Conceptual Model on Study of Energy Conservation Behavior in India in Today's Context

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Abstract

After globalization India's energy consumption has been increasing at a relatively fast rate due to population growth and economic development. With an economy projected to grow at 6% to 8% per annum, there is a rapid urbanization and improvement in standards of living for millions of Indian households, the demand for energy is likely to grow significantly, now it is the challenge in front policy makers to take leverage from alternative forms of energy and promotion of energy conservation behavior. Use of renewable energy needs to be promoted. There is shortage of electricity supply this shortage may be minimized by use of fossil fuel for generation electricity, which is not good for the environment and the ecology. There has to be a balance between economic growth and pollution carrying capacity of the environment. In this study researchers analyzed the literature about energy consumption trends and need for energy conservation in world and in India. An attempt has been made to evaluate existing policy structure for promotion of conservation behavior and barriers for energy conservation in the households and to prepare a conceptual model on energy conservation behavior.

Keywords: Efficiency, Behavior, Energy usage, Literature, Model)

I. INTRODUCTION

Energy is an essential requirement for the economic development of any country, as human development index is directly related to the use and accessibility of energy. Electricity consumption in the last decade rose approximately 3.8% per annum, and is continuing in a rapid upward trajectory. This growth has been fuelled in part by increased private sector participation in the sector, enabled by the reforms initiated by the electricity act of 2003. Around 59 % of electricity is generated from burning of coal (fossil fuel); this leads to rise in risk of climate change, environmental degradation and rise in temperature. Now for sustainable economic development, we have to reduce our carbon footprint in the atmosphere, by accepting renewable energy, by minimizing energy use, and by using energy efficient appliances. What is energy conservation?

Energy conservation means making an effort to reduce the consumption of energy sources like Electricity, LPG, Petrol, Diesel, and so on. Primary energy sources can be used directly, as they appear in the natural environment: coal, oil, natural gas and wood, nuclear fuels (uranium), the sun, the wind, tides, mountain lakes, the rivers (from which hydroelectric energy can be obtained) and the Earth heat that supplies geothermal energy. Secondary sources derive from the transformation of primary energy sources: for example petrol, which derives from the treatment of crude oil and electric energy, obtained from the conversion of mechanical energy, chemical plants (thermoelectric), or nuclear (nuclear plants).

Some sources are renewable, i.e. they provide energy, which is constantly regenerated by means of chemical transformations (e.g. biomass) or physical transformations (e.g. water power, solar, wind power, etc.). In particular the sun, the wind, the water cycle, the tides, the heat of the Earth are non-exhaustible sources, which are always available and will never end. Biomass, instead, can re-generate within times that are similar to man's life. With reference to wood, for example, it is always possible to have some combustible available, even though sometimes it is necessary to consume a small quantity of it and reforest in those areas where trees

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have been cut down. While Non-renewable sources, instead, are characterized by long regeneration times, so long (millions of years) that after they have been exploited they are considered depleted. They are those energy sources that took millions of years to form, like fossil fuels (oil, coal, natural gas) or when our planet was formed, such as uranium.

II. RESEARCH METHOD

This study focuses on review of literature, based on energy conservation behavior in India and preparation of a conceptual model based on TPB and VBN theories. This is descriptive study based on secondarydata.

III. NEED FOR STUDY

Why is energy conservation important? Wedepend on energy for almost everything in our lives. We wish to make our lives comfortable, productive and enjoyable. Hence even if the outside temperature rises a little, we immediately switch on the air conditioner to keep our house cool. This is again using up of extra energy. Unfortunately, what we do not realize is that we have started taking things for granted and we have started wasting energy unnecessarily. Most of us forget that energy is limited and hence to maintain the quality of life, it is important that we use our energy resources wisely. In research done by Narayan et al. (2010) tested the Environment Kuznet's Curve (EKC) hypothesis for 43 developing countries for the period from 1980 to 2004, they found that, if country can reduces its carbon dioxide emissions in the atmosphere, its income can be increased, means reduction in coal based electricity generation can be useful for rise in income level (per capita income) of any country. This supports need for more investments in renewable energysources.

