

Study on Solar products business startup: A Research based on Delhi NCR market & Customers

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ABSTRACT: In recent years, India's achievements in the energy sector have been outstanding. Led by Prime Minister of India, Government of India is implementing reforms towards a secure, affordable and sustainable energy system to boost the economic growth.

Solar power is the strategic need for the country because solar power has potential to save USD 20 billion in fossil fuel imports annually by 2030 and domestic manufacturing have the potential to save USD 42 billion in equipment imports by 2030. Solar manufacturing can have the potential to create direct employment equivalent to 50,000 in the next 5 years also in another case, it can create at least 125,000 indirect jobs in the supply chain.

Our research revolved around setting up a manufacturing unit for solar products in Ghaziabad and was done in the National Capital Region across people of different income groups. The purpose of this research was mainly to identify customer insights and their willingness to use the solar products. These products have already penetrated

into B2B markets, and we wanted to check the viability of the same in B2C segment.

Keywords:New business startup, Small Business Management, Quantitative Techniques for Business & Management Research, Solar Energy & Power, Business research, Renewable solar energy, Business strategy, Make in India, Business startup

I. INTRODUCTION

In recent years, India's achievements in the energy sector have been outstanding. Led by Prime Minister of India, the Government of India is implementing reforms towards a secure, affordable and sustainable energy system to boost the economic growth.

Energy sector in India is transforming to greater sustainability. The India's energy policy is based on the country's energy deficit and increased focus on alternative sources of energy, particularly solar, wind energy and nuclear.

The key indicators of the growth in the solar energy are:

India has 5th Global Position for overall renewable energy capacity.

Renewable energy has 23.39% share of total generation capacity.

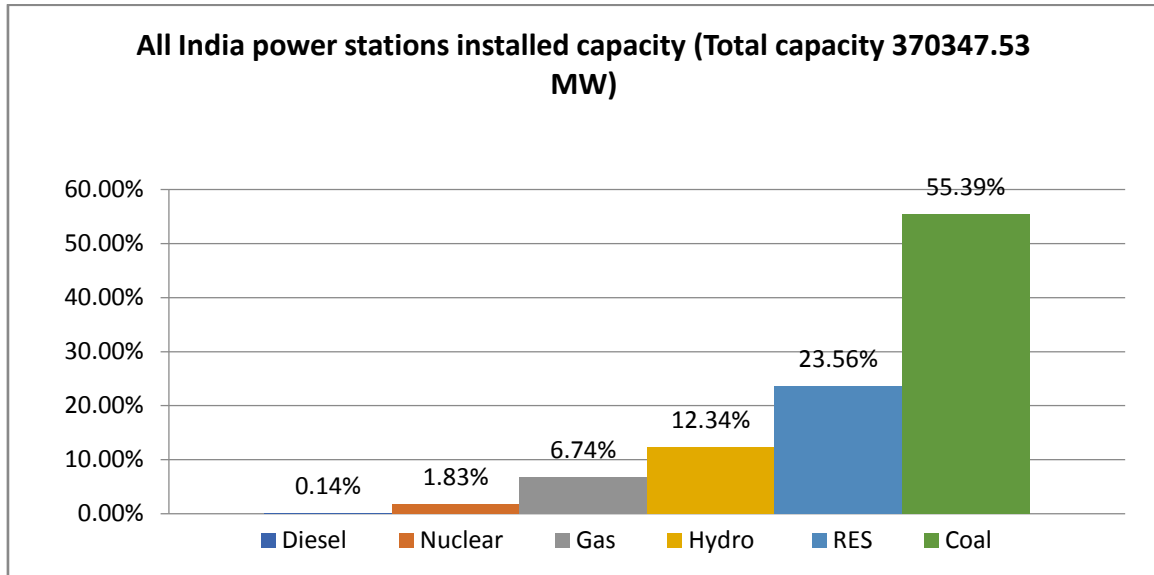
Solar capacity increased in the last 5.5 years from around 2.6GW to more than 34GW.

National Institute of Solar Energy has assessed the Country's solar potential of about 748 GW.

Solar power tariff reduced by more than 75% using plug & play model.

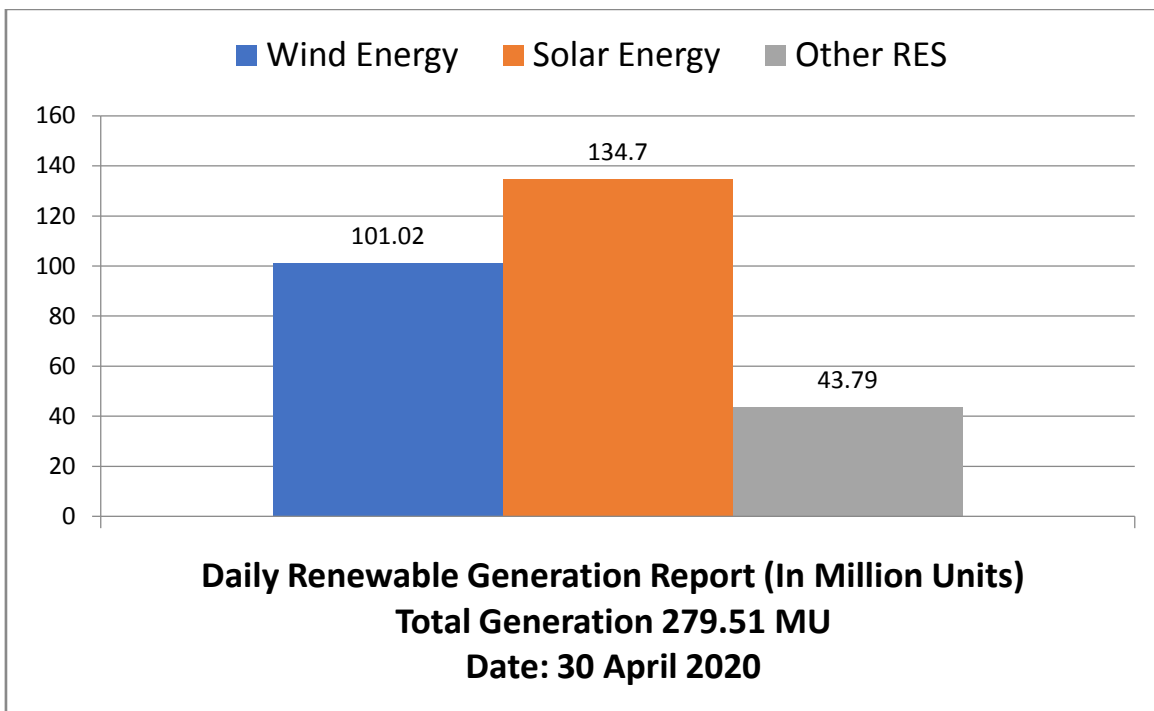
The total contribution of renewable energy source (RES) accounted for 23.56% of the total power capacity. This includes installed power capacity from solar power (9.8%), wind power

(10.1%), bio-power (2.3%), small hydro projects (1.3%), and waste-to-energy projects (0.06%). India's energy system is largely based on the use of coal for power generation.



