# Marketing strategies for augmenting the use of solar streetlights – study conducted in cities of India

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**Abstract:** Streetlights become an essential aspect in terms of secured nightlife. Inefficient and a less number of streetlights can increase the crime rates and road accidents. Scarcity of grid power and its connectivity issues can be major problems to set up streetlights on every road. Therefore, solar streetlight, which operates on solar power, becomes a good option. This research paper tries to identify and evaluate the significant factors influencing the use of solar streetlights, which can help in framing marketing strategies that will help in augmenting its use. These strategies can help the manufacturers and suppliers of solar streetlights to augment their sales. It will assist the government in its efforts to boost the usage of non-conventional energy resources, which will facilitate in reduction of greenhouse gas emissions, paving the way for sustainable development.

**Keywords:** energy; grid power; solar energy; off grid applications; solar photovoltaic energy; solar thermal energy; solar streetlights; green house gas emissions; sustainable development; marketing strategy.

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**Biographical notes:** Anupamaa S. Chavan completed her PhD in Developing Marketing Strategies for Solar Off Grid Applications. She has researched and identified factors influencing the use of solar off grid applications in cities of India. These factors were further used in drafting marketing strategies for augmenting the use of solar energy products. She has more than 11 years of research experience in the area of solar energy products. She is in teaching profession for the last 26 years and her teaching areas include marketing management, retail management and environmental studies at graduate, undergraduate, and postgraduate level. She has published several research papers in national and international journals.

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## 1 Introduction

Latest developments in power/energy sector suggest that the challenges related to energy security are growing rampantly. The world is going through a phase of a twofold energy related problems; that of lack of secure and sufficient supplies of energy at reasonable prices and, of damages caused to the environment due to its over consumption. Ever increasing prices of energy and current geo-political events have reiterated to us the significance of the role that affordable energy plays in growth on economic front and human development as well. It has also reminded us of the vulnerability of the global energy system to disruptions in supply. To provide a regular and reliable source of green as well as clean energy is a pressing need. Under such circumstances, solar energy sourced through natural sunlight becomes a very suitable option, for the simple reason that it is readily available and is also cost effective. The energy derived from the Sun is renewable and without any greenhouse gas emissions, consequently, it can avoid global warming and help in sustainable development.

Solar energy can be utilised in the two ways (Noble and Swartman, 1995):

a Solar photovoltaic energy (light energy) which is basically conversion of sunlight to electricity. Chavan (2014) states that, through the solar photovoltaic route, solar home lights, solar streetlights, solar generators, solar lanterns, solar traffic lights, solar road studs, solar blinkers and so on are the most conventional devices and systems that are being used widely.

b Solar thermal energy (heat energy) which uses the heat of the sun for variety of purposes and to produce electricity. It is utilised for heating water or air, cooking, drying food and agricultural products, distillation of water, water purification, detoxifying wastes, cooling and refrigeration, processing heat for industry and electricity generation.

Streetlights become important aspect in terms of secured nightlife. Less number of streetlights may hamper the visibility on the road and raise security concerns. Grid connectivity and reliability issues are also major problems. Off-grid solar power can be a solution, whereby electricity is generated without a connection to the power grid (Kumar et al., 2009). Off-grid solar applications can be used for reducing the load on grid power and hence solar streetlights can be a good option. Solar streetlights (SSLs) use solar energy and do not require grid connection. One important feature with respect to solar street light is that it is costly as compared to the conventional streetlights. Though the initial cost is high, once installed there is no recurring cost of electricity bill and the life

of this product is of 20 to 25 years. The payback period is 5 to 6 years after which one can use it free of cost. Ali et al. (2011) narrates that – "the direct solution for the grid related problem is to cut off some loads to keep its stability". They further suggest an energy-free system for street lighting, as there is no power demand from the grid. A standalone solar street light emitting diode (LED) light system is proposed. The proposed system consists of a PV panel, storage system, LED lamp, power conditioning system (PCS) and the controller, which can manage the power direction and system operation. Using LED in lighting applications has many advantages compared to other lamps. In additions to this, it needs low direct current (DC) voltage source to be operated. The storage system will be charged during the daytime using the available sunlight. On the other hand, during the nighttime the controller will give a signal to the system to connect the LED lamp to be ready for use. Since the LED needs a low dc voltage to be operated, a simple dc-dc converter will be enough for this system resulting in decreasing the cost of the overall system. Applying this idea in the streets enables the reduction of more than 50% of the total required energy by high-intensity discharge (HID) lamps that enable the use for small PV system. By this proposed system, streets can be illuminated with lower power lamps, no operating costs, no carbon dioxide ($CO_2$) emissions, and grid energy-free, which is environmentally friendly. Moreover, the proposed solution can solve the peak point crisis of load demand. SSLs can be one of the ways to bring down load on grid power and also reduce greenhouse gas emissions. Now this can happen only when these products are widely used. Oke et al. (2013) designed and constructed a solar powered lighting system. It was stated that solar energy is harnessed for powering street light and almost 100% operations of the system is achieved without the involvement of manual operation for ON and OFF switching of the light whenever the sunlight comes or goes using light dependent resistor (LDR).