There is no compromise on comfort levels. Best solution could be combination of both energy conservation and energy efficiency measures yields the better output. Energy Conservation Behavior and Energy efficiency play an important role in the protection of the environment and the prevention of energy crises. In recognition of the importance of energy conservation, the Indian government created the Petroleum Conservation Research Association (PCRA) in 1978. PCRA continues to play an active role in the promotion of petroleum fuel saving strategies and functions as a think tank to the government for proposing policies and strategies on petroleum conservation and environmental protection aimed at reducing excessivedependence on oil. In 2001, the Indian parliament passed the Energy Conservation Act 2001, which established the Bureau of Energy Efficiency (BEE) [2] with effect from 01st March 2002 under the Ministry of Power. BEE's mission is to develop programs and strategies on self-regulation and market principles with primary objective to reduce the energy intensity of the Indian economy. BEE is developing regulatory and voluntary programs and strategies with primary objective to reduce the energy intensity of the Indian economy. BEE is also working closely with energy development agencies at the state level in order to deliver energy efficiency services, through public-private partnership.

The rapid economic growth has been accompanied by commensurate growth in the demand for energy services that is increasing the country's vulnerability to energy supply disruptions. In recent years; India's energy consumption has been increasing at a relatively fast rate due to population growth and economic development. With an economy projected to grow at 8-9 % per annum, rapid urbanization and improving standards of living for millions of Indian households, the demand is likely to grow significantly. As per the estimates made in the Integrated Energy Policy Report of Planning Commission of India, 2006, if the country is to progress on the path of this sustained GDP growth rate during the next 25 years, it would imply quadrupling of its energy needs over 2003-04 levels with a six-fold increase in the requirement of electricity and a quadrupling in the requirement of crude oil. The supply side will experience severe shortages (Sathaye et al, 2012).

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We can avoid that situation in India, if we imbibe the habit of energy conservation and utilize energy efficient products. It is seen that, alteration of behaviour is not a easy option, but it is not impossible, we still have solution in proper combination of change in energy habits, preferences to renewable energy and acceptance of energy efficient technology. The habits and preferences related to energy usage are not same for rural and urban inhabitants. So that the approach while formulating the energy conservation policies must be different for urban and rural area.

According to Garg, P. (2012) India as a country suffers from significant energy poverty and pervasive electricity deficits. In recent years, India's energy consumption has been increasing at a relatively fast rate due to population growth and economic development, even though the base rate may be somewhat low. There is urgent requirement for energy conservation and use of renewable energy because, energy based on fossil fuel will ruin our environment, due to emission of greenhouse gases. India became highest carbon dioxide emitter in year 2014, with 9.4% rise over 2013.

