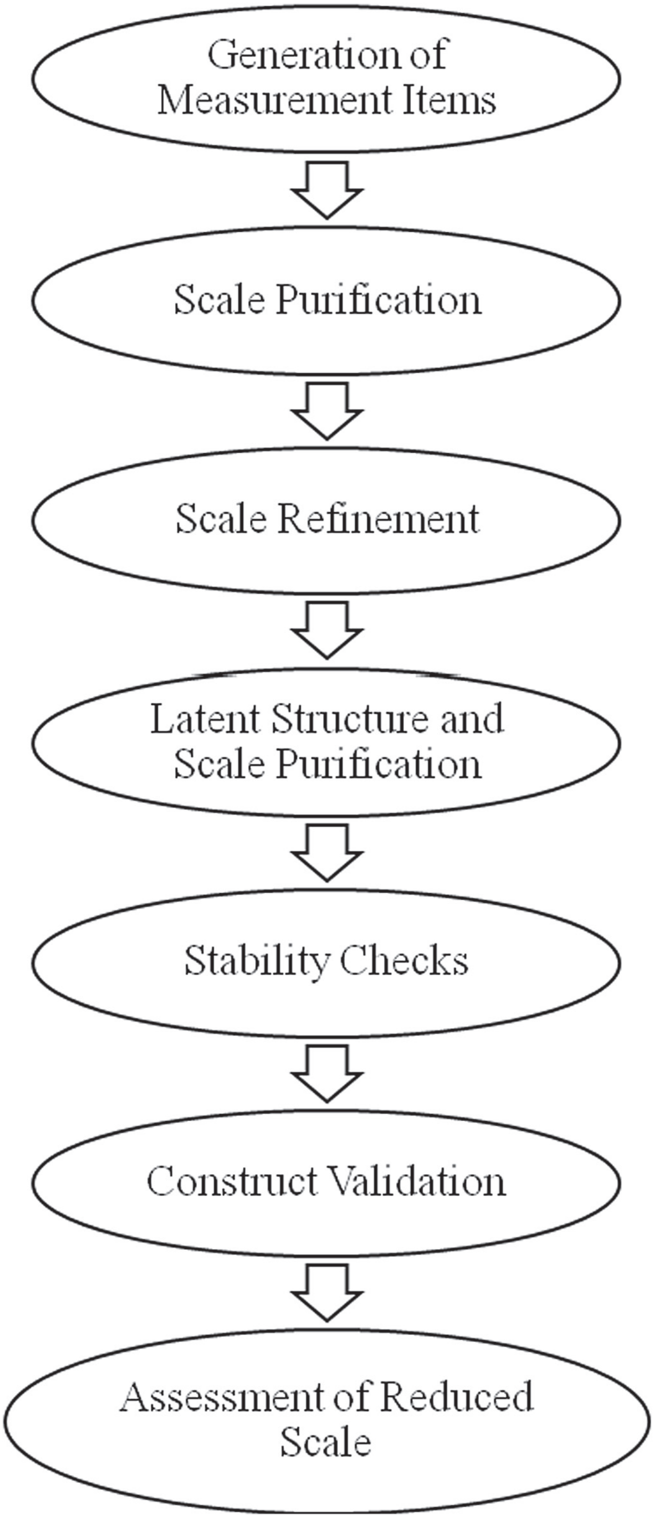

Fig. 2. GPV scale development process.

result of EFA, the four dimensions were used for SEM analysis.

3.6. Stability checks

During the process of developing a measurement scale, it is important that stability of the factor structure is examined. For this, various principal component analyses (PCAs) with were carried out for several subgroups of the sample: males and females, older (>35 years) versus younger respondents, less educated (undergraduates) versus high educated respondents. This analysis shows that factor structure of female subgroup was having higher consistency with the total sample in comparison to the male subgroup. However, not many differences were observed among the factor structures of level of education and age subgroups. Thereafter a subgroup of 50% of respondents was randomly selected and the stability of factor structure was again analysed by running factor analysis on this sample. In this case as well, the result of factor analysis was consistent with the factor structure generated for entire sample.

