CHAPTER 3

BACKGROUND AND OBJECTIVES OF THE PRESENT WORK

There are many promotional measures by way of subsidies/soft loans and other efforts by the Government of India towards the promotion of renewable energy technologies in the country. Among the various sources of energy, India has been successful in the use of wind energy for power generation.

Started in early 2010, the “Jawaharlal Nehru National Solar Mission (JNNSM)” is a flagship programme of the MNRE, Government of India, to promote solar energy in the country. The Indian Government plans to add 4,000 MW of solar power in the second batch of JNNSM which aims to infuse 20 GW of solar energy by 2017. More impetus to off-grid solar applications and roof top power will mark the second phase of this mission.

Under the eleventh five year plan in India, solar energy became the focus of a major research and development initiative of the Central and State Governments. A solar energy building is one of the major applications. The long term goal of solar energy research is to create conditions, through rapid scale up of capacity and technological innovation, to drive down costs towards grid parity. The eleventh five year plan emphasises the deployment of solar energy applications in the following areas: solar passive architecture, solar thermal systems/devices, solar water heating, and electricity generation from solar energy.
Though the potential for the use of solar energy is enormous in India, the use of DSWH to reduce the primary energy requirement has not been successful, in spite of several measures taken by the Central and State Governments, except in Maharashtra, Gujarat and Karnataka. However, the use of wind potential for electricity generation is successful in some states like Tamil Nadu and Maharashtra. But the percentage of diffusion of DSWH in the state of Tamil Nadu is very small, compared to the use of windmills for electricity generation.

Globally, the residential sector has the largest market share in the solar water heater. A majority of the solar water heating systems are installed in urban areas. With enormous solar energy potential, India is sharing only 1.5% of the global SWH capacity as compared to China (68%), followed by Germany (4.6%), Turkey (4.6%) and Brazil (1.7%), as shown in Figure 3.1.

Figure 3.1 Solar water heating global capacity, shares of top 12 countries, 2011

Source: REN21 (2013)
One of the major reasons for the failure of commercialisation of this product is the lack of customers’ involvement in the product development. Although there have been several studies, review papers, and reports pertaining to developments in the technologies, analysis, and design issues related to solar gadgets for various applications, the literature review indicates that there are not many studies on the application of product development processes, and the “fuzzy” front end issues related to these products.

Some of the barriers to the diffusion of DSWH in India identified in earlier studies point out the following:

(i) The main barriers to greater diffusion can be categorized into economic (financial), technological, and socio-cultural barriers. The distinction between these categories are not very clear in India.

(ii) Lack of awareness on the long term advantages of solar water heaters and on the environmental issues is clearly evident on the part of the non-users of the DSWH in the States of Karnataka and Maharashtra to name a few

(iii) Many customers perceive it as a product suited for independent houses and not so much for apartment buildings.

(iv) The capital cost, recourse to biomass, lack of piped water supply, roof design/strength, and the virtual absence of a supply chain are the major obstacles.
(v) There is a need to eliminate subsidies in respect of fossil fuels and petroleum products to encourage people to go in for renewable energy sources. The foray into RE would provide new opportunities in respect of job creation, entrepreneurship, while helping to reach our energy goals. There are evidences of profitability in solar thermal applications when deployed in larger markets. The government policies in China have considerably helped in larger diffusion in China.

(vi) In developing countries, problems associated with capacity limitation in the private sector to viable manufacture, distribute and service solar water heaters, coupled with the comfort of subsidies enjoyed by users in respect of other sources have led to a perception of higher costs for these products among potential customers.

(vii) The large scale deployment of electric geysers, especially in urban areas, with attendant lower initial costs compounded by subsidized electricity inhibit a changeover to DSWH and limit the retail outlets.

(viii) There is no effective public-private partnership to provide coordinated effort in promoting RE technology.

(ix) Issues related to quality in respect of existing products inhibit fresh consumer confidence to enlarge the market.

The maturity of solar technology does not seem to manifest in the form of successful commercial solar products. There is still reluctance and latent discomfort on the part of customers when it comes to the
purchase of solar products, which are viewed more as items of novelty than utility.

The current research has recognised that a successful solar product ought to be an organic derivative of both technology as well as the hitherto unexpressed need of the customer. Thus far, there have been very few attempts in gathering the voices of various stakeholders, including the end-users, to arrive at a customer-centric development of these products.

The available studies on the barriers to the diffusion of solar products in the market have unfortunately not considered many of these crucial issues. Seldom are customer views objective and clear. Several times, beyond the vague expression of discomfort, a customer might not even be aware of what he/she actually wants in a product, and what would delight him (latent needs). Often they could express their opinions from various experiences that strongly affect them.

Therefore, there is an important need to develop a scientific methodology where the customers are guided, but not influenced, towards offering their choices in a considered, but subjective manner. These subjective inputs could then be analysed using the conjoint analysis to generate product boundaries, which could be further crystallized into clear product specifications. Thus, there is an opportunity to incorporate the “voice of the customer” even during the product specification phase, using a structured approach.

Calantone et al (1978) have opined that the needs of customers are the results of multi-faceted factors involving complex relationships covering both internal and external attributes of a product. The internal
factors of individuals or group of customers include beliefs and past experiences, while external factors are the environmental aspects.

The present study examines and analyses the various barriers to the diffusion of DSWH in India, by using a combined approach of a preliminary survey, brainstorming, focus group and conjoint analysis.

The present research work tries to identify the prioritised needs (with an acceptable trade-off) of various stakeholders, including end users and potential customers of DSWH, by using the conjoint analysis, combined with brainstorming and focus group discussions.

The feasibility study takes care of the preliminary market analysis and the financial implications, to establish the viability of the DSWH in order to eliminate the barriers, and penetrate the Indian market.

Also, various currently available tools for successful product development like the use of morphological charts, SCAMPER technique, and the theory of inventive problem solving (TRIZ), or the structured development of tools like quality function deployment (QFD) have hardly been used at the concept development stage. Leading all these shortcomings is the lack of awareness of the customer expectations and preferences.

The objectives of this research study are:

(i) To investigate the ‘indifference’ towards DSWH among potential consumers and their propensity towards using them,
(ii) To identify the customer’s expectations and needs, and the possible technological improvements and features to be incorporated in a new DSWH; and

- To suggest ways and means of overcoming some identified barriers that would enable diffusion of DSWH in India, by incorporating the voice of the customer as early as the product development specification phase.