IV. REVIEW OF LITERATURE:

In-depth review of literature was carries out, to find the status of research on this topic. Upadhyay, H., & Pathania (2013) found that, income is very important factor in determining the consumer behavior, preferences, they used OLS model for establishing the relationship between income and various factors of consumer behavior. Jain et al (2014) reveal that the motivations of urban Indian households to practice energy conservation are hampered by several barriers restricting them from putting into practice energy conservation solutions, where the main barriers are identified in the forms of sharing information relating to use apart from other hampering factors. Consumption of energy has increased drastically over the last few decades owing to economic advancement, rapid industrialization and modern civilization, among other contributing factors. This has certain negative effects such as quick depletion of non-renewable sources, wastage of electricity/ fuel, over-consumption leading to dependency, etc. By using efficient energy technologies and changing consumption practices and attitude of people by creating awareness to adopt conservation methods one can protect energy from depleting in the near future. In India BEE is established to promote the efficient use of energy and its conservation. However, its success is completely dependent on the energy users and their attitude and awareness towards the adoption of such schemes. So National Campaign on Energy Conservation and National Painting Competition on Energy Conservation for school children have been started to develop knowledge among upcoming new generations (Jeyalakshmi, 2014). Energy modelling devices are incorporated by considering capital and operating costs as they are key elements of technology choice. In this study, various parameters have been designated like demographic and economic background, behavioral factors, possession and awareness of energy efficient technologies, financial factors and government policies (Somashekar & Nagesha, 2010). Energy is an essential input for industrial development. Energy is produced from commercial sources like coal, petroleum, hydroelectric schemes as well as from non-commercial sources like cow dung, fuel wood and agriculture wastes. Per capita consumption of commercial energy is something used as an index of the economic advancement that a country has attained. India's per capita consumption of commercial energy, however, is very low. It is only one eighth of the world average. A paper by Geelen D et al. (2010) presents a study about a 'serious game', "Energy Battle", as a means to influence energy-related behavior in households. The Energy Battle is designed to engage home occupants in a fun way in energy conservation via a competition with other households. The challenge enabled home occupants to gain insight into their energy consumption and actively involved them in reducing energyconsumption.

To combat climate change, many economists and policymakers advocate price-based approaches, such as greenhouse gas emissions taxes and emissions trading programs; technology-based approaches, such as R&D subsidies and public

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private R&D partnerships was suggested by Allcott, H., & Mullainathan, S. (2010).

According to Reddy, (2004) the energy consumption is disaggregated according to social class (employment characteristics, access to resources) and income group for rural as well as urban households. It is observed that large variations in energy use exist across different sections of households urban/rural, low/high income groups, etc. Abrahamse W (2005) suggested that evaluations of an intervention's effectiveness should be focused on (changes in) behavioral determinants as well as (changes in) energy-related behaviors. This is helpful when carrying out the intervention study.

Abrahamse W (2009) found that, household energy use related to different variables than energy savings, energy use was mainly determined by socio-demographic variables, lending additional support to previous findings (Brandon & Lewis, 1999; Gatersleben et al., 2002). Households with higher incomes and households larger in size tended to use more energy. According to this research work, constraints and opportunities strongly shape household energy consumption patterns. Barriers need to be identified for energy conservation behavior. Conscientiousness is positively associated with energy conservation behavior (Schwab N. et al. 2013) It indicate that self disciplined, orderly and well organized individuals tends to conserve energy

There is no avoiding the fact that the success of globalization is underscored by dramatic increases in consumption, and with increased consumption comes environmental degradation (Marber, 2004). Current and projected damage to the environment can impede economic progress, and climatic changes attributed to greenhouse gas emissions and pressures on natural resources have become serious problems. Resource scarcity is an issue the world will have to confront as two to three billion more people consume like middle class Americans over the next fifty years (Marber, 2004). This phenomenon is not favorable for sustainable development. Energy efficiency is the process of ensuring that homes, businesses, and appliances use energy as effectively and efficiently as possible.

V. CONCEPTUAL MODEL

Researcher studied various models of consumer behavior, and understood that for explaining energy conservation behavior, Ajzen's theory of planned behavior and Stern's Value based norm theory are appropriate. For effective energy conservation policy implementation, it is necessary to understand the energy consumption behavior in detail with respect to rural and urban households. How the customers perceive energy consumption concept and which factors influence the consumer's decision making while selecting the home appliances. There is need for in depth analysis of existing energy needs and uses patter, preferences, energy efficiency vs initial cost, while understanding the effect of various methods adopted by policy makers for energy conservation. More research is needed on nature of consumers' decision making related to energy.