3.7. Construct validation

This study used the confirmatory factor analysis (CFA) proposed by Anderson and Gerbing (1988) proposed for examining measurement model for the proposed constructs i.e. emotional value functional value, social value and conditional value. Firstly, overall fitness of the model was tested on the condition that the value of χ^2/degree of freedom should be small and should not reach the significance level. As shown in the Table 3, the value of chi-square of the model is 94.725 ($df = 59$, $p < 0.002$). But in case of large sample size, this value can easily reach the significance level, thereby leading to rejection of the model (Bentler and Bonett, 1980). However, the ratio of χ^2 value to degrees of freedom ($\chi^2/df = 1.61$) is below the recommended value of 3 (Bagozzi and Yi, 1988). Moreover, the other fitness statistics such as, goodness of fit index (GFI = 0.94), adjusted goodness of fit index (AGFI = 0.91) and non-normed fit index (NNFI = 0.93) are greater than cutoff value of 0.9. The root mean square error of approximation (RMSEA = 0.04), and root mean square residual (RMSR = 0.06) are also less than the recommended value of 0.08.

The measurement quality of all the four first order constructs was subsequently tested by examining the convergent and discriminant validity. According to Fornell and Larcker (1981), the condition that needs to be fulfilled for establishing convergent validity is that the average variance extracted (AVE) of a construct should be greater than 0.5. As Table 4 shows that AVE is higher than the threshold limit of 0.5, thereby indicating fulfillment of the convergent validity condition. Additionally, Fornell and Larcker (1981) suggested that for establishing satisfactory discriminant validity, AVE of a particular construct should be greater than the correlation shared by that particular construct with other constructs in the model. The discriminant validity is established as the square root of the variance extracted is greater than the correlations among the constructs (see Table 3).

In case of formative second order constructs, some additional tests are require in addition to conventional validity and internal reliability analyses (Chin and Newsted, 1999). This study used the criterion developed by Petter et al. (2007) to examine the reliability and validity of GPV as a second-order latent construct. First, assessment of multicollinearity among the first order dimensions was done with variance inflation factor (VIF). The VIF values for the four first-order dimensions of the GPV construct were - 1.37 (functional value), 1.42 (conditional value), 1.69 (emotional value), and 1.51 (social value). Since, these values were well below the commonly accepted threshold value of 5 (Kleinbaum et al., 2013), no evidence of multicollinearity among the first order constructs could be said to be present. Second, it was examined if the first-order constructs significantly contributed to the second-order formative latent construct (MacKenzie et al., 2011). This condition was also fulfilled as all the path weights between the first-order constructs and the second-order formative construct were