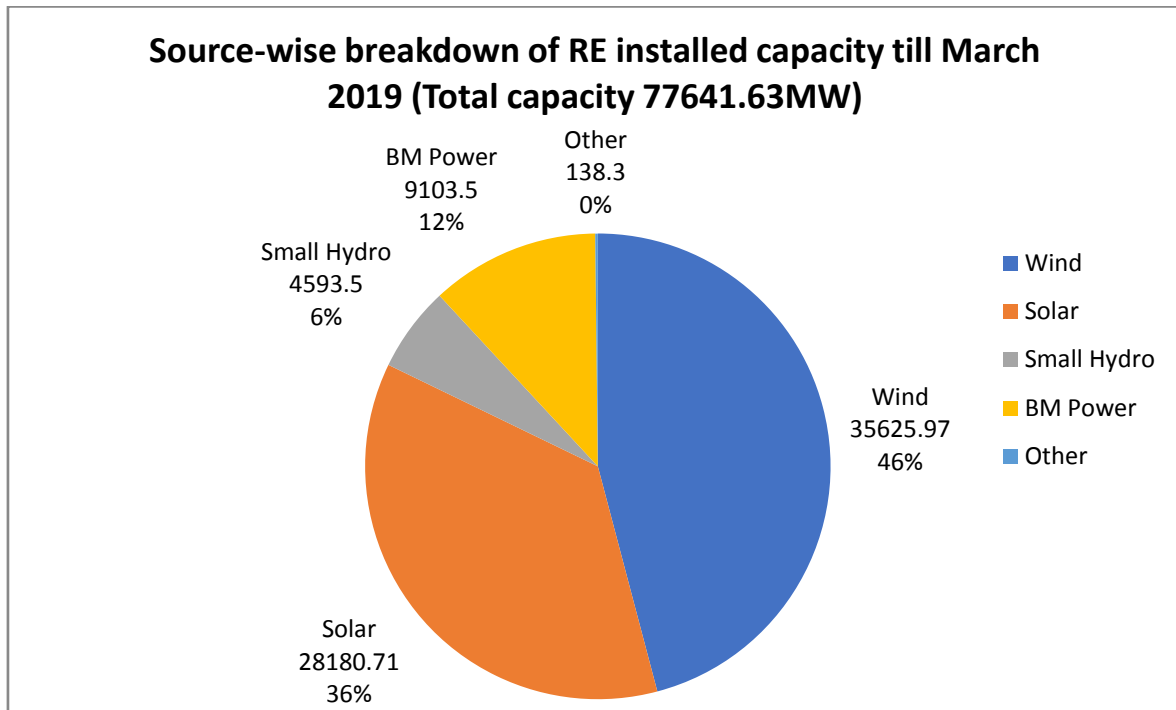
The Indian Government has made impressive progress in increasing citizens' access to electricity and clean cooking. It has also successfully implemented a range of energy market

reforms and carried out a huge amount of renewable electricity deployment, notably in solar energy.

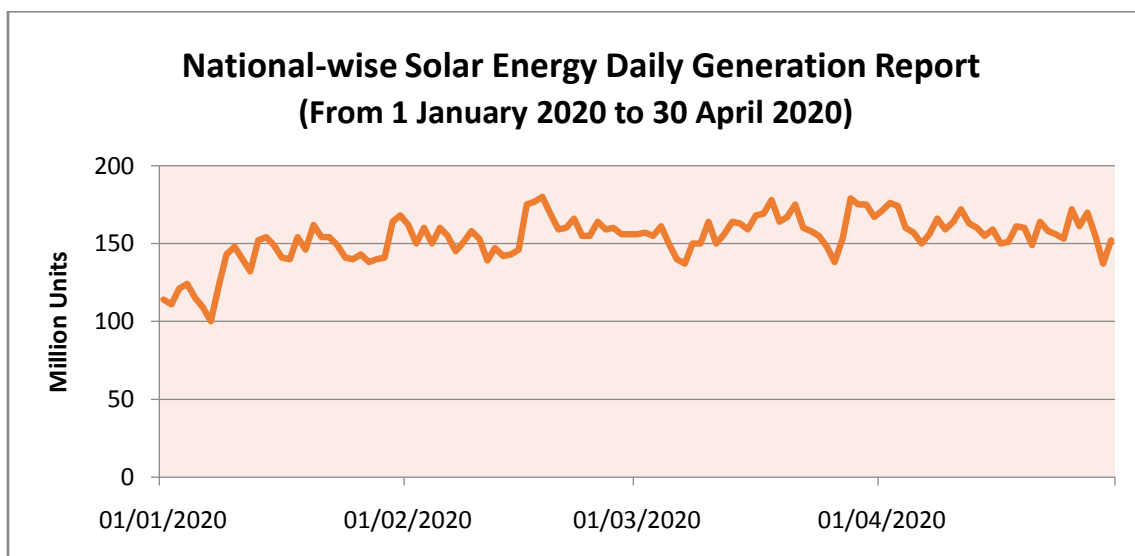


The Indian Power Sector is increasing number of Distributed Generation Resources, integration of renewable energy projects like wind and solar with the national grid due to shift of generation mix from conventional sources based on fossil fuel to renewable resource based projects

concerning the environmental aspects, replacement of conventional fuel. The graphs indicating source-wise generation from RE sources and source wise breakup of RE installed Capacity for the years 2018-19 are given below:



The National-wise solar energy daily generation for the period 1 January 2020 to 30 April 2020 indicates the following graph:



Needs to build Solar Manufacturing Capacity

National Solar Mission (NSM) was launched on 2010. The Mission’s objective is to establish India as a global leader in solar energy. The Mission targets installing 100 GW grid-connected solar power plants by the year 2022.

To achieve the target, the Government have launched various schemes for encouraging the generation of solar power such as Grid Connected Solar Rooftop Scheme, Solar Park Scheme, VGF Schemes, Defence Scheme, Canal bank & Canal top Scheme, Bundling Scheme, and CPSU Scheme etc.

Solar power is the strategic need for the country because solar power have potential to save USD 20 billion in fossil fuel imports annually by 2030 and domestic manufacturing have the potential to save USD 42 billion in equipment imports by 2030. Without manufacturing, India will have to import USD 42 bn. of solar equipment by the year 2030 corresponding to the target capacity of 100 GW. Solar manufacturing can have the potential to create direct employment equivalent to

50,000 in the next 5 years assuming local manufacturing captures 50% domestic market share and 10% global market share. In another case, it can create at least 125,000 indirect jobs in the supply chain.

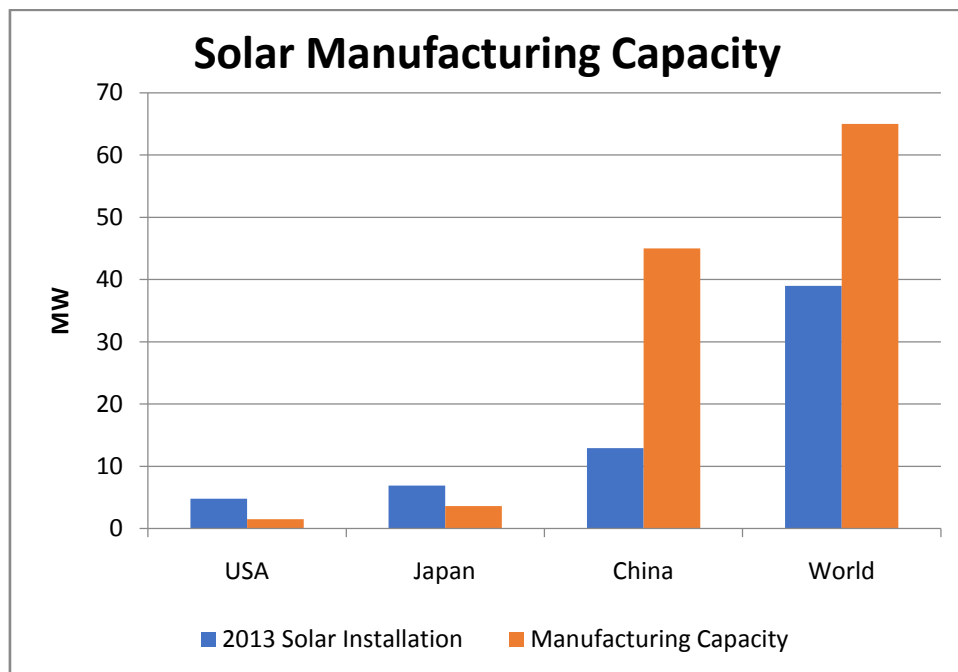
Indian Solar Manufacturing Industry

Present Installed Solar PV Manufacturing Capacities in India

- Solar PV Cells Capacity: Around 3 GW/year;
- Solar PV Modules capacity: Around 10 GW/year;
- Poly-silicon/Wafer/Ingots: No manufacturing in India

India’s solar Manufacturing Policy recognizes as an industry with ‘strategic importance’. However, there is some of the unintended effect:

- 40% solar cell manufacturers have shut down with industry because of utilization at only 21%
- The industry has suffered a sudden and sharp price declines because of global over-supply.