According to Transparency Market Research (2017), "the global solar street lighting market is likely to be worth US$12.54 billion by the end of 2027 from US$3.76 billion in 2018. During the forecast period of 2019 and 2027, the global solar street lighting market is expected to progress at a CAGR of 16.24%. The applications of solar street lighting solutions are seen in areas such as residential, commercial, and industrial. Of these, the commercial segment is projected to lead the global market due to rising initiatives by governments and civic authorities to using solar lighting. Asia Pacific was the largest regional segment for solar street lighting market globally, accounting for 45.4% share in 2018. Countries such as China, Japan, India, South Korea, and Australia are the major revenue generator in Asia Pacific. On the other hand, the Middle East and Africa was the second-largest market for solar street lighting in 2018. Kenya, South Africa, Ghana, and Nigeria spearhead the solar street lighting market in Africa with need for clean and reliable source of off-grid electricity. Europe is also expected to provide lucrative opportunities in solar street lighting market along with USA and Germany, as part of their carbon emission reduction goals".

## 2 Rationale of study

This research intends to identify the significant factors impacting the use of SSLs, which in turn will help in developing suitable marketing strategies. These strategies are further discussed with the suppliers/manufacturers to find out their efficacy in implementing.

Taking into account the recommendations of the suppliers/manufacturers, ultimate strategies have been framed, these strategies are supposed to augment the usage of SSLs. These marketing strategies can help the suppliers/manufacturers of SSLs to boost their sales. It will lend support to the Government in its efforts to enhance the use of energy resources, which are renewable in nature. Harnessing clean solar power will also help in sustainable development. The end user will feel a sense of satisfaction for extending support to save Planet Earth.

## 3 Literature review and hypotheses formation

Very less has been found and done in the area of marketing of SSLs. Thus, there is not much literature available for review. The following literature review gave the necessary insights to derive important factors that can influence the use of SSLs, and based on these factors hypotheses were formulated.

### *3.1 Utility and usage of SSLs*

Marshall (1890) spells out how utility can have an impact on demand for a product. Utility theory is derived from an economic concept measuring people's preferences or values over a good or service in numerically useful ways (Fishburn, 1968). Utility is want satisfying capacity of a product. Demand can be created if people are convinced about the utility of a product. According to Drucker (1986), the customer considers value not in the product, but in the utility provided by the product. Robinson (1962) states that, "utility is the quality in the goods that makes individuals want to buy them, and the fact that individuals want to buy them shows that they have utility".

Kanungo and Dutta (1966) in their research paper 'Brand awareness as a function of its meaningfulness, sequential position, and product utility' published in *Journal of Applied Psychology*, which was based on a study of meaningfulness of brand name, sequential position of the brand name in a slogan, and the utility of the product for the consumer on brand awareness, paper further asserts that superior learning and retention were observed for brand names of high-utility products. Thus, high utility of the products play a vital role in positioning the products. The following hypothesis is developed to learn the impact of utility on the use of SSLs.

$H_o$ There is no significant impact of consumers' opinion regarding the utility of solar streetlights on its use.