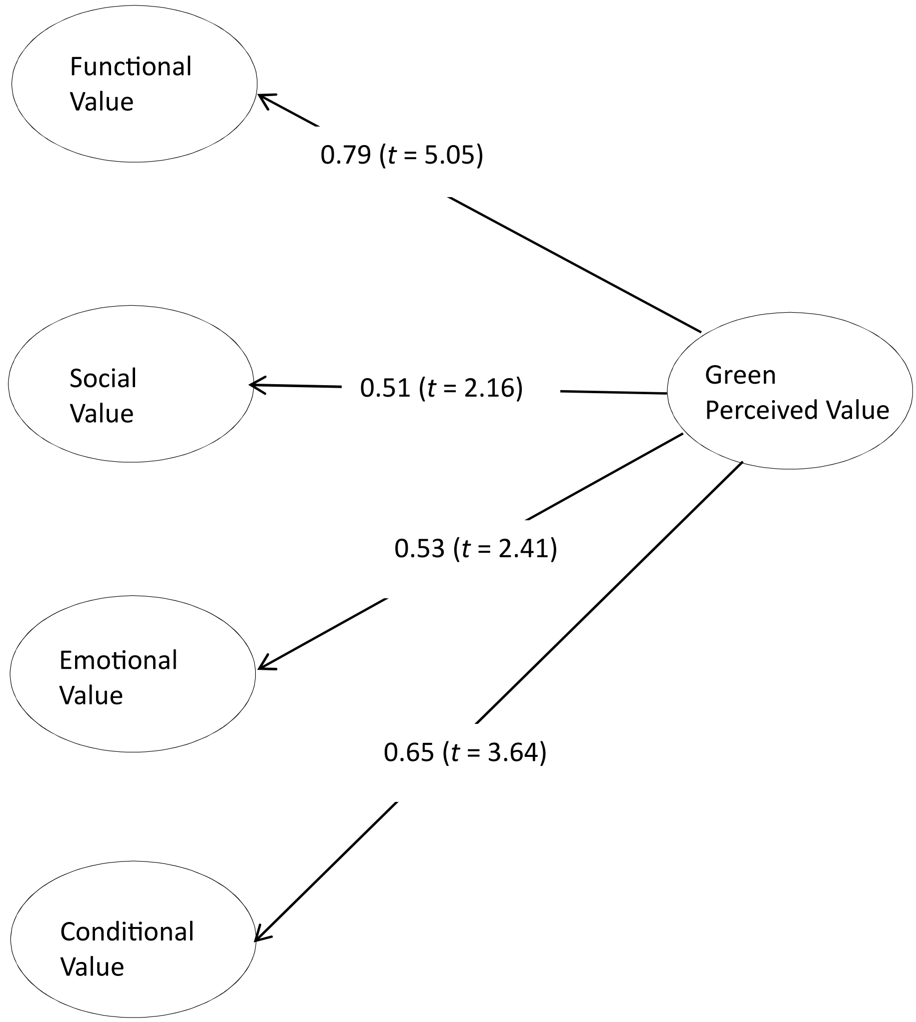

Fig. 3. Second order confirmatory factor analysis of Green perceived value.

Table 1
Descriptive statistics of respondents.

	Research sample	
	N	%
Gender		
Male	423	64.19%
Female	236	35.81%
Marital Status		
Married	611	92.71%
Single	31	4.71%
Other	17	2.58%
Age Group		
20–30	62	9.41%
30–40	204	30.96%
40–50	179	27.16%
50–60	131	19.87%
Above 60	83	12.50%
Education Level		
Post graduate	158	23.97%
Graduate	354	53.72%
Under Graduate	147	22.31%
Annual Income (In USD, 1 USD 60 INR)		
Under 5000	73	11.07%
5001–10,000	141	21.39%
10,001–15,0000	235	35.66%
15,001–20,0000	157	23.82%
Above 20,000	53	8.04%

significant at the 0.001 level.

Thus, the four first order latent constructs, namely functional value, emotional value, social value, and conditional value aimed at measuring GPV, exhibited high and significant factor loadings on the green perceived value model (see Fig. 3). Specifically, functional value and conditional value had relatively higher effect on GPV for green energy.

3.8. *Assessment of reduced scale*

The GPV scale developed in this study may be relevant to analyse the various value attributes of the green energy, but the burden on the survey respondents can increase with the increase in number of measurement variables. Thus, it is important to examine the possibility of constructing GPV scale with less number of measurement variables.

At this step, we have developed a 15-item measurement scale by selecting three items from every GPV dimensions, except the functional value which had six items. These measurement items were selected on the basis of two criteria: (1) factor loadings value (higher value preferred) and (2) mean correlation value of each item with other factors (lower value preferred). Subsequently, a principal component analysis was carried out on reduced scale

Table 2
Factor analysis of green perceived value.

Factors	Factor Loading	Eigen Value	Explained Variance
Factor 1: Functional Value		3.50	20.9%
Quality of green energy is consistent	.791		
Green energy is well made for reducing environment distortion	.797		
Green energy has an acceptable level of standard of quality	.474		
Green energy will not last a long time	.381		
Green energy would perform consistently	.362		
Green energy is reasonably priced	.415		
Using green energy offers value for money	.692		
Green energy is a good energy source for the price	.453		
Factor 2: Conditional Value		3.29	27.3%
I would use green energy over conventional energy if offered at a discount or with other promotional incentives	.848		
I would use green energy over conventional energy if offered at subsidized rate	.843		
I would use green energy when it is easily available.	.756		
I would use green energy over conventional energy under unsustainable environmental conditions	.713		
Factor 3: Social Value		2.93	16.1%
Using green energy would help me to feel accepted by others	.742		
Using green energy would improve the way me is being perceived by others	.895		
Use of green energy would make a good impression on others	.627		
Use of green energy would give me social approval	.753		
Factor 4: Emotional Value		2.89	15.4%
I enjoy using green energy	.735		
I want business of green energy should be increased	.655		
I feel relaxed after using green energy	.613		
Use of green energy would make me feel good	.371		