Indian manufacturing costs are suffering higher because of three major reasons:

- Lack of scale -factory sizes are one-fifth that of a typical Asian factory.
- Insufficient government support -Other countries have provided massive loans, subsidized, easy access to land and technology support utility services tax holidays.

- Underdeveloped supply chain –Indian manufacturers do not have access to domestic raw material supplies of poly-silicon and wafers.

II. GOVERNMENT SUBSIDIES

The Indian Ministry of New and Renewable Energy (MNRE) has now introduced various Central Financial Assistance (CFA)

schemes that promote solar energy in India to achieve its ambitious target of 100 GW. The support is aimed to provide subsidies to enterprises that are contributing to growth.

Scheme: Solar Parks and Ultra Mega Solar Power Projects

- CFA totaling INR 2 M/MW, or 30% of a project's cost, including grid-connectivity costs, is available.
- An additional INR 2.5 M per plant is available for the preparation of Detailed Project Reports (DPRs) and conducting surveys, etc.

Scheme: 300 MW of solar PV for defense establishments and paramilitary forces

- Financing is made available through Viability Gap Funding (VGF), which is provided as a capital subsidy. Successful bidders are selected based on the lowest bids for these funds.
- Considering technology upgrades and economies of scale, the upper limit of VGF was revised on February 2017, to INR 11 M/MW for all projects irrespective of size.

Scheme: Installing grid-connected solar PV power projects under Phase-II, with VGF support via SECI

- Batch-I (750 MW) – VGF is limited to 30% of a project's cost or INR 25 M/MW
- Batch-III (2000 MW) – The upper limit for VGF is kept at INR 10 M/MW for the open category and INR 13.1 M/MW for projects in the DCR category
- Batch-IV (5000 MW) – The upper limit for VGF is kept at INR 10 M/MW for the open category and INR 12.5 M/MW for projects in the DCR category
- Batch-V (1000 MW) – for Central Public-Sector Undertakings

Schemes for grid-connected Rooftop

- CFA is 30% of the benchmark cost for general and 70% CFA for the residential, social and institutional sectors. No subsidy for the commercial & industrial sector.

Schemes for development of grid-connected PV plants on canal banks and canal tops

- Financial support of INR 30 M/MW or 30% of the project cost, for canal top projects and INR 15 M/MW or 30% of the project cost, for canal bank projects. Total CFA of up to INR 2.25 billion for 100 MW to be disbursed over a

period of a maximum of two years, with 1% service charge to SECI

Off-Grid schemes: PV lighting systems and power plants, solar pumps

A. Lighting systems

- Home lights/lanterns/streetlights with lead acid batteries: Benchmark Cost = INR 340/W; CFA = INR 102/W
- Street lights with lithium ferro phosphate batteries: Benchmark Cost = INR 475/W; CFA = INR 142.5/W

B. Power packs with a battery bank

- Up to 300 W: Benchmark Cost = 200/W; CFA = INR 60/W
- 300 W to 1 kW: Benchmark Cost = INR 135/W; CFA = INR 40.5/W

C. Solar Power plants with a battery bank

- 2 VAh/W and capacity up to 10 kW: Benchmark Cost = INR 135/W; CFA = INR 40.5/W

D. Solar Pumps from 3 HP up to 5 HP

- Up to 3 HP (DC): Benchmark Cost = INR 120,000/HP; CFA = INR 30,000/HP
- 3HP to 5 HP (DC): Benchmark Cost = INR 95,000/HP; CFA = INR 19,000/HP
- Up to 3 HP (AC): Benchmark Cost = INR 100,000/HP; CFA = INR 25,000/HP
- 3HP to 5 HP (AC): Benchmark Cost = INR 85,000/HP; CFA = INR 17,000/HP

1. Research Methodology

For research methodology we followed below steps:

Requirements:

1. Time Constraints

This research was to be conducted in a limited time frame with a small group of distributors and manufacturers. Research was also to be done with the customer base to get a solid base for the research.

2. Budget

We were not given any budget for this research as it was a part of our MBA course for Business Reach Methodology elective.

3. Availability of data

To study about solar industry market and the consumer's perception, it was important to reach out to the right set of consumers. No data was

available that can could help with the research. To identify the existing market conditions of solar products, we reached out to many distributors and manufacturers for better understanding. Most of the distributors or manufacturers did not respond to this research.

We conducted five in-depth interviews with Manufacturers to get an in-depth understanding of this whole industry and its existing market.

4. In-depth Interviews

Our team conducted one IDI with a Solar products manufacturer, all interviews went up to for 40 minutes to 1 hour of duration.

This data was sufficient to understand the market condition of the solar industry in India. That interview also helped us to understand the type of market or organizations where solar products are in demand, and also about the cost and channels associated with the products and market.

5. Distributor's Surveys

Based on our IDI's with one manufacturer, we prepared a set of questionnaires to get details of the solar products from distributors. Our team searched the names of the distributors from Delhi-NCR and called them and sent them to fill the survey form.

Our target was to reach out to at least 50 distributors but to time and budget constraints, we were able to get 27 survey results.

This helped to get some idea about the distributors' perception and the average range of price for the products we were targeting for research.

6. Consumer's Surveys

Our target was to reach out to at least 700 consumers but because of time and budget constraints and due to the Covid-19 outbreak we had few restrictions and time constraints and we managed to get 208 responses. We prepared a google form of questionnaires for consumers asking about their choices and preferences about using solar products.

2. Questionnaires

(i) In-depth Interview Questionnaires for Manufacturers

1. Name
2. Company Neo electricals
3. Do you supply in NCR.
4. Yes we do and even other close by areas.
5. How is the solar business growing?
6. It's growing as they are cheaper in the long run and the government provides subsidies

7. What products do you sell?
8. We sell solar heaters, solar panel of 10KW and above, solar lanterns, solar lights, solar home systems.
9. Who are your major clients?
10. We sell to households, restaurants, school residential complexes.
11. What products do schools take?
12. They take the solar lights, panels of more than 10KW.
13. Which panels are sold more, mono or polycrystalline?
14. In north India polycrystalline is sold more because the temperature is high here and poly can withstand it but mono breaks at temp above 45, mono is more suitable for hill stations.
15. Do household purchase these panels?
16. People who own villas and farmhouses purchase these big panels, solar heaters, and solar lights as well. Smaller households buy the heaters and home systems. We also get orders from NGO's for solar lanterns.
17. Do you sell products of one particular company or many?
18. We keep the products of many companies but we supply whatever the customers want. sometimes they want panels of Adani but the battery of Su-Kam and we make that and provide it to them. We make what every combination the customers want.
19. What's your average margin in the solar products?
20. I cannot say the margin but it more in the Chinese products than our Indian products.
21. Do Chinese products have a big market?
22. Yes, china had captured a good solar market but I think after COVID-19 the market will go down and with the new policy we may see a decrease in the cost of India products.

(ii) Distributor's Questionnaires

Solar products survey questionnaire in Ghaziabad

As a part of Business Research Method-Project, mandatory for our PGDM Ex Term II, we are conducting a survey on our project topic: "A study of solar products market of Ghaziabad, Uttar Pradesh" We humbly request you all to spare 5 minutes of your time to complete the survey and give your valuable input.

This form contains 3 sections,
I- General information
II- Solar household/B2B/farm products
III- Solar panels

*Required

Name of Business

Occupier / Owner's

City

Mark only one oval.

Ghaziabad

Delhi-NCR(ExceptGhaziabad)

Others

If Others, please specify

Locality of Business/Shop

Sub Locality If any

Do you sell outside NCR also?

Mark only one oval.

Yes

No

If yes, then please specify the area

II- Solar household products

Solar water heater

1.1-Which of following type of solar water heater is sold most? Mark only one oval.

ETC

FPC

1.2-Approximated sale per month in numbers

1.3- Name of brand sold most

1.4-Market price of product per litre

1.5-Distributor margin of product (in percent)

1.6-In which market the product is sold most Mark only one oval.