### *3.2 Cost and usage of SSLs*

Off-grid power also suffers from handicaps (Palit and Chaurey, 2011). The cost of off-grid power is generally greater than the cost of conventional power, and off-grid power is also currently not a substitute for grid access for the large quantum of electricity that many industrial activities require (Arnold et al., 2008; Bhattacharyya, 2006). Bhide and Monroy (2011) state that high cost and lack of financial mechanisms are the major barriers to adoption of off-grid solar applications. Niruka (2018) remarks "the need to have more efficient and low-cost solar panels has given rise to the different PV technologies. Polycrystalline, thin films, single-crystalline silicon, amorphous silicon,

and semi-crystalline are the main types of solar panel. In an endeavor to explore the working principle of PV to produce electricity for street lighting using LEDs, some researchers have evolved various design strategies for street light installation in a number of cities and communities. Paper further states that, the importance of using light emitting diode (LED) as the lighting device for street light system powered by solar was greatly highlighted in Fathi and Chikouche, Guijian and Yingchun, Yongqing et al. It also has a mention of Kiong (2014) who gave a cost-effective LED street light system powered by solar. An algorithm for LED light intensity control was proposed by him". To know whether initial high cost has an impact on the use of SSLs following hypothesis is framed:

$H_o$ There is no significant impact of high cost of installation on use of solar streetlights.

### *3.3 After sale service & usage of SSLs*

Vipradas (2001) in *Renewables – Products and Markets* a collection of papers edited by him observes that extensive approval in the society for the interrelations among environment, poverty, and sustainable development forces our attention to technological solutions that address the needs of current times without creating any negative externalities. It is in this respect renewable energy technologies (RETs') have gained enormous popularity. The editor further asserts that technology and installations have to be provided with due regard to replication and integration into long-term development strategies. This, in turn, demands the expanse of these technologies through market channels necessitating the provision of a maintenance and after-sales servicing infrastructure. High price and uncertainty with respect to after sales service and maintenance of solar panels make the adoption of solar off grid application difficult (Rai et al., 2016). Technical support for on-time repairs and maintenance is crucial for the success of low-cost energy technology (Millinger et al., 2012; Palit, 2013; Nishesh et al., 2018). Lack of effective technical support decreases service quality and strains the relationship between customers and implementers (Sovacool et al., 2011; Ulsrud et al., 2015; Kebede et al., 2014).

Adewale et al. (2013), in their research paper titled 'Impact of marketing strategy on business performance – a study of selected small and medium enterprises (SMEs) in Oluyole Local Government, Ibadan, Nigeria' published in *IOSR Journal of Business and Management*, state that marketing mix and after sales service were significant common predictors of business performance in terms of profitability, market share, return on investment, and expansion. One needs to know whether after sale service has an impact on the use of SSLs and hence the hypothesis framed is:

$H_o$ There is no significant impact of availability of after sales service on the use of solar streetlights.

### *3.4 Availability of the product and its usage*

Making products available at the right time, at right place and at right price is the quintessence of distribution. The significant impact of product availability on consumer demand has been well established by Bronnenberg et al. (2000), Bruno and Vilcassim (2008), Jeuland (1979) and Pancras (2011). Farris et al. (1989) state that retail stores tend

to stock only popular or large-market-share brands. Shah et al. (2015) state that brand performance is influenced by the dynamics of retailers' stocking preferences of different products. One can very easily find the conventional electronic products but when it comes to off grid application like solar streetlight, it may not be sold at every electronic retail outlet. In the statement of National Renewal Energy Laboratory – A US Department of Energy Laboratory, Lori et al. (2002) underscore that greater emphasis must be laid on marketing of green power – the act of selling energy produced wholly or in chunk from sources which are renewable in nature. In addition to it, they also affirm that customer awareness and forceful marketing, both are necessary to make these products recognised among people so that they are aware about the availability of such products. A number of marketing efforts or joint efforts – (i.e., organisations working to safeguard environment teaming with marketers) can bring about awareness regarding the availability of such products in the market to a great extent. Thus, one needs to understand if availability of SSLs has any impact on its use, hence following hypothesis is framed:

$H_o$ There is no significant impact of easy availability of solar streetlights on its use.

### *3.5 Credit/loan facility, Government incentives and usage of SSLs*

International Energy Agency (IEA) (2006), *World Energy Outlook* published by IEA, which is an independent body founded in November 1974 within the framework of the Organization of Economic Co-operation and Development (OECD) to execute an international energy program. IEA's goal is to improve the world's energy supply and demand structure by increasing the effectiveness of energy use. It emphasises on how to improve system in order to cope with oil supply disruptions. The book states that the world is experiencing twofold energy- related threats: that of lack of sufficient and secure supplies of energy at reasonable prices and that of environmental damage caused by greenhouse gas emissions because of its overconsumption. The existing model of energy supply holds the risk of acute and irrevocable harm to environment along with climate change at global level. It also asserts that unifying the objectives of energy security and protecting the environment commands firm and coordinated action on the part of the Government as well as support from general public. In this way, IEA emphasises on the use of unconventional energy resource, and hence use of solar energy is absolutely inevitable.