Note: Bartlett's test of sphericity = ($p < 0.001$).
Total explained variance = 79.7%.
Kaiser – Meyer - Olkin measure of sample adequacy = 0.856.
Cronbach'sχ coefficient of 20 perceived value items = .92.

Table 3
Convergent validity analysis (correlations and AVE).

Green Perceived Value	Functional Value	Conditional Value	Social Value	Emotional Value
Functional Value	1.00	.60	.22	.36
Conditional Value	.60	1.00	.17	.23
Social Value	.22	.17	1.00	.45
Emotional Value	.36	.23	.45	1.00
AVE	.74	.89	.85	.77

Table 4
Goodness of fit measures for measurement model (N = 659).

	Absolute fit measures			Incremental fit measures			Parsimonious fit measures		
	GFI	RMSR	RMSEA	AGFI	NNFI	PNFI	CFI	IFI	RFI
Green perceived value	0.94	0.04	0.07	0.91	0.93	0.63	0.93	0.91	0.92
Recommend Value	≥0.90	≤0.05	≤0.08	≥0.90	≥0.90	≥0.90	≥0.95	≥0.90	≥0.90

Note: GFI = goodness of fit index; RMSEA = root mean square error of approximation; RMSR = root mean square residual; AGFI = adjusted goodness of fit index; PNFI = parsimonious fit index; NNFI = non normed fit index, CFI = comparative fit index; RFI = relative fit index; IFI = incremental fit index.

data, which again provided a four-factor structure. However, this reduced scale was contributing to the 59.6% of the total experience, which is less than the 20 item GPV scale. This shows some of the important measurement items have been removed and the original 20 items measurement scale is appropriate for examining value perceived by green energy user.

4. Discussion

In this study, Green perceived value (GPV) of consumers using green energy for their electricity requirement has been identified. The major influence of conditional and functional value in development of GPV irrespective of their concern towards environment highlights the sensitivity of the consumers towards price, subsidies and discounts. Previous studies in the European market has also concluded that high cost of green energy sometimes prevents widespread uptake of green energy and thus, support through subsidies and discounts is needed for its development (Bigerna and Polinori, 2014). An improvement in the green energy market can be achieved through the integrated efforts of governments and related industrial actors advocating sustainable environmental awareness and protection. From the green marketing research we know that consumers' emotions exhibited towards environmental concern trigger their decisions to use green products (Rex and Baumann, 2007). Studies conducted in European countries, like Germany, U.S.A and China reveal that consumers' with high environmental concern are more like to engage in green buying behaviour (Wang et al., 2014). Thus, as suggested by Newton et al. (2015) marketing and advertising agencies should create the promotion strategies around unprecedented environmental problems and thereby get the most out of the growing environmental concerns among consumers.

It has been found that emotional benefit in combination of functional benefit enhance attitude of consumers' towards green energy, increases purchase intention and thereby contributing to green energy adoption (Hartmann and Apaolaza-Ibáñez, 2012). Thus, renewable energy suppliers should increasing the knowledge of consumers by supplying information about the functional benefits of the green energy. They should use more promotional activities for informing consumer about the need and benefits of using green energy. All directional publicity system may be used based on TV programs for the spread of environmental concern, television being the most important medium of entertainment in the developing countries. Previous research has widely addressed the emotional benefit of a "nature experience" (Hartmann and Apaolaza-Ibáñez, 2012), but given the positive image of green energy it is surprising that more energy providers did not try to exploit this benefit (Herbes and Ramme, 2014). Marketing manager should include these visual imagery in their marketing communication design which will create consumer appeal. Renewable energy supplier should also target existing consumer of other green products as it has been seen that consumer using green products are more likely to support green electricity (Ek and Söderholm, 2008).