B2B(Business to Business) B2C(Business to Customer)

Solar Street Light

Solar Street Light | |

2.1-Which rating is sold most?? (forexample,12-Watt,18Watt)

2.2- Approximated sale per month in numbers *

2.3-Name of brand sold most

2.4- Market price of product

2.5-Distributor margin of product (in percent)

2.6-In which market the product is sold most? Mark only one oval.

B2B(Business to Business) B2C(Business to Customer)

1- Solarstuds||

3.1-Approximated sale permonth in numbers*

3.2-Name of brand sold most

3.3-Market price of product

3.4-Distributor margin of product (inpercent)

3.5-Inwhichmarkettheproductissoldmost. *Mark only one oval.*

B2B(Business to Business)

B2C(Business to Customer)

2- Solarhomelightingsystem||

4.1-Which rating is sold most?? (for example 30Watt, 40 Watt etc)

4.2-Approximated sale permonth in numbers

4.3-Name of brand sold most

4.4-Distributor margin of product (inpercent)

4.5-In which market the product is sold most? (*) Mark only one oval.

B2B(Business to Business)

B2C(Business to Customer)

3- Solar Lightning System

5.1-Which rating is sold most?? (for example 12 Watt, 18 Watt)

5.2- Approximated sale per month in numbers *

5.3-Name of brand sold most

5.4-Market price of product

5.5-Distributor margin of product (inpercent)

5.6-In which market the product is sold most? Mark only one oval.

B2B(Business to Business)

B2C(Business to Customer)

III - Solar Panel ||

Solarpanelarecommonforboth

1. On Grid

2. Off Grid Solar plants

Hence,wearefocusingonmarketsize,brandandpriceofsolarpanelonly

4- Solar Panel up to 10KW

Which type of solar panels are sold most in this segment? Mark only one oval.

Monocry stalline

Polycry stalline

6.1-Approximated sale permonth in KILOWATTS*

6.2-Name of brand sold most

6.3-Market price of product per KILOWATT

6.4-Distributor margin of product (inpercent)

6.5-In which market the product is sold most?

Tick all that apply.

B2B(Business to Business)

B2C(Business to Customer)

7- Solar panel more than 10 KW ||

Which type of solar panel are sold most in this segment?Mark only one oval.

Monocry stalline

Polycrystalline

7.1-Approximated sale permonth in KILOWATTS*

7.2-Name of brand sold most

7.3-Market price of product per KILOWATT

7.4-Distributor margin of product (in percent)

7.5-In which market the product is sold most?

Tick all that apply.

B2B(Business to Business)

B2C(Business to Customer)

Any other suggestion for us

Tick all that apply.

(iii) Customer's Questionnaires

Solar products survey questionnaire in Ghaziabad

As a part of our Business Research Method- Project at IMT, Ghaziabad, mandatory for our PGDMExTermII,weareconductingasurveyono

urprojecttopic:"Astudyofsolarproducts market of Ghaziabad, UttarPradesh"

We humbly request you all to spare 5 minutes of your time to complete the survey and give your valuable input.

*Required

Solar product survey questionnaire in Ghaziabad

1. Name

2. City

Mark only one oval.

- Ghaziabad
 Delhi-NCR (Except Ghaziabad)
 Others

3. If Others, please specify

4. Locality of residence

5. Sub Locality If any

6. Overall family income * *Mark only one oval.*

- 0 to ₹ 1,50,000
 ₹ 1,50,001 to ₹ 5,00,000
 ₹ 5,00,001 to ₹ 10,00,000
 ₹ 10,00,001 to ₹ 20,00,000
 ₹ 20,00,001 and more (₹ 20,00,001)

7. Are you a permanent resident of Ghaziabad / Delhi NCR? *Mark only one oval.*

- Yes
 No

8. If "NO", then please specify your permanent area of residence area

9. For what purpose would you like to use "Solar products"? *Tick all that apply.*

- For Residence || For Shop/ Business/ Factory || Other

10. Type of construction

Mark only one oval.

- Villa/ Plot Based Independent house (apartment)
 Shop/ Business/ Factory
 Other

11. Type of ownership*

Mark only one oval.

- OWN
 RENTED

12. Have you used any of these solar products?

(i) Solar water heater: It's used to heat water, by utilizing the solar energy

Mark only one oval.

- YES
 NO

(ii) Solar Street Light Huge lights, which provide light on roads

Mark only one oval.

- YES
 NO

(iii) Solar Blinkers: They are solar blinkers which show the path on roads in the night

Mark only one oval.

- YES
 NO

(iv) Solar studs: These are solar studs which show the path on roads in the night-time

Mark only one oval.

- YES
 NO

(v) Solar home lighting system: -Complete home lighting system run by solar power

Mark only one oval.

YES

NO

(vi) Solar power system upto 10 KW Solar panels are devices that converts unlight into electricity]

Mark only one oval.

YES

NO

(vii) Solar power system more than 10 KW -Solar panels are devices that converts unlight into electricity]

Mark only one oval.

YES

NO

13. Are you further interested to purchase any of these solar products?

(i) Solar water heater It's used to heat water, by utilizing the solar energy

Mark only one oval.

YES

NO

(ii) Solar Street Light: Huge lights, which provide light

Mark only one oval.

YES

NO

(iii) Solar Blinkers The yare solar blinkers which show the path onroads in the night-time

Mark only one oval.

YES

NO

(iv) Solar studs These are solar studs which show the path on roads IN THE night-time*

Mark only one oval.

YES

NO

(v) Solar home lighting system Complete home lighting system run by solar power

Mark only one oval.

YES

NO

(vi) Solar power system upto 10 KW:- Solar panels are devices that converts unlight into electricity]

Mark only one oval

YES

NO

(vii) Solar power system more than 10 KW Solar panels are devices that converts unlight into electricity]

Mark only one oval.

YES

NO

(viii) Are you aware of government subsidies on solar products? *

Mark only one oval.

YES

NO

14. If you like to know more about government subsidies on solar energy products, please provide

your email ID

15. Any other comments/ Suggestions

16. Have you used any of these solar products?

(i) Solar water heater :- It's used to heat water, by utilizing the solar energy

Mark only one oval.

YES

NO

(ii) Solar Street Light Huge lights, which provide light on roads factories

Mark only one oval.

YES

NO

(iii) Solar Blinkers:-They are solar blinkers which show the path on roads in the night-time

Mark only one oval.

YES

NO

(iv) Solar studs These are solar studs which show the path on roads in the night-time

Mark only one oval.

YES

NO

(v) Solar home lighting system Complete home lighting system run by solar power *

Mark only one oval.

YES

NO

- (ix) Solar power system upto 10 KW :- Solar panels are devices that converts unlight into electricity]

Mark only one oval.

- YES
 NO

- (x) Solar power system more than 10 KW –Solar panels are devices that converts unlight into electricity|]

Mark only one oval.

- YES
 NO

17. Are you further interested to purchase any of these solar products?

- (i) Solar water heater:- It's used to heat water, by utilizing the solar energy

Mark only one oval.

- YES
 NO

- (ii) Solar Street Light ():- Huge lights, which provide light on roads

Mark only one oval.

- YES
 NO

- (iii) Solar Blinkers They are solar blinkers which show the path on roads in the night-time

Mark only one oval.

- YES
 NO

(iv) Solar studs These are solar studs which show the path on roads in the night - time
Mark only one oval.

YES

NO

(v) Solar home lighting system Complete home lighting system run by solar power
Mark only one oval.

YES

NO

(vi) Solar power system upto 10 KW :- Solar panels are devices that converts unlight into electricity]

Mark only one oval.

YES

NO

(vii) Solar power system more than 10 KW Solar panels are devices that converts unlight into electricity

Mark only one oval.

YES

NO

(viii) Are you aware of government subsidies on solar products? *
Mark only one oval.