Deambi (2009), in his article 'Harnessing the power of the sun', published in *The Solar Quarterly* states numerous steps are taken by the Government to promote the use of solar energy and also enhance the growth of this energy sector in the country, which were:

- subsidising solar energy systems
- providing subsidy on interest to offer affordable loans to users and producers
- making provision for import duty at concessional rates or even scrapping import duty on some of the raw materials, parts and finished goods
- giving exemption from excise duty
- giving 80% accelerated depreciation in the maiden year of installation

Kumar et al. (2020) asserts that, Government initiative is one of the factors that significantly influences customer attitude towards green behaviour. Government should promote and incentivise green purchases by giving subsidies and credit or loan facility, which will make such costly green products affordable. Jørgensen and Zaccour (1999) scrutinised how government subsidies can positively influence the adoption of sustainable technologies in a manufacturer's production process. The major issue to encourage prospects for SSLs is the financial incentives (Bazen and Brown, 2009). Government of India (2020) through Ministry of New and Renewable Energy (MNRE) under their scheme, "Off Grid & Decentralized Solar PV Application Programme Phase III – (March 2021), had proposed installation of 300,000 solar street lights throughout the country, with special emphasis on areas where there is no facility for street lighting systems through grid power specifically North Eastern States and Left-Wing Extremism (LWE) affected districts. MNRE offered Central Financial Assistance (CFA) of 30% of the benchmark cost of the system or the tender cost, whichever is lower for solar street lights and solar power plants in general category states. CFA of 90% of the benchmark cost or tender cost whichever is lower, for North Eastern States including Sikkim, Jammu and Kashmir, Himachal Pradesh, Uttarakhand, Lakshadweep and Andaman and Nicobar Islands. State Nodal Agencies (SNAs) will be the designated Implementation Agency under the scheme. Public sector undertakings PSU(s) can be implementation agencies for remote/hilly or border areas on the request of state agencies. Such PSU(s) will make sure that procurement of solar street lights should be done as per MNRE specifications and standards". One can check for such MNRE schemes for off grid solar applications on their official website.

One needs to find out whether Credit/Loan facility and Government incentive/subsidy influences the use of SSLs in cities, hence following hypotheses are framed:

$H_o$ Availability of loan/credit facility to buy solar streetlights does not have significant impact on its use.

$H_o$ Government incentives and subsidies for solar streetlights have no significant impact of on its use.

### *3.6 Social and environmental concern and usage of SSLs*

Chauhan (2010) states that social advertising can play an important role in creating awareness regarding the social and environmental issues and motivate the general public to come forward and participate in environmental friendly practices. Going green underscores the 'greenness' which includes decreasing environmental pollution, encouraging social equity, and rationally employing resources (Wang et al., 2014). Kim et al. (2013) indicated that perceived threats of climate change are positively associated with the readiness to act in favor of the environment. Singh (2010) states that energy efficiency improvements and green sources of energy are required to slash green house gas (GHG) emissions and to combat climatic change. Unruh and Ettenson (2010) in their research article titled, 'Growing Green: Three smart paths to developing sustainable products' published in *Harvard Business Review*, state that administrators who are of the opinion that it is sensible to develop green products for their organisation have to decide the best path ahead. The authors have proposed and described three wide-ranging

strategies that companies can adopt to support their green goals with their capabilities which are:

1 *accentuate:* strategy involves underlining existing or hidden green attributes in your current portfolio

2 *acquire:* strategy involves purchasing green brand of someone else

3 *architect:* strategy covers devising green offerings – building from ground level.

These policies arose from ten detailed case studies of consumer goods and industries, which were moving into green space; the authors held discussions with scores of senior and middle-level sustainability administrators. The plan now plays a key role in the main executive Master in Business Administration (MBA) course offerings in sustainable business policy and in the executive learning programs at Thunderbird School of Management.