5. Conclusion and implication

The present study develops a scale to measure consumers' GPV with respect to green energy. On the basis of the reliability and validity tests conducted, the scale appears robust and credible. The fact that GPV has been considered a multidimensional second order construct (as opposed to studies that considered GPV as a unidimensional construct) makes the scale all the more reliable as it considers the various dimensions of consumers' green perceived value. The scale can be used to assess consumers' perception towards green energy. Such information could be used to formulate strategies that encourage consumers to voluntarily adopt green energy. The proposed scale also emphasizes the emotional and social dimensions of consumer perception. This is a very important aspect of this study. Hitherto, policy makers relied on incentives and subsidies to encourage green energy use which led to increased burden on the exchequer. However, the study reveals that it is not only the financial aspects that lead consumers to decide on adoption of green energy; consumers are also driven by emotional and social considerations. Thus, policy makers could formulate pro-green energy programmes and mass messages that appeal to consumers' sense of responsibility to voluntarily adopt green energy without having to rely on financial incentives. The messages could clearly convey the ability of green energy to reduce the adverse effects of greenhouse gases and fight climate change while reinforcing that efforts of consumers could actually make a difference. A good example of an effort like this being successful is, in April 2015, the Indian Prime Minister, Shri Narendra Modi's appeal to the Indian citizens that could afford to do so, to forego LPG cylinder subsidy. As a result, 10.25 million citizens voluntarily gave up the subsidy by June 2016. It has also been observed that consumers purchase green energy under the pressure of their respective social groups. Bearing this in mind, policy makers and marketers could establish and reinforce social norm that favours use of green energy. In turn, green energy suppliers should try to emphasize and increase functional benefits of green energy to appeal to greater number of consumers.

The present study also significantly contributes to existing literature. It proposes a GPV model with four different dimensions — functional value, social value, emotional value and conditional value — and develops respective measurement scales for these dimensions. In doing so, it draws attention of the academia to the fact that GPV is a construct that has multiple dimensions, giving a deeper understanding of the construct. Researchers could examine these dimensions further with respect to other constructs related to consumer behaviour.

6. Limitations and suggestions for future research

Like any other study, this study is also not without limitations. First, consumers' GPV should be understood as a phenomenon that is sensitive to change. This means that consumers' may have a particular perception regarding a green product before purchase, but the perception may change post-purchase. The proposed scale measures consumer GPV only in case a consumer has purchased and used green energy earlier. Future studies may develop a tool that measures consumers' GPV considering pre and post purchase scenarios. Second, being an exploratory study, this research focused only on the dimensions of the GPV construct. Studies may be conducted to examine the relationships between GPV and other consumer behaviour constructs such as green trust, green loyalty and green satisfaction. Finally, although the four dimensions — functional value, emotional value, conditional value and social value — explained most of the variance associated with GPV, some other factors accounting for the unexplained variance in the model warrant further study.

Appendix A. Multiple dimensions of perceived value

Authors	Dimensions of Perceived Value	Research Context
Sheth et al. (1991)	Functional Value Emotional Value Epistemic Value Social Value Emotional Value	Consumer goods (e.g. cigarettes)
Babin et al. (1994)	Utilitarian Value Hedonic Value	Shopping
Holbrook (1999)	Excellence Efficiency Esteem Ethics Status Play Aesthetics Spirituality	Conceptual paper

(*continued*)

Authors	Dimensions of Perceived Value	Research Context
Sweeney and Soutar (2001)	Functional (Including Price and Quality) Emotional Social	Consumer durable goods (e.g. car stereos, furniture and household appliances)
Mathwick et al. (2002)	Aesthetics (visual appeal and entertainment) Customer ROI (price and efficiency) Playfulness (enjoyment and escapism) Service Excellence	Internet shopping setting
Tsai (2005)	Affective (emotional and behavioural price) Symbolic (reputation) Utilitarian (monetary price and quality)	Consumer goods (e.g. coffee, computers, denim wear)
Sánchez et al. (2006)	Functional value (installations, quality, professionalism and price) Social value Emotional value	Tourism Products
Williams and Soutar (2009)	Functional Value Value for money Emotional Value Social Value Novelty Value	Adventure Tourism
Hur et al. (2013)	Hedonic value Social value Functional value	Green Products (e.g. Hybrid vehicles)
Walsh et al. (2014)	Quality Price Emotional Social Hedonic Value Social Value	Consumer durable goods (e.g. Furniture)