YES

NO

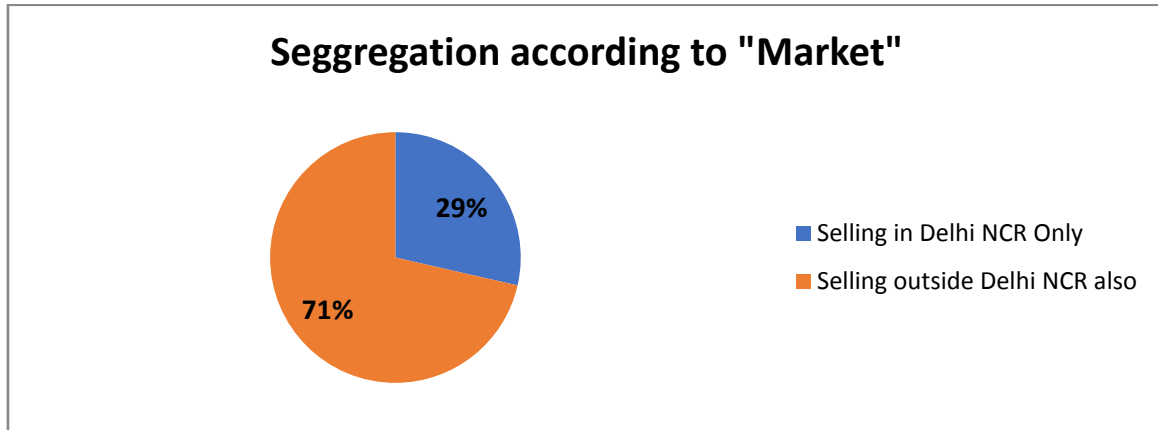
(ix) If you like to know more about government subsidies on solar energy products, pleaseprovideyouremaillD

18. Any other comments/ Suggestions

III. DATA ANALYSIS

(i) Distributors's data analysis
Segregation on basis of market

We found 71% distributors who are also selling their products not only in Ghaziabad market but also outside Delhi-NCR too. 29% of respondents were selling their products in Delhi NCR market only.

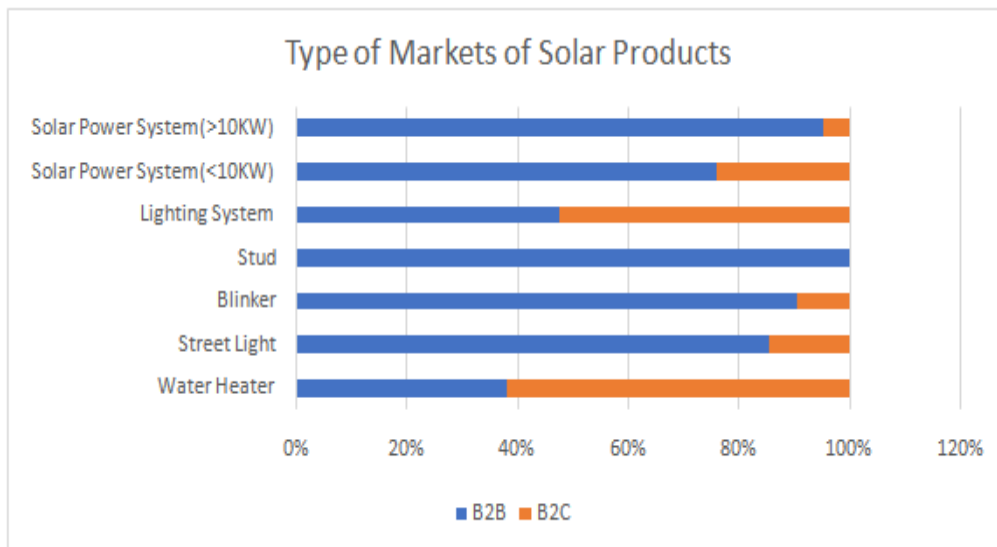


Per month average sale of solar products

The average sale of Solar products per month from the data collected from Distributors was found to be as below. Solar panels, Solar stud, and street lights are the one sold most. Water heater, home lightening system, solar blinkers are not sold as much as compared to other 3 products.

Type of markets for solar products

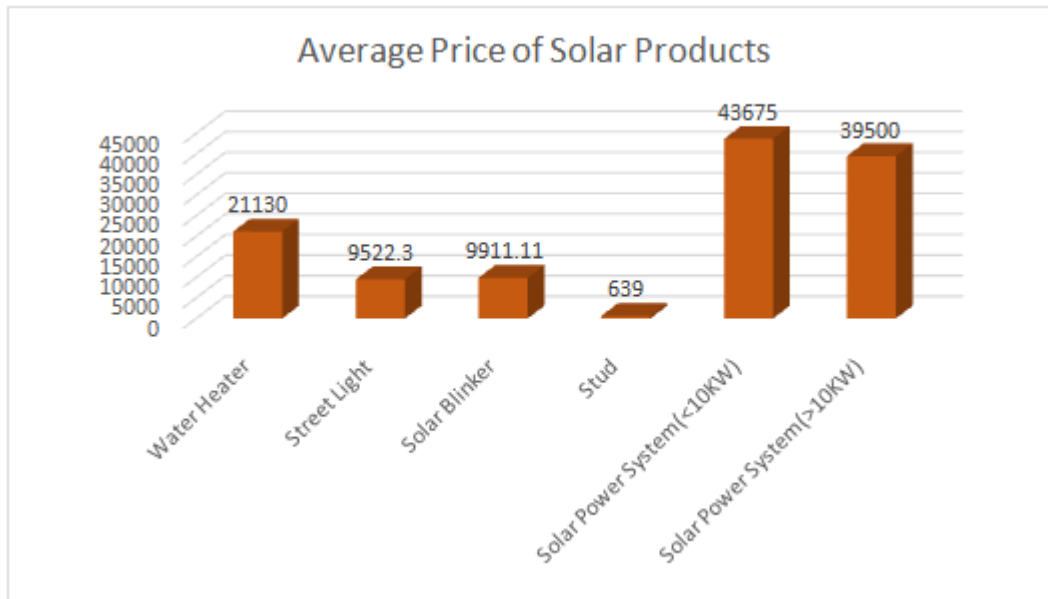
The type of market for solar products are mainly focused on B2B for most of the products. Water heater, Lighting system are majorly sold in the B2C market while Solar Panel (>10KW as well as <10KW), solar stud, blinkers, and street light are sold most in B2B markets.



Average price of solar products in the market

Data collected from Distributors shows the average price of solar products in the market. Water heater average price goes to Rs. 21130, street light

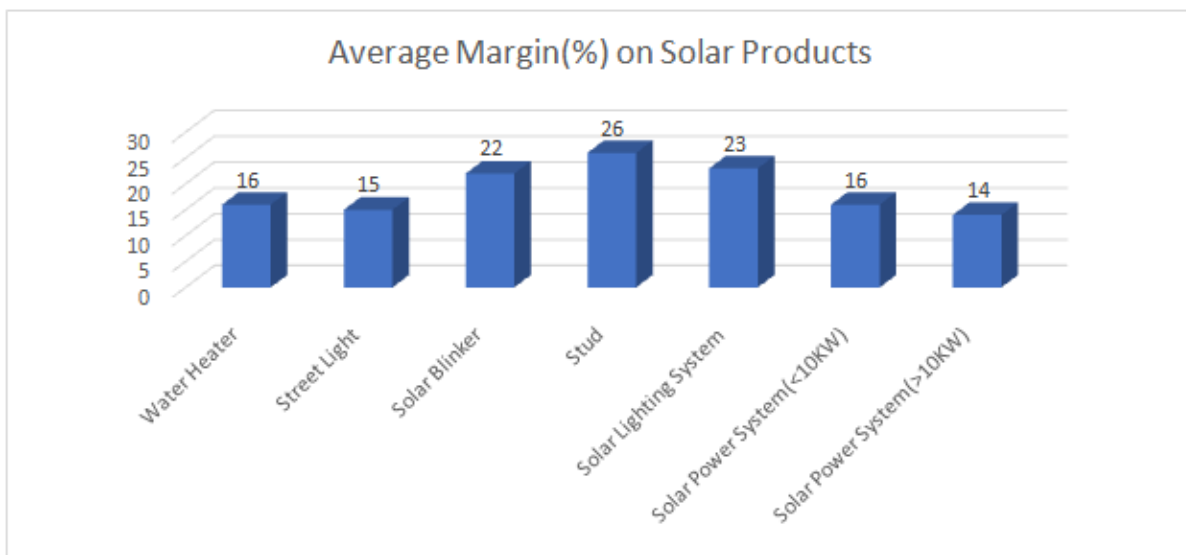
to Rs. 9522.3, Solar Blinker average prices go to Rs. 9911 while for stud is Rs. 639 for each piece. Solar power system (<10KW) average price rangelandts to Rs. 43675 whereas power system (>10KW) average price falls to Rs. 39500.