Kotler and Keller (2016), in his book *Marketing Management*, expresses that "consumer constitutes an important class of the society. All industries undertake production directly or indirectly for the satisfaction of the consumer wants. All the economic activities centre round the consumer. Therefore, it becomes important to study the pattern of consumer behaviour objectively and mould it favorably to the maximum advantage of the business and the industry. One should consider all the factors i.e. social, economic, cultural and personal/individual, which influence the buying decision. Marketers should study their buyers for effective sales and to increase their profitability, they need to identify the circumstances that trigger a particular need. By gathering information from a number of consumers, marketers can identify the factor that sparks an interest in a product category. They can develop marketing strategies that trigger consumer interest by adding appropriate tangible and intangible values to the product". Thus, in case of SSLs that are quite environment friendly products; common social values and belief values can facilitate placement of these products in the market. SSLs can be placed as environment friendly products. The following hypothesis is framed to find out whether social and environmental concern impacts the use of SSLs.

$H_o$ There is no significant impact of Social and Environmental concern on the use of solar streetlights.

## 4 Methodology

Literature review helped in finding out the factors that can have an impact on the use of SSLs. These factors were considered to be the independent variables of the study. They were utility, high cost, availability of after sales service, product availability, loan/credit facility, government incentives and subsidies, social and environmental concerns related to sustainable development. Buyers'/Prospective buyers' (users and non-users of SSLs) who intend to purchase/utilise solar streetlights were considered to be dependent variable.

Random sampling technique was applied. The respondents belonged to the six cities of Western and Southern states of India. Mumbai, Ahmadabad and Jaipur were the cities from West zone, whereas Hyderabad, Bengaluru and Chennai were cities from the South zone of India respectively. A structured questionnaire was administered among 1,056 respondents residing in the above-mentioned cities. Respondents included private

residential owners, cooperative societies new constructions, hospitals, industries, hotels, education institutions, public utilities, places of worship, and recreation centres. The respondents were interrogated on various factors influencing the use of SSLs. Sixteen manufacturers/suppliers from the six cities mentioned above were also interviewed either face to face and/or through telephonic conversation to gain insights in finalising the marketing strategies.

## 5 Data analyses

From Table 1, it can be observed that there are total 52 users of SSLs, with Mumbai and Bangaluru having the maximum number of users, i.e., 16 each. Chennai follows with 11 users, Ahmadabad has five users, whereas Jaipur has 3 users and Hyderabad has only one user. There are total 1,004 respondents who do not use Solar Streetlights. In the category of non-users we had:

1 non-users who were unaware of SSLs and therefore not using SSLs

2 non-users who were aware of SSLs but still not using them.

Therefore, only the responses of people who did not use SSLs in spite of knowing about them were considered, i.e., non-ignorant non-users, as ignorant non-users could not respond since they were totally ignorant about SSLs.

**Table 1** Users and non-users of solar streetlights (SSLs)

| *Total no. of respondents* | *Users* | *Non-users* | | |
|---|---|---|---|---|
| | | *Ignorant (a)* | *Non-ignorant (b)* | *Total non-user (a + b)* |
| 1,056 | 52 [Mumbai – 16, Hyderabad – 1, Bangaluru – 16, Chennai – 11, Ahmadabad – 5, Jaipur – 3] | 75 | 929 | 1,004 |

Binary logistic regression was used for analysing the data since the dependant variable is binary which consisted of users and non-users of SSLs and accordingly following model is developed:

Binary logistic regression designed for solar streetlights:

Dependent variable Y is defined as:

- Y = 1; if respondent uses SSLs (user)
- Y = 0; if respondent does not use SSLs (Non-User).

Following statistical model is used:

$$\log\left[\frac{p}{1-p}\right] = b_0 + b_1 X_1 + b_2 X_2 + \ldots + b_7 X_7 \quad (1)$$

where

$$p = \Pr[Y = 1/X] \\ = \Pr[\text{Solar energy products user}/\text{Response of seven factors}] \tag{2}$$

$X_i$'s are factors (utility, high cost, availability of after sale service, availability of product, loan/credit facility, government incentives, and social & environmental concern).

Parameters were estimated by maximum likelihood method.

Wald's chi-square test was used to assess the significance of each factor.

Global testing:

$$H_o: b_i = 0, \quad \forall i, \text{ i.e., none of the factor impacts buying decision} \tag{3}$$

$$H_1: \text{not } H_o, \text{ i.e., at least one factor has an impact of the buying decision} \tag{4}$$

Using three tests (likelihood ratio, score and Wald), we fail to accept $H_o$ and arrive at the conclusion that, at least one factor influences the buying decision.