Appendix B. Descriptive analysis of green perceived value items

Green Perceived Value Variables	Mean	Standard Deviation
Green energy perceived value variables		
Quality of green energy is consistent	4.51	.379
Green energy is well made for reducing environment distortion	4.23	.495
Green energy has an acceptable level of standard of quality	4.38	.472
Green energy will not last a long time	1.46	.326
Green energy would perform consistently	4.19	.557
Green energy is reasonably priced	3.68	.36
Using green energy offers value for money	4.32	.51
Green energy is a good energy source for the price	3.86	.68
Using green energy would help me to feel accepted by others	4.25	.50
Using green energy would improve the way me is being perceived by others	4.17	.36
Use of green energy would make a good impression on others	4.23	.72
Use of green energy would give me social approval	4.19	.41
I enjoy using green energy	3.98	.65
I want green energy industry to be developed	4.27	.34
I feel relaxed after using green energy	3.61	.37
Use of green energy would make me feel good	4.34	.31
I would use green energy over conventional energy if offered at a discount or with other promotional incentives	4.25	.49
I would use green energy over conventional energy if offered at subsidized rate	4.19	.48
I would use green energy when it is easily available.	3.78	.53
I would use green energy over conventional energy under unsustainable environmental conditions	4.26	.61

Note: Green Perceived Value: 1means strongly disagree, 5 means strongly agree and 3 means neutral.

Appendix C. Reliability analysis

Green Perceived Values	Cronbach's Alpha
Functional Value	0.83
Conditional Value	0.87
Social Value	0.76
Emotional Value	0.81

Appendix D

Structural Equation Modelling (SEM): SEM is a multivariate statistical technique that simultaneously applies and integrates factor analysis and path analysis. This statistical technique incorporates two sub-models - measurement model and structural model. This study analyses the conceptual model in two steps: in first step, the model was tested for psychometric properties of measurement scales; in the second step, estimation of structural relationship (strength and direction) among variables was done. The measurement models considered comprised four first order latent constructs - functional value, social value, emotional value, and conditional value. Multiple measurement variables were used for identifying respective first order latent constructs. These first order latent constructs were then used for analysing the second order latent construct (GPV). In higher order modelling, the inclusion of numerous first order latent constructs into a single structural model can cause major problems. According to Koufteros et al. (2009), in such cases, the significant impact of individual exogenous variables on dependent variable (i.e. second order latent construct) might disappear or exhibit a sign contrary to what was expected. Moreover, chances of cross loadings between some measurement variables and other first order latent constructs increase. In such cases, the researcher should maintain the idiosyncratic properties of all the first order latent constructs. The statistical impact of first-order dimensions can be estimated by relating the path coefficients of a first order construct to its higher order formative construct (Koufteros et al., 2009).

Confirmatory Factor Analysis: Anderson and Gerbing (1988) proposed a two-step procedure for examining fitness of measurement and structural model. They stated that measurement model should be developed and tested through CFA before examining the structural model. Anderson and Gerbing (1988) proposed maximum likelihood method for examining measurement model. During CFA, the measurement variables having coefficient alphas less than 0.3 were removed from further analysis (Jöreskog and Sörbom, 1993).

Convergent and Discriminant Validity: The measurement quality of all the four first order constructs was tested by carrying out convergent and discriminant validity. According to Fornell and Larcker (1981), the condition that needs to be fulfilled for establishing convergent validity is that the average variance extracted (AVE) of a construct should be greater than 0.5. In addition, Fornell and Larcker (1981) suggested that for establishing satisfactory discriminant validity, AVE of a particular construct should be greater than the correlation shared by that particular construct with other constructs in the model.

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