Average margin % obtained by Distributors on Solar products

The average margin (percent) obtained on these solar products found from data collected is

highest for stud followed by solar lighting system and blinkers. Water heater margin goes to 16%, street light to 15%, solar power system to 14% to 16%.



Analysis on solar products

1. Survey responses clearly states that the sales of “Polycrystalline solar panels” is significantly higher than “Mono crystalline type solar panels”.
2. Data indicated 62% sales of Polycrystalline while 38% of Monocrystalline type of Solar Panels.

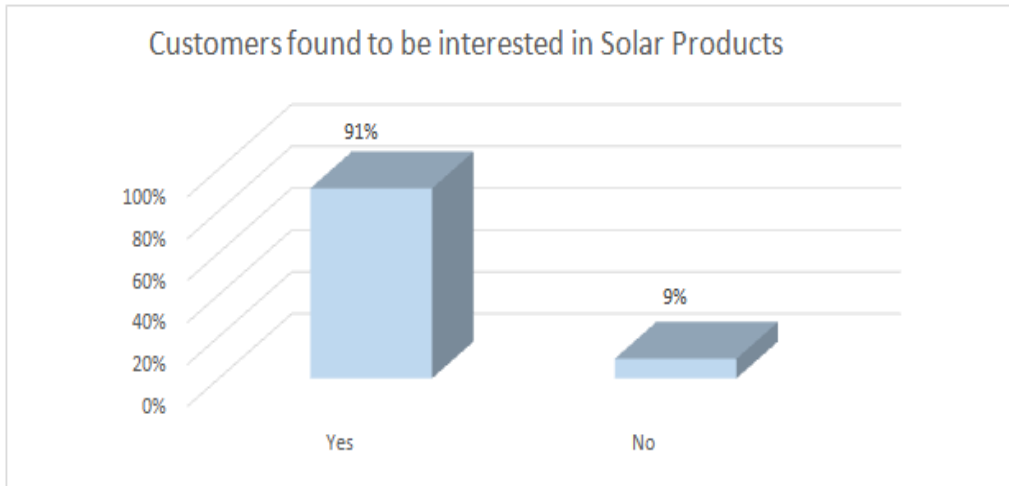
3. Survey results shows that ETC type solar water heaters are sold most, i.e. 57% of overall survey responses. Average price (Per litre) is found to be INR 183.80.
4. Solar Street light of 12 Watts are sold most with 62% distributors opted for it.

(ii) Customer Data Analysis

As per the data collected from customers, we found that 4 records were not appropriate hence eliminated.

Willingness among costumers about Solar products

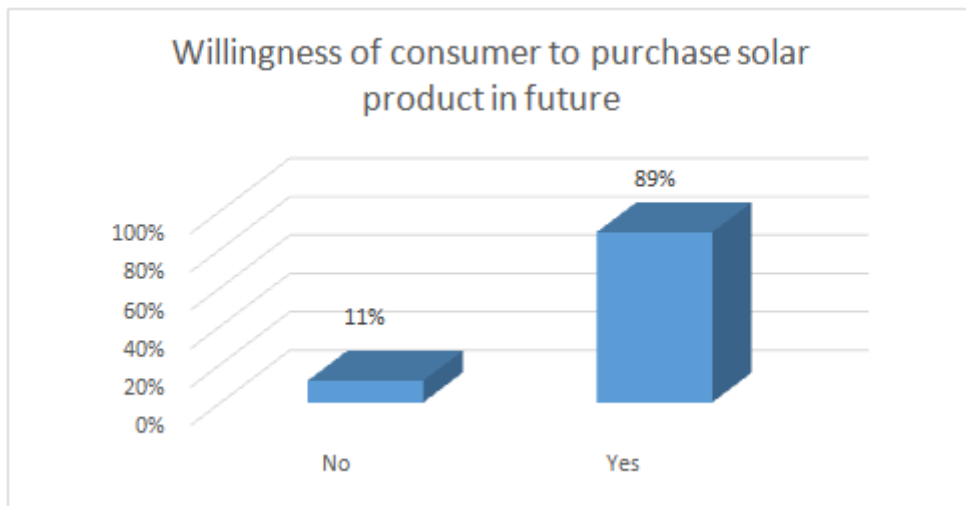
Out of the total customer base, 91% of consumers were found to interest in at least one or more than one solar product where 9% consumer did not show any interest in purchasing even a single solar product.



Consumer who never used any solar product in their life

From the data, it is found that 89% of consumers have never used any solar product in

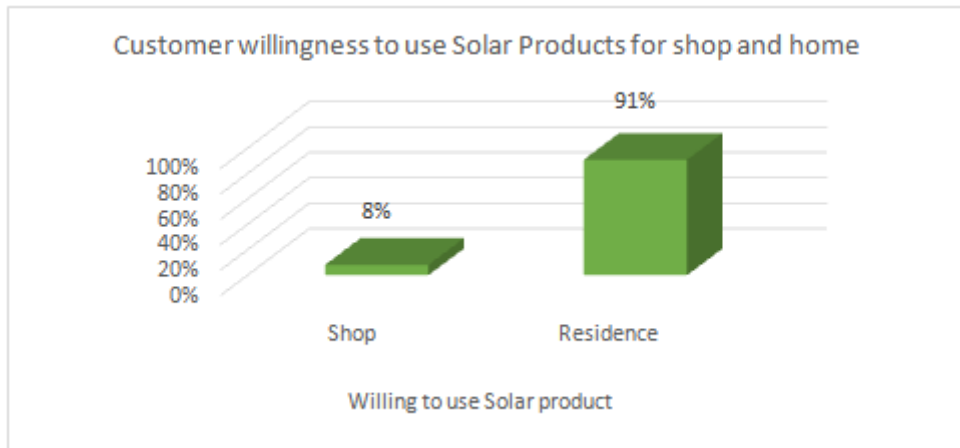
their life but are willing to use it in the future while 11% of consumers have never used any product in the past neither shown any willingness to purchase any solar product.



Consumer willing to purchase solar products for home or business

Form the data collected from consumers who shown interest in atleast one solar product, out

of that 91% of customers shown interest to use at least one solar product in their home, while 9% of consumers shown interest in using solar products at their businesses/shops.

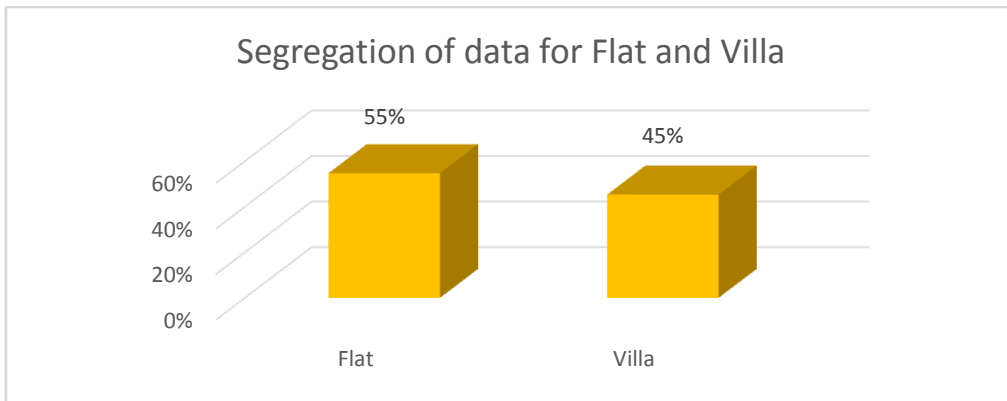


Customers’ residential set-up and willingness to use solar products

The data obtained shows that most of the customers who shown interest in solar products are staying in flats than villa/independent houses. However, it is difficult to install the solar product

to the flat/apartment system, still, consumers have shown great interest in using these products.