**Table 2** Table of coefficients for solar streetlights

| *Variable* | | *DF* | *Estimate* | *SE* | *Wald's test statistic* | *p-value* |
|---|---|---|---|---|---|---|
| Intercept | | 1 | –12.6914 | 1.9394 | 42.8225 | <.0001 |
| 1 | Utility | 1 | 2.3580 | 0.3076 | 58.7537 | <.0001 |
| 2 | High cost | 1 | –0.0784 | 0.1740 | 0.2030 | 0.6523 |
| 3 | Availability of after sales service | 1 | 0.0800 | 0.2424 | 0.1088 | 0.7415 |
| 4 | Product availability | 1 | 0.1464 | 0.2442 | 0.3592 | 0.5489 |
| 5 | Loan/credit facility | 1 | 0.9881 | 0.2834 | 12.1593 | 0.0005 |
| 6 | Government incentives/subsidy | 1 | 0.0819 | 0.2431 | 0.1136 | 0.7361 |
| 7 | Social and environmental concern | 1 | –0.4915 | 0.3035 | 2.6218 | 0.1054 |

From Table 2, one can observe that statistically there are two significant factors impacting the use of SSLs those are utility (b = 2.3580, p-value =< .0001), and loan/credit facility (b = 0.9881, p-value = 0.0005).

Therefore, following interpretations can be made regarding the hypotheses framed with respect to the independent variables:

- Utility (b = 2.3580, p-value =< .0001) – we fail to accept:
  $H_o$ There is no significant impact of consumers' opinion regarding the utility of solar streetlights on its use.
- High cost (b = –0.0784, p-value = 0.6523) – we accept:
  $H_o$ There is no significant impact of high cost of installation on the use of solar streetlights.
- Availability of after sales service (b = 0.0800, p-value = 0.7415) – we accept:
  $H_o$ There is no significant impact of availability of after sales service on the use of solar streetlights.
- Availability of product (b = 0.1464, p-value = 0.5489) – we accept:
  $H_o$ There is no significant impact of easy availability of solar streetlights on its use.

- Loan/credit facility (b = 0.9881, p-value = 0.0005) – we fail to accept:
  $H_o$ Availability of loan/credit facility to buy solar streetlights does not have a significant impact on its use.
- Government Incentives/Subsidies (b=0.0819, p-value= 0.7361) – We accept:
  $H_o$ Government incentives and subsidies for Solar Streetlights have no significant impact of on its use.
- Social and environmental concern (b = –0.4915, p-value = 0.1054) – we accept:
  $H_o$ There is no significant impact of social and environmental concern on the use of SSLs.

From the above analyses, suitable marketing strategies are suggested after considering these important factors.

## 6 Findings and suggestions

It has been observed from the above analyses that utility and credit/loan facility have proved to be the significant factors impacting the use of SSLs. There is an urgent need to educate people about its utility and also make credit/loan facility available to them so that they can buy SSLs. The following steps can be taken to bring about awareness regarding its utility:

- extensive advertising through digital media
- banners, hoardings, leaflets, pamphlets
- advertisement using social media platforms, i.e., e-mails, Facebook, Instagram, Pinterest and so on
- advertisements through celebrity endorsements and influencer marketing
- organising game shows and role plays
- advertising with the help of mobile vans displaying boards of these goods
- use of social advertising to build positive attitude among people towards SSLs
- government to use of SSLs in government buildings, parks, public places, public companies, etc. so that these products get public attention.

Credit/loan facility has to be provided to enhance the use of SSLs, though credit facility is extended by Indian Renewable Energy Development Agency (IREDA) and also by State Nodal Agencies in India, it is observed that prospects are not aware of this facility. One can adopt the following strategies:

- extensive advertisement about the loan/credit offered to buy SSLs
- prospects are to be educated through various means about loan/credit facility offered to buy SSLs provided by IREDA and State Nodal Agencies
- the manufacturers/suppliers should give detailed information to the prospects about loan/credit facility

- ‘sale on instalment’ basis can be made available to the prospects
- the Finance Ministry and Reserve Bank of India (RBI) can play a crucial role in this regard; various qualitative and quantitative measures can be taken by them through commercial banks to induce and encourage a large number of people to use SSLs by providing good loan/credit facility.