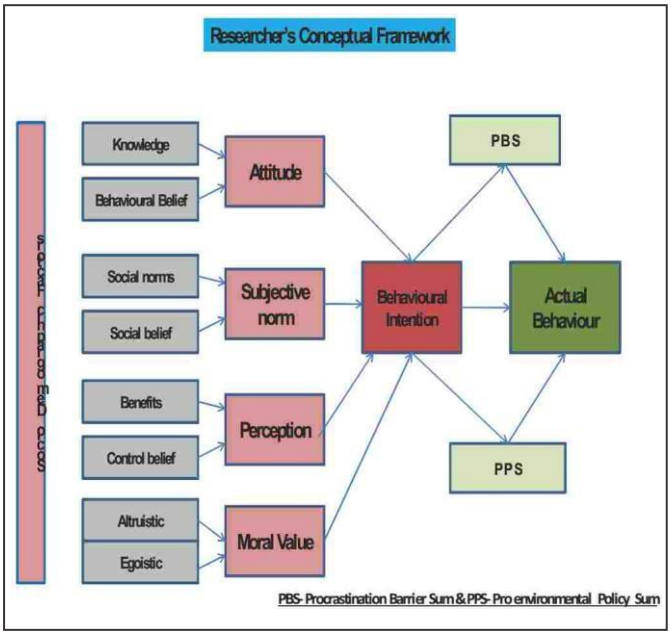
The study identifies the factors which differentiate between consumers who have a positive attitude towards energy conservation from those who have a negative attitude towards energy conservation. In this study researcher is using Theory of planned behavior-TPB and Value based norm-VBN to study the energy conservation behaviors of rural and urban people. Both the methods are implemented and validated in several studies conducted on consumer behavior analysis.

The Theory of Planned Behavior (Ajzen 1991), was developed as an extension to the Theory of Reasoned Action (Fishbein and Ajzen 1975). TPB builds upon three variables, defined as attitude towards the behavior, subjective norm, and perceived behavioral control. The first two variables were included in the Theory of Reasoned Action, whilst the latter was introduced with the TPB. The Theory of Planned Behavior is often criticized for its omission of moral considerations.

The Value-Belief-Norm theory (Stern 2000) on the other hand, makes extensive use of altruistic, or by extension, moral values considerations in order to explain consumer behavior. The VBN theory further develops the Norm-Activation theory (Schwartz 1977), in that it includes a person's ecological worldview and values into the equation. The theory presents personal norms as the main predictor of environmental behavior.

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Figure No.1- Conceptual framework



Source: Researcher's framework

Understanding buyer behaviors plays very important role in marketing, since it is difficult predict the demand for any product. With the help of consumer behavior models we can predict it with accuracy. The human behavior is complex phenomena, and prediction of pro environmental behavior is even more complicated assignment. In this model two mediating variables are added to explain the barriers towards conservation behavior (PBS-Procrastination Barrier Sum) another variable is PPS (Pro-environmental Policy Sum) These variables could be helpful to find the gap between the behavioral intention and actual behavior of consumers. The model will be tested by using SEM for its goodness of fit, and significance of correlations.

VI. CONCLUSION

Consumer behavior models help a marketer in identifying and understanding a wide range of variables that could explain consumer behavior. In this way these models help a marketer understand and predict buyer behavior, and they help the marketer formulate better marketing programs and strategies. Researchers have attempted to study the dynamics of consumer decision making and consumer behavior from varying orientations, and various models have been proposed, as shown in Fig. No.1.Theory of planned behavior and VBN are studied for understating the pro environmental behavior. Both theories are capable of explaining the behavior in context of this study. As determining pro environmental behavior could be possible only if, we can understand the theories of human behavior. For this purpose theory of planned behavior which is based on rational behavior is the most suitable. Also value based norm which is based upon the morals of behavior could be utilized for developing combined model of consumer behavior, basically focused on energy conservation behavior. Actual behavior could be determined from the combined model of behavior.

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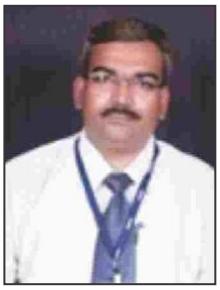
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