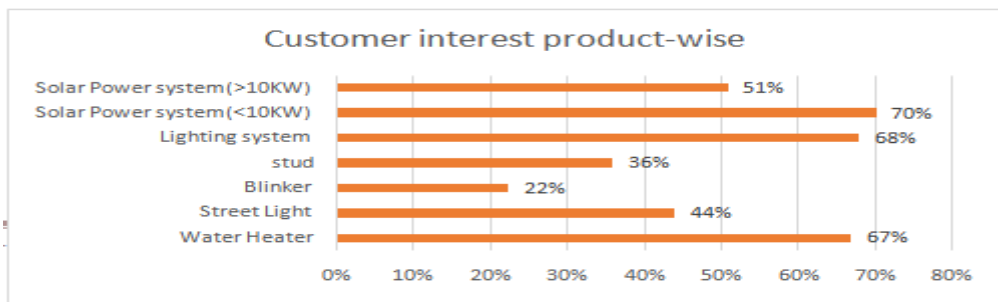
Customers who want to invest in solar products, 55% of them reside in flat or apartments and 45% are owning a villa or independent house. This clearly shows a willingness to use solar products among consumers for their homes.



Product-wise willingness among consumers

The below chart indicates the interest shown by the consumer as per the product. Customers who shown interest have found Solar Power systems, home lighting systems, and waterheater to be most beneficial for home as

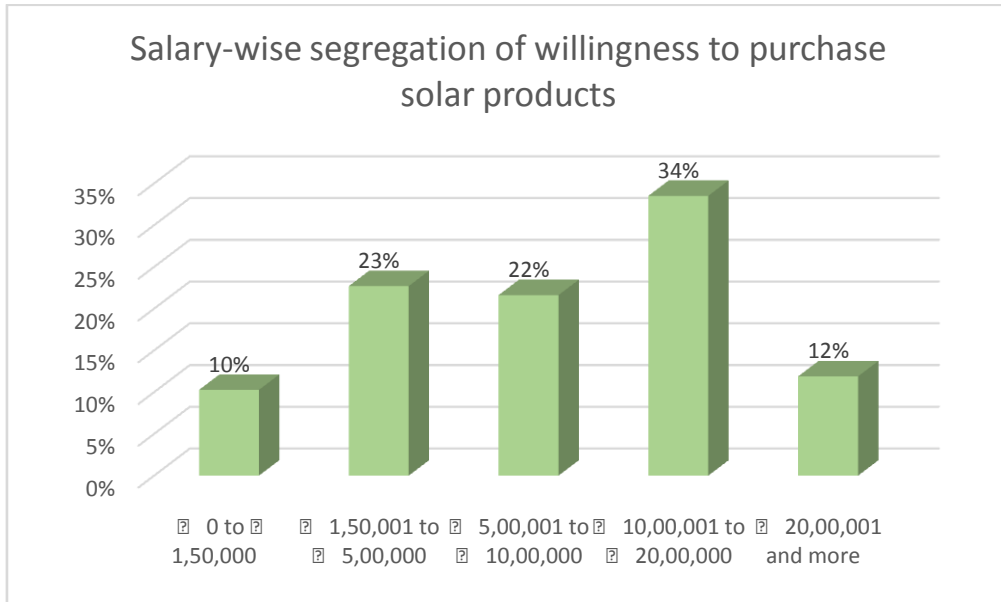
compared street light, stud, and blinker. However, stud, blinker, and street light are mainly used by infrastructure/construction businesses, consumers have shown interest in these too, which can be avoided.



Salary-wise segregation of Consumer's willingness to invest into solar products

From the research, it is found that all income groups have shown interest in the solar products. Salary group of 10,00,000 to 20,00,000

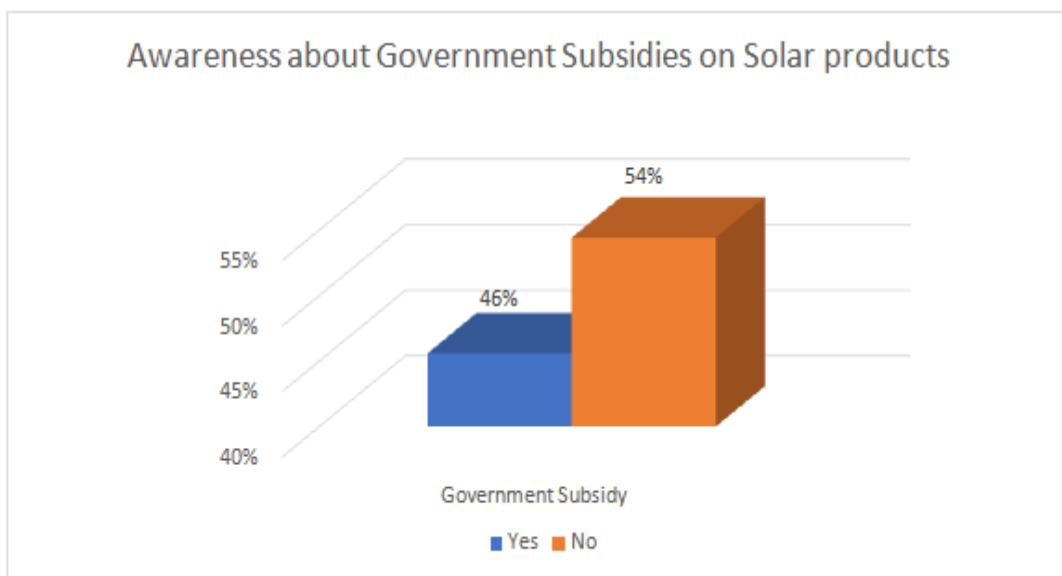
have shown greater than other groups. Since the consumer records were not that large, so reaching any conclusion is not right and a large base should be considered for better understanding.



Awareness among consumers about government subsidies on Solar products

From the total consumer base and the data collected, only 46% are aware of subsidies

provided by the government on solar products, rest 54% of consumers had no prior knowledge about this.



5. Market Analysis by using Marketing concepts
 (i) Porter's Five Forces
 Porter's five forces model is an analysis tool that uses five industry forces to determine the intensity

of competition in an industry and its profitability level.
 Bargaining Power of Buyer – It is Higher as the Cost of switching to a non-renewable energy source

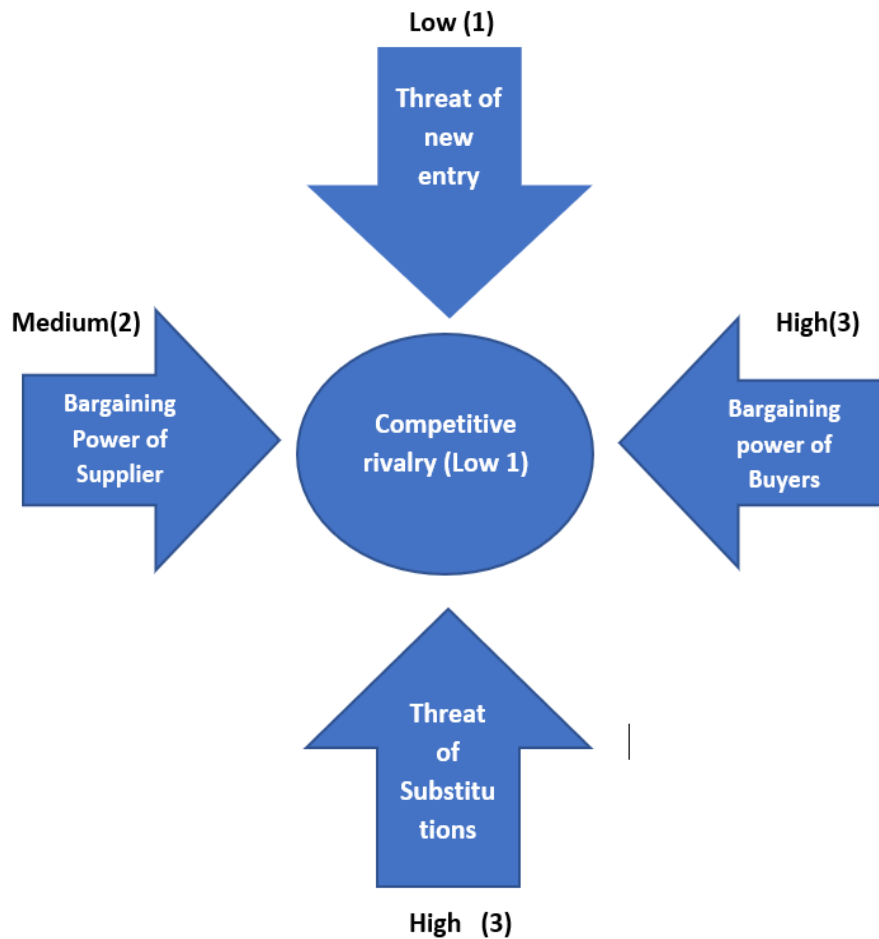
is low, and customers will easily switch to a cheaper source of energy.