Thus after considering the vision and mission statements marketers need to undertake the strength, weakness, opportunities and challenges (SWOC) analysis, conduct a thorough study of marketing mix elements and work out the strategy to market their products. Niche marketing strategy with skimming pricing can help in a great way in case of SSLs. Market can be segmented taking into account the geographical and demographic factors and the segment whose needs can be catered in best possible manner can be targeted and SSLs should positioned in the market emphasising on its utility factor. Basically SSLs are tailored depending upon the location of the site, the structure of the building, lamp’s mounting structure with solar modules, which has to face the direction of the Sun. Therefore, one has to customise the product and decide the design of SSLs and also the number of SSLs required to be installed in the required area.

## 7 Discussion

The above suggestions were discussed with sixteen manufacturers / suppliers to check their practicality and feasibility of implementation. The following remarks were made by them:

- 93.75% of manufacturers/suppliers expressed their inability to conduct rigorous advertising campaign for promoting SSLs resulting in further addition to the cost of SSLs, which will make these products costlier.
- 100% of suppliers/manufacturers were of the opinion that *sale on instalment basis* is highly impossible in case of SSLs as these products are customised and designed according to the demand of individual buyers and also based on availability of open space for installation of the solar panels. If a client is unable to pay the instalment, it would be very difficult for them to find another buyer for the dismantled product recovered from the defaulting client.
- 93.75% of suppliers/manufacturers had no collaboration with any commercial banks to grant credit/loan facility to the buyers of SSLs.

Taking into consideration the above feedback of suppliers/manufacturers following strategies are framed which can positively augment/boost the usage of SSLs:

- Promotion of SSLs to be done through:
  - a one to one selling
  - b local promotions can be done through pamphlets, leaflets and banners
  - c online promotions through E-mails, use of other social media platforms like Facebook, Instagram, Pinterest and mobile phones
  - c organising road shows at public places and major railway stations highlighting the environment friendly feature of SSLs which can boost its social value

e arranging mobile vans displaying such goods.

In the above-mentioned promotion techniques, stress has to be laid on the utility, payback period, zero utility bills, credit/loan facility and government incentives. Push strategy has to be implemented by the organisations, if heavy endorsements are unaffordable. In this way, below the line (BTL) promotional techniques can certainly help.

- Study of market segmentation will help the firms to identify the appropriate segment that can be targeted by them to position SSLs. On the basis of the availability of resources, individual firms can decide their role; either as market leaders, or challengers, or followers or nichers. Small firms can use a niche marketing strategy to their advantage. Omni-channel marketing techniques should be adopted.
- While designing the product one has to take into account the solar radiation, product specifications and standards specified by MNRE of India. Offering after sale service, which covers installation, repairs and maintenance. Also allowing warranty period for the SSLs. Manufacturers/suppliers should examine post purchase dissonance experienced by their customers. To counter such dissonance, their after-sale communications should provide evidence and support to help customers feel good about their choice.
- Making it mandatory to have skilled and competent staff for installation of SSLs, the ground workers must be given appropriate training to install and operate these products. Even a minor mistake made by these workers in installing and operating the product may reduce its effectiveness. This can have drastic effects on the future development of solar industry.
- Collaborate with commercial banks that can grant loans for buying SSLs.
- Having good customer relationship management. As these products have a long life, almost 25 to 30 years, the manufacturers/suppliers should maintain regular contact with the buyers and seek regular feedback on the efficiency of the product. They must offer quick service for any defect in functioning of the product. Customer satisfaction is absolutely essential; it substantiates and confirms the organisation's success in meeting the expectations of its customers. It is an important aspect for the firm's financial well-being. A sense of pride can be imbibed in the minds of buyers by declaring them as 'green customers', who have come forward to save Mother Earth, can also help in promoting SSLs.

If the strategies mentioned above are employed, they will certainly help in accelerating the use of SSLs.

## 8 Limitations and scope of the study

This study is limited to the six cities of western and southern states of India. The study concentrates on only solar streetlights, and other solar grid/off grid applications/products are not included. Only seven factors, i.e., utility, after sales service, high cost, product availability, loan/credit facility, government incentives/subsidies and social and environmental concern are considered and studied. The other factors, which might have

an impact on the use of solar streetlights, are not taken into account. Similar study can be undertaken for other solar off grid applications/products in numerous cities/regions.

## 9 Conclusions

One can think of lighting up the roads and streets without the grid connected electricity due to availability of solar streetlights. Maximising the use of SSLs will help in reducing the burden on grid connected electricity production and distribution. There can be a further research conducted in the area of reducing the cost of SSLs so that more and more people will be able to buy/use these products, which will in turn raise its demand.

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