Threat of substitution – Threat is higher as long as other non-renewable sources of energy remain cost-effective.

Bargaining Power of suppliers – It is Medium as it is a relatively niche sector and the suppliers are therefore limited, so they enjoy some bargaining power.

The threat of new entry – It is Low as the cost of generating renewable energy is very high; for example the cost of setting up a windmill or a solar panel etc; which makes the entry of new players highly difficult.

Competitive Rivalry – Relatively new sector and players are still establishing themselves in the industry; the sector has still not reached the stage of the competition. Therefore competitive rivalry is quite Low.



(ii) **STP – Segmentation, Targeting & Positioning**
 The steps in STP is commonly referred to as a process, with segmentation being conducted first, then the selection of one or more target markets and then finally the implementation of positioning.

Segmentation

- Geographic – Focus on Ghaziabad & NCR
- Demographic – Focused on local resident, and segmented based on income
- Behavioral – Benefits of Solar products, return over investment

Targeting

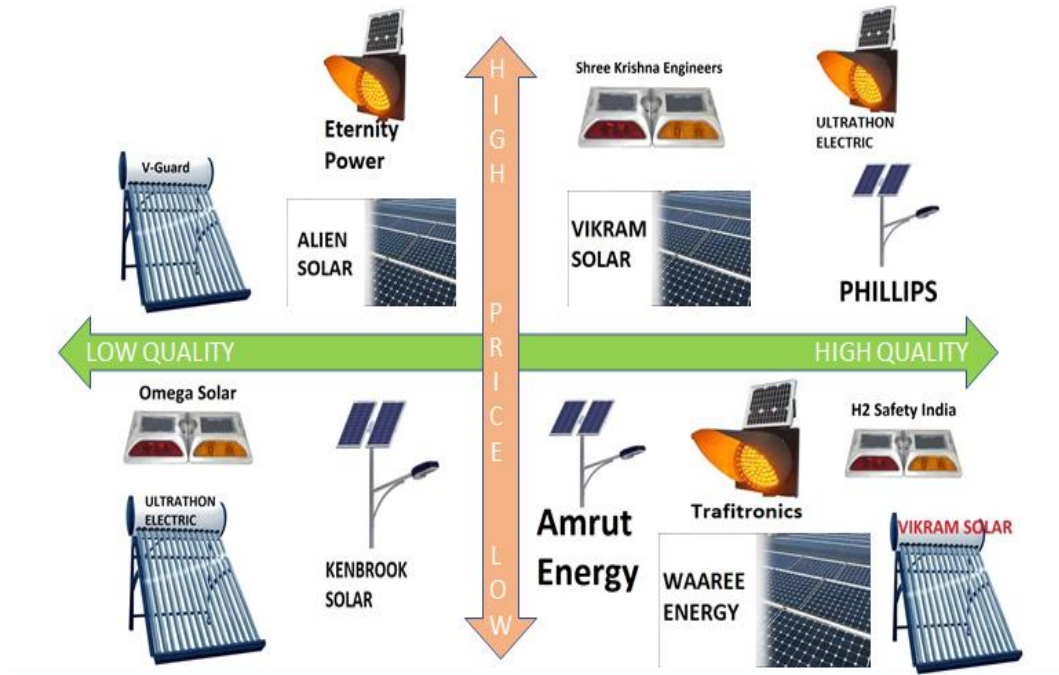
- Industrial Customers – Ghaziabad & NCR are industrial rich zones.
- Government – Govt. agencies and their tenders are a vital source of market capture.
- Domestic – A wide range of products for domestic consumers.
- Farmers – Targeting this consumer base will be an added advantage.

Positioning

We found the major companies and their products and evaluated in which quadrant we can introduce

our products like we can launch a water heater in a high quality and high price range and panels in low

price and low-quality range.



(iii) 4P's of Marketing

The four Ps of marketing are the key factors that are involved in the marketing of a good or service. They are the product, price, place, and promotion.

Product	Price	Place	Promotion
Solar Water Heater	Solar Water Heater – 8000 to 60000	Offline – Distributors and Manufacturers	Local TV
Solar Home Power System	Solar Home Power System – 10,00,00 to 30,00,000	Online – Companies own websites	Newspaper
Motor Pumps	Motor Pumps – 2,00,000 to 7,00,000	Online retailers – Amazon, Shopclues, Flipkart	Radio Commercial
Solar Blinker	Solar Blinker – 2500 to 8000		Local Marketing
Solar Light/Lanterns	Solar Light/Lanterns – 500 to 5000		Co-marketing with Strategic Partners
Solar Street Light	Solar Street Light – 900 to 8000		
Solar Studs	Solar Studs – 600 to 2500		

(iv) PESTEL

PESTEL analysis or PESTLE analysis (formerly known as PEST analysis) is a framework or tool used to analyze and monitor the macro-environmental factors that may have a profound impact on an organization's performance.

P Political	E Economic	S Social	T Technology	E Environmental	L Legal
India targets 100GW power generation by 2022 by solar energy under the National Solar Mission.	The price of the Solar Thermal project was 10.24 to 12.24 for PV projects.	Due to the various publicity campaigns on saving energy and recycle waste making the public a lot more conscious about their behaviour towards the environment	With improvements in technology and aggressive research, development in thermal and electrical storage system has happened.	Growing environmental awareness is a huge support to solar energy	Solar thermal, guidelines mandated 30% project to have domestic content
The government provides huge subsidies on solar products 30% of the installation cost.	The budget encouraged private solar companies by reducing customs duty on solar panels by 5% and exempting excise duty on solar voltaic cells.		Nanotechnology and hybrid solar lighting systems have come up.	With fossil fuels coming to an end, the world needs to find a clean and renewable source of electricity	Zero import duty on capital equipment, raw materials, and excise duty exemption.
Huge support from all policies.				Climate change from the burning of fossil fuels, deforestation and impact of global warming on our biodiversity stability of our delicate ecosystem have led increased environment concerns	The products that avail subsidy must come under the prescribed list of Ministry of renewable energy

IV. FINAL ANALYSIS

After the research done on households and distributors where we looked out for more than 200 households and 27 distributors in the city of Ghaziabad and NCR. We conducted an online survey to get the grip of the market of solar products and what is the perception of people about them. It turns out that around 91% respondents shown interest in using solar products. 70% customers shown willingness to use solar power system (solar panels). More than 50% of customer has shown interest to use one or more solar products. More than 65% customers are keen to use solar geysers home lighting system and solar power system.

Solar power systems of 10KW were less known among the public. Among the business owner, the solar water heater was the most popular.

The data we collected from the households showed a huge interest in people ready to try out the solar products, with the country moving towards nonrenewable sources of energy. Top four product demands in Household Consumers Solar Home Lighting System, Solar Power System (Upto 10KW) and (>10KW) and Solar Water Heater. Also one product was in demand for business and that was a solar water heater. It is found that Consumer has awareness and has shown interest in purchasing solar products for the home.

Looking at the capital required for land acquisition for setting a factory and labour and machinery cost, it will all turnaround to be an investment of 3-4 crores.

As business owner, we can go ahead with the plan of starting a manufacturing firm in

Ghaziabad, even though the competition is tough but with recent changes in policy and promotion of local products by the government. It can give a boost to manufacturers like us.

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